## STREET AND ELECTRIC RAILWAYS PART I

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PART I.<br>By Edward Dana Durand, Expert Special Agent.

## OHAPTER I.

## SCOPE AND METHOD OF INVESTIGATION.

Definition of street and electric railways.-The statistics in this report cover all electric railways in the United States irrespective of their length or: location and all street dailways irrespective of their motive power. In the corresponding investigation at the census of 1890 the term "street railways" was used as defining the scope of the statistics. At that time practically all railways, except ordinary steam railways, could be correctly designated by this term, as they were confined mainly to urban districts and operated almost exclusively upon the public streets and roads. During the past few years there has been an extraordinary development of electric railways outside the limits of cities and villages, and a considerable proportion of these suburban and interurban lines are located on private rights of way and not on the public thoroughfares. Hence the more inclusive term "street and electric railways" has been adopted, as covering more adequately the scope of the present investigation. It includes all railways doing a public business except the ordinary steam lines, which report to the Interstate Commerce Commission.

The statistics, in fact, cover the electric business of two steam railways which have either placed electric cars upon part of their tracks in connection with steam trains or have equipped certain tracks exclusively for electric traction. This practice has been most extensively adopted by the New York, New Haven and Hartford Railroad Company, The Pennsylvania Railroad also operates an electric system in New Jersey in connection with the West Jersey and Seashore Railroad. The recent movement of the New York Central and Hudson River Railroad and the Pennsylvania Railroad in determining upon the installation of electric traction for all passenger trains entering their New York termini, together with other electric installations now con-
templated by steam railroads, may mark the approach of a time when all steam lines will have introduced electric traction in connection with steam, or in place of it, and when it will not be possible to distinguish clearly between electric and steam railways. At present the distinction is still a fairly clear one, although the methods and service of some electric interurban lines already resemble those of the steam railways in many important respects.

The present report also includes eleven inclined planes operated separately from other railway systems. These, which for the most part use cable traction, are found in a few cities and towns where steep bluffs exist, notably in Pittsburg. They differ materially in their methods of operation from ordinary street railways. Their traffic is insignificant in comparison with the total for all street and electric railways.

Period covered.-The statistics, as a rule, cover the twelve months ending June 30, 1902, but in a considerable number of instances the reports are for the calendar year 1901 and in a few instances for the calendar jear 1902 or for other periods of twelve months. Companies in operation during only part of the year are included, but not companies whose lines were under construction and not yet in operation. The number of companies reporting for only part of the year was 57 out of a total of 817 operating companies. This number includes a few companies which were actually in operation during the entire year but for which, on account of changes in ownership, only partial reports could be securect. These part-time railways, however, are in mosti instances much less important than a large proportion of those in operation throughout the entire census year, so that the inclusion of them does not materially affect the relations between the totals for the varions items.

Completeness of returns. - In most instances the rail-
way companies replied in full to the inquiries in the schedule submitted by the Bureau of the Census. The officials of every company were visited by the special agents of the Burean, who undertook to secure uniformity in the returns. In some instances the agents found it necessary to make estimates, in conjunction with the officials of the railways, for certain data of which accurate records had not been kept. Most companies, bowever, and particularly the important ones, kept such records as to permit precise replies. In a few instances only have figures not reported by the companies been supplied by office estimates. Those cases in which information is wholly omitted or in which it has been supplied by estimates made by the Bureau are indicated in connection with the detailed presentation of the statistics.

In the appendix will be found a copy of the schedule employed in this investigation and of the instructions to special agents conducting the fieldwork.

Basis of classification of companies.-The results of strect railway operation differ so greatly under different conditions that it becomes necessary, in the presentation of summaries, to group the companies in such a way as to bring together, so far as possible, those which operate under similar conditions. For this purpose two classifications have been made. The first is based chiefly on the kind of power used, one of the groups being further subdivided according to certain operating conditions. The second classilication is based upon the distinction between urban and interurban railways, and the urban railways are further divided upon the basis of the population of the urban center served. These classified summaries are the more essential for the presentation of financial data regarding street railways, since these can not be published for individual companies, as is done with the items concerning physical equipment and traffic.

Classification according to power used.-The first method of classification divides the companies into the following groups and subgroups:

1. Electric surface railways.
a. Without commercial lighting.
b. With commercial lighting.
c. Part time.
2. Animal power railways.
3. Steam and electric elevated railways.
4. Cable railways, surface and inclined planes.
5. Steam surface railways.

The companies reporting for only part of the year all operate electric surface lines. The separation of these companies from the other electric surface lines makes it possible to observe more precisely the results of operation under normal conditions.

The separation of the first two subgroups of group 1 is based upon the obvious fact that the running of a lighting plant in connection with an electric railway business must materially affect the operating results for
the railway. Moreover, it is impossible in most of such cases to separate satisfactorily the capital invested or the current expenses for the lighting business from those for the street railway business, so that the returns must necessarily cover both branches. There is no sharp line of demarcation between subgroups $a$ and $b$, a large proportion of electric railway companies receiving some income from the sale of light and power. The aim has been to include under subgroup 18 only companies which operate distinctly commercial light or power plants. Most of these companies presented to the Bureau of the Census supplementary schedules regarding the equipment and operations of these auxiliary plants, as far as it was possible to make a segregation, and these supplementary data are included in the present report. A company which sells, incidentally, a small amount of current, especially if the current is delivered to the consumer directly at the dynamo, is placed in subgroup $1 a$.
A considerable number of street railway companies under $1 a$ and a fer under 13 , while operating primarily electric surface lines, have also some trackage operated by cable or animal power or some elevated trackage. Among leading instances of this class may be mentioned the Interurban Street Railway Company, of New York city, which operates a large number of horse cars, the passengers carried constituting a very large proportion of the total horse-car traffic of the United States. In Chicago and San Francisco extensive cable lines are operated by companies which are now primarily electric in their equipment, and the elevated systems in Brooklyn and Boston are operated by the companies which run the surface lines of those cities. In all such instances it is impossible to divide the statistics of the company and apportion them between different kinds of traction. The amount of traffic carried by predominantly electric surface railways on horse, cable, or elevated cars is, however, but a small fraction, probably not more than 2 or 3 per cent, of their aggregate traffic, so that the significance of the totals for the group is not materiatly affected. On the other hand, the statistics presented for elevated railways, while they do not cover the entire business of this description, doubtless show the typical results of operation. The number of companies operating cable railways predominantly (aside from inclined planes) is now only 3 , and the number of exclusively steam street railways is only 3 , so that the statistics of these two groups are less significant than those of the larger groups.

Classification according to population.-The second method of classification divides street and interurban railway companies into the following groups:

1. Railways in urban centers of 500,000 population and over.
2. Railways in urban centers of 100,000 , but under 500,000 population.
3. Railways in urban centers of 25,000 , but under 100,000 population.
4. Railways in urban centers of less than 25,000 population.
5. Fast, long interurban railways.
6. Miscellaneous interurban railways.

Statistics grouped into the 6 classes above named are presented for all companies, whatever the power used, and also separately for those full-time companies which operate electric surface railways without lighting plants.

This classification of companies according to population involves no little difficulty. In the first place the more important street railways are no longer confined, as they were formerly, to a single municipality. They extend into the suburbs and adjacent rural districts, and often to cities and towns at a considerable distance. In determining the area to be credited to a given urban center, the rule followed has been to include all the municipalities reached by the lines of the company, or companies, which serve the city that constitutes the leading component in that center. The statistics of minor railways serving any part of the area thus defined have been added to those of the more central systems, and the population of any additional localities reached by these minor companies. The population of strictly rural areas, through which primarily urban street railway systems pass, has necessarily been disregarded in discussing urban centers, since there is no way of ascertaining what proportion of the inhabitants of such areas are actually within reach of street railway facilities.

Pittsburg and the neighboring cities and towns furnish a striking illustration of the difficulty of ascertaining the population served by a railway company. Of the 469.47 miles of track reported by the 8 Pittsburg companies, 188.19 miles lie ontirely outside of the limits of any municipality. Nevertheless, the traffic is so largely carried on within city limits that these companies have been classed as urban rather than interurbun. A somewhat similar coudition exists in Baffalo, N. Y., and its vicinity, while the railways serving Detroit, Mich., Fall River, Mass., Canton and Akron, Ohio, and several other important cities are so largely interurban that their statistics have been excluded from the urban groups. Not only are certain predominantly urban companies thus engaged to some extent in interurban traffic, but all companies which are predominantly interurban in charweter likewise carry passengers wholly within cily limits and, in many instances, the proportion of pussengers thus carried is large.

When, therefore, the attempt is made to compare the population of a given urban center with the number of passengers carried in that center, the result is only approximate, since it is impossible to distinguish between the different classes of traffic carried by a single street railway company. Nevertheless, in most large cities the margin of error arising from these complications is not very great. The totals for the four groups of cities adopted in this report show fairly well the true conditions of urban street railway operation, since all companies whose business is to a large extent interurban have been placed in the fifth and sixth groups.

These considerations point clearly to the heterogeneous character of many of the railways which are classed as interurban. A large part of the traffic of so-called interurban railways is really intraurban. As a general rule all companies which have more than half of their trackage outside of municipal limits have been considered interurban in the present investigation. For the purpose of showing the operating results of the more typical modern interurban railways, 55 companies have been selected, which may be fairly described by the term fast, long interurban lines. No company is included in this group which reported less than 15 miles of single track, or which had more than one-third of its trackage within municipal limits, or which operated cars at a maximum speed of less than 20 miles per hour. The distinction between such interurban railways and those in the miscellaneous group is necessarily more or less arbitrary. Several of the companies in the miscellaneous group operated at least part of their trackage in such a way as to conform to the criteria indicated for fast, long interurban lines. This is notably the case with the Detroit United Railway Company, which yet carries the greater proportion of its passengers wholly within the limits of the city of Detroit, thus rendering the statistics of its total business quite incomparable with those of more strictly interurban lines. Group 6, the miscellaneous interurban class, includes on the one hand such cases as the Detroit United Railway Company, and the Boston and Northern Street Railway Company which serves several of the large cities of eastern Massachusetts, and, on the other hand, many small railways connecting mere villages, or operated in connection with summer resorts. It thus represents such widely varying conditions that the totals are less significant than in the case of any of the other groups.

## OEAPTER II.

## COMPARISON WITH CENSUS OF 1890.

Difficulty of comparison.-Comparisons between the statistics of street railways for 1890 and 1902 must be made with great caution. In 1890 only 706 out of the 789 street railways in the country made reports to the Census Office. The figures of trackage, cost of construction, number of cars, number of employees, and number of passengers for the remaining 83 companies were either obtained from outside sources or were estimated. The figures thus secured from sources other than certified returns constitute from 4.20 to 10.36 per cent of the totals for the respective items mentioned. The returns of earnings and expenditures and of car mileage were incomplete, even for many of the companies which reported fully other statistics; but these items were not supplemented by estimates, so that the figures given as totals represent from 10 to 20 per cent less than the actual totals for all companies. The degree of error in the statistics of 1890 is more fully discussed in connection with the analysis of the data on each subject. The returns for 1902 were much more nearly complete, as all but two companies covered by the statistics furnished certified returns, and in most cases all inquiries in the schedule were answered.

Comparative summary.--Table 1 contains a summary of the more comparable statistics for all street railways at the censuses of 1890 and 1902, together with the percentages of increase.

Table 1.-Comparative summary: 1902 and 1890

|  | 1902 | 1890 | Percentage of increase. |
| :---: | :---: | :---: | :---: |
| Number of companies, operating and | 987 | 789 | 5 |
| Length of jine, miles $1 . .$. | 16,651,58 | 5, 788.47 | 187.9 |
| Length of track, miles ${ }^{\text {l }}$ | 22,576.99 | 8,123.02 | 177.9 |
| Cost of construction and equipment.. | \$2,167, 634,077 | \$389, 357, 289 | 456.7 |
| Number of employees | 140, 769 | 70, 764 | 98.9 |
| Number of passenger cars. | 6 60, 290 | 32,505 | 85.5 |
| Number of fare passengers .-....... | 4,774,211,904 |  | 186.0 914.8 |
| Fare passengers per mine of track ... | 212,217 | 249,047 | ${ }^{9} 14.8$ |
| Ratio of operating expenses to operating earnings for companies reporting, per cent | 57.5 | 68.4 |  |

${ }^{1}$ By "length of line," as used throughout this report, is meant length of first main track or of roadbed. By "length of track" is meant total length of all trackage, including sidings. Thus, in the case of a double track road:"length of track " would be double "length of line."

2 Exclusive of tracLage of two railways carrying freight only.
${ }^{3}$ Decrease.
The 1902 figures include, for cost of construction and equipment, 967 out of 987 operating and lessor companies, while of the 817 operating companies, 797 reported the number of employees, 811 the number of fare passengers, and 799 earnings and expenses. The figures for 1890, except as to ratio of expenses to earnings, cover all companies, though some of them are based partly on estimates.
The contributions of the different sections of the country to the development of the street railway industry are indicated in the following table:

Table 2.-COMPARATIVE SUMMARY, BY GEOGRAPHIC DIVISIONS: 1902 AND 1890.

| DIVISION, | Year. | Length of track, miles. | length of line, miles. |  |  |  |  | Number of passenger cars. | $\begin{aligned} & \text { Number of } \\ & \text { fare passengers } \\ & \text { carried. } \end{aligned}$ | Total cost. | Number of employees. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Total. | Electric. | Animal. | Cable. | Steam. |  |  |  |  |
| United States ... | 1902 1890 | $\begin{array}{r} 22,576.99 \\ 8,126.02 \\ \hline \end{array}$ | $\begin{array}{r} 16,651.58 \\ 5,783.47 \\ \hline \end{array}$ | $\begin{array}{r} 16,230,62 \\ 914.25 \end{array}$ | $\begin{array}{r} 195.21 \\ 4,061.94 \end{array}$ | $\begin{aligned} & 113.93 .92 \\ & \hline 289 \end{aligned}$ | $\begin{aligned} & 111.82 \\ & 524.06 \end{aligned}$ | $\begin{gathered} 60,290 \\ 32,505 \end{gathered}$ | $\begin{array}{r} 14,774,211,904 \\ 2,023,010,202 \end{array}$ | $\begin{array}{r} 182,167,684,077 \\ 389,357,289 \end{array}$ | $\begin{array}{r} 1140,769 \\ 70,764 \end{array}$ |
| Increase Percentage of increase |  | $\begin{array}{r} 14,453.97 \\ 177.9 \\ \hline \end{array}$ | $10,868.11$ 187.9 | $\begin{gathered} 15,316.87 \\ 1,675.3 \end{gathered}$ | 2 $3,866.73$ 495.2 | $\begin{gathered} 2169.29 \\ 259.8 \end{gathered}$ | $\begin{aligned} & 2412.24 \\ & 278.7 \end{aligned}$ | $\begin{array}{r} 27,785 \\ 85.5 \end{array}$ | 2, 751, 201, 7862 | $1,778,276,788$ 456.7 | 70,005 98.9 |
| North AtJantic. | 1902 | $\begin{array}{r} 10,164.89 \\ 2,951.85 \\ \hline \end{array}$ | $\begin{array}{r}7,702.22 \\ 2,063.94 \\ \hline 6.0828\end{array}$ | $\begin{array}{r}7,579.01 \\ \\ \hline 78.22 \\ \hline\end{array}$ | $\begin{array}{r} 66.02 \\ 1,655.61 \end{array}$ | $\begin{array}{r} 5.50 \\ 47.27 \end{array}$ | $\begin{aligned} & 51.69 \\ & 84.94 \end{aligned}$ | $\begin{aligned} & \hline \hline 31,319 \\ & 14,651 \end{aligned}$ | $\begin{aligned} & 2,618,528,979 \\ & 1,141,187,460 \\ & \hline \end{aligned}$ | $\begin{array}{r} 1,088,982,237 \\ 199,404,200 \\ \hline \end{array}$ | $\begin{aligned} & 75,928 \\ & 37,412 \end{aligned}$ |
| Increase $\qquad$ Percentage of increase |  | 7,213.04 | $5,638.28$ 273.2 | $\begin{aligned} & 7,305.79 \\ & 2,674.0 \end{aligned}$ | $\begin{gathered} 1,592.19 \\ 296.0 \end{gathered}$ | $\begin{aligned} & 241.77 \\ & 288.4 \end{aligned}$ | $\begin{aligned} & 233.25 \\ & 239.1 \end{aligned}$ | 16,668 113.8 | $1,477,341,519$ 129,5 | $889,528,087$ 446.1 | 38,516 103.0 |
| South Atlantic... | 1902 1880 | $\begin{array}{r}1,670.15 \\ \mathbf{6 1 1 . 9 6} \\ \hline 1\end{array}$ | $\begin{array}{r}1,195.29 \\ 465.93 \\ \hline\end{array}$ | $\begin{array}{r} 1,182.04 \\ 83.68 \\ \hline \end{array}$ | $\begin{array}{r} 1.25 \\ 307.49 \end{array}$ | 3.70 | 71.16 | $\begin{aligned} & 4,290 \\ & 1,702 \\ & \hline \end{aligned}$ | $\begin{array}{r} 297,198,541 \\ 101,647,174 \end{array}$ | $\begin{array}{r} 162,507,589 \\ 16,125,671 \\ \hline \end{array}$ | 9,839 4,189 |
| Increase.............. |  | 1.058 .19 172.9 | 729,36 156.5 | $\begin{aligned} & 1,098.46 \\ & 1,314.3 \end{aligned}$ | $\begin{gathered} 2294.24 \\ 295.7 \end{gathered}$ | $\begin{aligned} & 23.70 \\ & 2100.0 \end{aligned}$ | $\begin{aligned} & { }^{2} 71.16 \\ & 2100.0 \end{aligned}$ | $\begin{aligned} & 2,688 \\ & 152.1 \end{aligned}$ | $195,551,367$ 192.4 | $146,981,918$ 907.8 | $\begin{aligned} & \mathbf{5 , 7 0 0} \\ & 137.7 \end{aligned}$ |
| North Central. | 1902 | $\begin{array}{r} 7,815.32 \\ 2,758.67 \\ \hline \end{array}$ | $\begin{aligned} & 5,631.69 \\ & 1,867.93 \end{aligned}$ | $\begin{array}{r} 5,524,28 \\ 584.56 \end{array}$ | $\begin{array}{r} 50.91 \\ 1,229.90 \end{array}$ | $\begin{array}{r} 56.40 \\ 129.69 \end{array}$ | 123.78 | $\begin{aligned} & 18,648 \\ & 11,335 \end{aligned}$ | $\begin{aligned} & 1,344,000,951 \\ & 638,309,887 \end{aligned}$ | $\begin{aligned} & 705,558,933 \\ & 110,741,609 \end{aligned}$ | $\begin{aligned} & 39,405 \\ & 20,814 \end{aligned}$ |
| Increasé $\qquad$ Percentage of increase |  | 5, 0661.75 | $\begin{gathered} 3,763.66 \\ 201.5 \end{gathered}$ | $\begin{aligned} & 5,139.72 \\ & 1,336.5 \end{aligned}$ | $\begin{array}{r} 21,178.99 \\ 295.9 \end{array}$ | $\begin{aligned} & 278.29 \\ & 256.5 \end{aligned}$ | $\begin{aligned} & 3128.78 \\ & 2100.0 \end{aligned}$ | $\begin{array}{r} 7,308 \\ 64.5 \end{array}$ | $\begin{array}{r} 805,681,064 \\ 149.7 \end{array}$ | $594,812,324$ 537,1 | 19,091 94.0 |
| South Central.. | 1902 1890 | 1, 324.45 | $\begin{aligned} & 1,007.10 \\ & 773.05 \end{aligned}$ | $\begin{array}{r} 959.45 \\ 81.63 \end{array}$ | $\begin{array}{r} 17.75 \\ 559.88 \end{array}$ | . 90 | $\begin{array}{r} 29.00 \\ 131.59 \end{array}$ | $\begin{aligned} & 3,007 \\ & 2,342 \end{aligned}$ | $\begin{array}{r} 210,108,861 \\ 98,005,026 \end{array}$ | $\begin{aligned} & 87,294,862 \\ & 24,602,138 \end{aligned}$ | 6,731 3,830 |
| Increase $\qquad$ Percentage of increase |  | $\begin{gathered} 353.78 \\ 36.5 \\ \hline \end{gathered}$ | $\begin{gathered} 284.05 \\ 80.3 \end{gathered}$ | $\begin{array}{r} 877.82 \\ 1,076.4 \end{array}$ | $\begin{aligned} & 2542.08 \\ & 296.8 \end{aligned}$ | . 90 | $\begin{gathered} 2102.59 \\ 278.0 \end{gathered}$ | $\begin{array}{r} 665 \\ 28.4 \end{array}$ | 112, 098,885 | $62,692,724$ 254.8 | 2,901 75.7 |
| Western.. | $\begin{aligned} & 1902 \\ & 1890 \end{aligned}$ | $\begin{array}{r} 1,004.18 \\ 830.97 \end{array}$ | $\begin{array}{r} 1,115.38 \\ 612.62 \end{array}$ | $\begin{array}{r} 985.84 \\ 91.26 \end{array}$ | $\begin{array}{r} 47.28 \\ 306.21 \end{array}$ | $\begin{array}{r} 51.13 \\ 102.56 \end{array}$ | $\begin{array}{r} 31.18 \\ 112.69 \end{array}$ | $\begin{aligned} & \mathbf{3 , 0 8 1} \\ & \mathbf{2}, \mathbf{4 7 5} \end{aligned}$ | $\begin{aligned} & 304,379,572 \\ & 143,860,655 \end{aligned}$ | $\begin{array}{r} 128,345,456 \\ 38,483,671 \end{array}$ | $\begin{aligned} & 8,866 \\ & 5,069 \end{aligned}$ |
| Increase ............. |  | $\begin{gathered} 767.21 \\ 91.7 \end{gathered}$ | $\begin{gathered} 502.76 \\ 82.1 \end{gathered}$ | $\begin{aligned} & 894.68 \\ & 980.2 \end{aligned}$ | $\begin{gathered} 2258.98 \\ 284.6 \end{gathered}$ | $\begin{aligned} & 251.48 \\ & 250.1 \end{aligned}$ | $\begin{aligned} & 281.46 \\ & 272.4 \end{aligned}$ | $\begin{array}{r} 556 \\ 22.6 \end{array}$ | $160,618,917$ 111.6 | $\begin{array}{r} 84,861,785 \\ 220.5 \end{array}$ | $\begin{array}{r}3,797 \\ \hline 74.9\end{array}$ |

1 Of the 957 companies, 967 reported the cost of construction and equipment; while of the 817 operating companies, 797 reported the number of employees and 811 the number of fare passengers carried.

Number of companies.-There were 789 operating and lessor companies in existence at the census of 1890 and 987 in 1902. Of the 706 companies which actually reported in 1890, 681 were in independent operation and only 25 were leased, 5 of the latter reporting their operations separately. At the present time the method of combination by lease, which usually means virtually the absorption of the lessor company, has been extensively adopted. Only 817 of the companies reporting in 1902 were operating companies. Moreover, in several cases, these include companies which were really, by ownership or lease, controlled by other companies, although they made distinct reports to the present census. The number of companies having actual independence of control is, therefore, even smaller than appears from the returns. For instance, 11 companies in the District of Columbia and the adjacent parts of Maryland made separate returns, although all are controlled by a single company.
The small increase in the number of operating companies since 1890 is explained by the fact that railways formerly separate have been merged into systems, a process which is more fully described in Part I, Chapter VIII. As a matter of fact, a considerable number of these merged railways, aside from those held under lease, still continue to maintain a separate corporate existence, being controlled by ownership of their stock, so that the aggregate number of actual street railway corporations at present is considerably greater than appears from the statistics. Where, however, these merged companies have ceased to report operations separately they have not been counted.
Although some railways in small towns, especially in Western states where they were constructed in connection with temporary "booms," have ceased to operate since 1890 , a much larger number of new street railways have been constructed. Itis impossible, however, to determine by the dates of the charters of the present companies the number of railways established since 1890, since in many cases the companies now in operation are merely reorganizations or combinations of earlier companies.
The combination of street railways has greatly increased the size of many operating railway companies. Moreover, many railways which have not undergone consolidation have extended their tracks very materially since 1890. The difference in the importance of the average railway company at the two census periods may be seen from Table 3, which is based on the number of operating companies.

Table 3.-Comparative size of operating companies: 1902 and $1890 .{ }^{1}$

${ }^{1}$ The number of operating companies in 1890 was 769 and this number is used in all the computations. In 1902, 817 companies reported trackage and cara, 811 fare passengers, and 797 number of employees, and these numbers have been used respectively.

These figures indicate that the average operating company in 1902 was more than twice as important in both trackage and traffic as the average operating company in 1890.

Trackage and motive power.-As will be seen from Table 1 the increase in the length of line of street railways in 1902, as compared with 1890 , is $10,868.11$ miles, or 187.9 per cent, and the increase in the length of track is $14,453.97$ miles, or 177.9 per cent. By length of line is meant the length of the first main track exclusive of second track and sidings. The length of all track is a more valuable basis for comparison. Double tracks for cars operating in opposite directions cost nearly twice as much, and have nearly twice as great maximum traffic capacity, as a single track with short sidings for cars to pass. In some cities the track used by cars running in one direction occupies one street, while the corresponding track for cars in the opposite direction occupies a parallel street. This is particularly true of Philadelphia, because of its narrow streets. The length of line in such case is double that which would be reported if the two tracks had been laid side by side in a single street, yet the traffic capacity is practically the same.
The fact that the length of line has increased more rapidly than the length of track is due to the recent large extension of street railways in small towns and rural districts. Railways so situated have usually only a single track, while the dense traffic of the large cities, to which the street railways of 1890 were mostly confined, requires double tracks in most instances. In 1880 the length of line of street railways in the United States was $2,050.16$ miles, or a little less than oneeighth as great as in 1902.
Table 2 shows that the increase in trackage since 1890 has been largest, 244.4 per cent, in the North Atlantic states, notwithstanding the comparatively high development of street railways in the cities of that division in 1890. A great part of this increase is due to the
extensive construction of interurban railways. The ratio of increase in trackage is least in the South Central states, where the railways are, for the most part, still contined to a few leading cities.

The most striking feature of the street railway development since 1890 has been the replacement of other methods of traction by electricity. The great majority of the companies which used other power in 1890 have since changed to electric power, while practically no new street railways have been constructed which use any other form of traction. Even since the time covered by the present investigation this change has rapidly progressed. The elevated railways in New York city, which used steam up to 1902 and during a portion of that year, and a part of the trackage operated by animal power in that city, have since been equipped for electric traction.

The following table shows the number of miles of track in the United States in 1890 and 1902, grouped according to the character of the motive power. Elevated railways are not separately presented, as in later tables, since this distinction was not made in the statistics of track given by the census of 1890 ; their trackage is included with that operated by steam and electricity, respectively.

Table 4.-Comparatice summary of track mileage, classified according to motive power: 1902 and 1890.

| Character of power. | Miles of track, 1902. | Niles of track, 1890. | Percentage of increase. |
| :---: | :---: | :---: | :---: |
| Trited States. | 22,576.99 | 8,128.02 | 177.9 |
| Electrie | 121,907. 59 | 1,261.97 | 1,636.0 |
| Animal | 259.10 | 5,661.44 | 295.4 |
| Steam... | 210.69 169.61 | 488.81 711.30 | 250.7 276.2 |

1 Inchudes f. 06 miles operated by compressed air.
2 Decrease.
In 1890 the trackage operated by electric power was less than one-sixth of the total, while in 1902 it had increased to 97 per cent, the track mileage thas operated increasing from $1,261.97$ miles to $21,907.59$ miles. In 1850 horses or mules were used to haul cars on more than two-thirds of the total track, but in 1902 while $6 i$ companies still used animal power wholly or in part only on 1.1 per cent of the trackage was such power used. The mileage operated by cable decreased 50.7 per cent and that operated by steam 76.2 per cent. It is understood that since the date of the census inquiry the small amount of trackage operated by compressed air has been equipped with electric power.

It is not possible to make an exact comparison of the number of companies using each class of power in 1890 and 1902 , as in the former year many companies did not submit individual reports. Of the 686 operating companies which did report in 1890 (counting 5 lessor companies which operated separately), 126 used electric power wholly or in part, 506 animal power, 55 cable
power, and 74 steam power. Of the 817 operating companies in 1902, 747 used electric power wholly or in part, 67 animal power, 26 cable power (including inclined planes), and 9 steam power.

Cost of construction.-For reasons, more fully set forth on page 47 , the figures for cost of construction as returned by the street railway companies in 1890 can not be considered as in any sense representing the actual amount of cash put into the physical properties. This is even more the case in 1902. Aside from the fact that part of the cost in 1890 was based on census estimates only, the cost of construction, as reported by the companies themselves at both censuses, represented, in many instances, merely the amount of cash or the amount of securities which had been paid for the purchase of a railway or railways already long in operation. The purchase price in such a case is naturally based on earning capacity and not on the original cost of construction or the cost of duplication. The apparent percentage of increase in this item since 1890, 456.7 per cent, can therefore be considered as of only slight significance.

Number of employees. - The reported number of salaried employees and wage-earners on street and electric railways ( 4.23 per cent of the number in 1890 being estimated or obtained from indirect sources) increased 98.9 per cent during the interval between the two censuss investigations. The actual increase was probably somewhat greater since 20 companies, with a trackage of 417.03 miles, did not report this item in 1902. Moreover, at the census of 1890 , report was made of the average number of employees for the time during which each street railway was in operation. Since at that time there were many roads which had only recently begun operation and which reported for less than an entire year, the total number of employees reported in 1890 was somewhat greater than the number which would have been necessary to conduct an equal amount of business if distributed throughout an entire year in every case. In the presentinvestigation, as more fully explained in Twelfth Census, Volume VII, Manufactures, page lxi, the effort bas been made to ascertain what would be the average number of employees, on the assumption of twelve months of operation.
The returns indicate that the number of employees at present bears a considerably smaller ratio to the number of passengers carried than was the case in 1890 , and this is doubtless true, though the disparity is exaggerated by the statistics.
$N_{u m b e r ~ o f ~ c a r s .-T h e ~ n e c e s s a r y ~ l i m i t ~ t o ~ t h e ~ s i z e ~}^{\text {- }}$ of cars when horses were employed has been greatly extended by the introduction of electricity. The consequent increase in the average size of cars is presumably one cause of the fact that the total number of passenger cars was only 85.5 per cent greater in 1902 than in 1890 , despite an increase of 136.0 per cent in the number of passengers carried. The proportion of
passenger mileage (by which is meant the total distance covered by all passengers) to the number of cars owned has increased in still larger measure. In Part II, Chapter III, will be found detailed information regarding the development of cars and the size of the cars at present accepted as standards in the leading cities.

Traffic.--The number of fare passengers reported for street and electric railways rose from 2,023,010,202 in 1890 to $4,774,211,904$ in 1902 . In $1890,5.13$ per cent of the passengers were estimated or ascertained from unofficial sources, while the figures for 1902 cover 811 out of 817 operating companies.

No separate return of transfer passengers was made in 1890 and, generally speaking, the statistics were based on the number of tare passengers although, in some instances, apparently, the total of fare and transfer passengers was reported and included in the United States total. As a matter of fact, the total number of transfer passengers in 1890 is known to have been comparatively small, while in 1902 the number of passengers carried on free transfers was no less than $1,062,403,392$. Where, as in Philadelphia, a charge is made for a transfer, the passenger is counted as a fare passenger.

The actual increase in the number of fare passengers was slightly greater than appears from the figures, since the statistics of 1890 , even those based on certified returns, included estimates on the basis of twelve months of operation for those roads operating less than the entire year, while for part-time railways at the present census only the actual number of passengers carried is stated.

At first glance it seems surprising that the average number of fare passengers carried per mile of single track should be considerably less in 1902 than in 1890 , the figures being, respectively, 212,217 and 249,047 . If, however, the number of transfer passengers could be added to the number of fare passengers, the density of traffic per mile of track would probably appear somewhat greater in 1902 than in 1890. It is well known that the traffic on the leading street railways in the more thickly populated parts of our great cities has become much more dense than ever before. The explanation of the decline in the average number of fare passengers per mile of track is found in the increased length of rides taken by passengers, both in the large cities and on interurban roads-an increase partly attributable to the greater use of transfers-and in the construction of electric railways in small towns, suburban areas, and rural districts, where the number of passengers per mile of track is low. In 1890 the street railways were mainly confined to the large cities and to the more densely populated parts of those cities. Year by year urban railways, with the higher speed which electric traction has made possible, have been able to extend their tracks farther out and to offer longer journeys to their patrons. The average length of ride on the new interurban railways is also much greater than
on railways within city limits. It is quite probable that, taking all street railways together, the passenger mileage, or number of passengers carried 1 mile, per mile of track operated, is larger to-day than it was in 1890 , but statistics on this subject are wholly lacking.

The increase of traffic in the different sections of the country, as may be seen from Table 2, does not correspond closely with the increase in trackage. In those sections where, on account of the development of interurban railways, the trackage has been extended most markedly, the number of passengers has naturally risen with less rapidity. Thus, in the North Atlantic section, which shows the greatest addition to trackage, the number of passenger's carried increased only 129.5 per cent. The most remarkable augmentation of traffic is in the South Atlantic strtes, 192.4 per cent. In view of the small increase of track in the South Central states, the fact that 114.4 per cent more passengers were carried in 1902 than in 1890 is striking.

Trafic in relation to population.--Table 5 shows for the country as a whole and its grand divisions the relation between street railway traffic and population at the two census periods.

Tabre 5.-Relation of traffic to population by geographic divisions: 1902 und 1890.

| division. | Year. | population. ${ }^{1}$ |  | Total mumber of fare passengers carried. | AVERAGE NUMBER OFRIDES PER INMAMTIT ANE. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total. | Urban (in places of 4,000 and over). |  | Total. | Urball |
| United States. . | $\begin{aligned} & 1902 \\ & 1890 \end{aligned}$ | $\begin{aligned} & 75,994,755 \\ & 62,947,714 \end{aligned}$ | $\begin{aligned} & 28,972,392 \\ & 20,745,974 \end{aligned}$ | $\begin{aligned} & 4,774,211,904 \\ & 2,023,010,202 \end{aligned}$ | $\begin{aligned} & 68 \\ & 32 \end{aligned}$ | 168 98 |
| Increase. |  | 13,040, 861 | 7,626, 418 | 2,751, 201, 702 | 31 | 70 |
| North Atlmatic.. | 1902 1.800 | $\begin{aligned} & 21,046,695 \\ & 17,406,969 \end{aligned}$ | $\begin{aligned} & 13,618,736 \\ & 10,071,957 \end{aligned}$ | $\begin{aligned} & 2,618,628,979 \\ & 1,141,187,460 \end{aligned}$ | $\begin{gathered} 124 \\ 66 \end{gathered}$ | 192 |
| Increase |  | 3,689,726 | 3,541,779 | 1,477, 341, 519 | 58 | 79 |
| South Atlantic .. | 1902 1890 | $\begin{array}{r} 10,443,480 \\ 8,857,922 \end{array}$ | $\begin{aligned} & 2,0: 09,620 \\ & 1,551,190 \end{aligned}$ | $\begin{aligned} & 297,198,511 \\ & 101,647,174 \end{aligned}$ | $\begin{aligned} & 28 \\ & 11 \end{aligned}$ | 145 65 |
| Increase. |  | 1,585,558 | 405, 230 | 195, 551, 367 | 17 | 80 |
| North Central... | $\begin{aligned} & 1902 \\ & 1890 \end{aligned}$ | $\begin{aligned} & 26,333,004 \\ & 22,410,417 \end{aligned}$ | $\begin{aligned} & 9,348,213 \\ & 6,744,936 \end{aligned}$ | $\begin{array}{r} 1,344,000,951 \\ 588,309,887 \end{array}$ | $\begin{aligned} & 51 \\ & 24 \end{aligned}$ | 144 80 |
| Increaso. |  | 3, 222, 587 | 2,698,277 | 805, 601, 004 | 27 | 64 |
| South Central ... | 1902 | $\begin{aligned} & 14,080,047 \\ & 11,170,137 \end{aligned}$ | $\begin{aligned} & 1,896,655 \\ & 1,2399,232 \end{aligned}$ | $\begin{array}{r} 210,108,861 \\ 98,065,026 \end{array}$ | 15 9 | 111 |
| Increase. |  | 2,909,910 | 557, 423 | 112, 098,885 | 6 | 38 |
| Western | $\begin{aligned} & 1902 \\ & 1890 \end{aligned}$ | $\begin{aligned} & 4,091,349 \\ & 8,102,269 \end{aligned}$ | $\begin{aligned} & 1,469,268 \\ & 1,035, \mathbf{0 5 9} \end{aligned}$ | $\begin{aligned} & 304,379,572 \\ & 143,860,655 \end{aligned}$ | $\begin{aligned} & 74 \\ & 46 \end{aligned}$ | 207 139 |
| Increase |  | 989,080 | 433,609 | 160, 518, 917 | 28 | 68 |

1 Population shown is that reported at the eensus of 1900 .
Taking the population as determined by the census of 1900 for comparison with the statistics of traffic for 1902, the average number of rides per inhabitant is 63 , as compared with 32 in 1890. To correct the computation for the present census in a rough manner, it may be assumed that during the one and one-half years from
the date of the population census to the middle of the year covered by the statistics of street railways, the population increased at the same ratio as from 1890 to 1900. On this basis the population at the beginning of 1902 would have been somewhat more than $78,300,000$, and the average number of rides per inhabitant would be about 61 . These figures indicate the great increase in the importance of the street railway as a factor in the life of the people. The table shows very wide differences between the sections of the country in the ratio. of rides to total population, as might be expected from the great differences in the proportion of urban population. The South Atlantic states present the greatest percentage of increase in the number of rides per inhabitant, but the patronage of street railways there is still less than one-fourth as great as in the North Atlantic states.

Urban population and the number of street railway passengers are somewhat less closely related at present than in 1890 , because of the recent extension of electric railways into rural districts. Nevertheless, more than nine-tenths of the passengers are probably still carried within urban areas, and comparison with urban population will give a much truer idea of the significance of street railway service to the people than comparison with the total population. On the basis of the population census of 1900 , the number of street railway ricles in 1902 was equal to 168 for every inhabitant of urban areas of 4,000 population and over, as compared with 98 in 1890. If the population of urban centers at the beginning of 1902 be roughly estimated, the average number of ricles per urban inhabitant would be reduced to approximately 160 (calculating the increase in urban population for one and one-half years at the same ratio as from 1890 to 1900). Even thus it is seen that there has been a remarkable increase in the patronage of street railways by urban dwellers. Among the causes of this increase may be mentioned the construction of railways in urban communities where they were formerly lacking; the growth in geographic area covered by the larger cities, necessitating more extensive resort to street railway transportation; and the improved character of the service. The ratio of passengers to urban population is now highest in the Western states, next in the North Atlantic states, and lowest in the South Central states. The increase in the number of rides per urban inhabitant has been most marked in the South Atlantic states.

A comparison of the street railway traffic with the population of individual urban ceuters of more than 100,000 inhabitants for the censuses of 1890 and 1902 is presented elsewhere (page 24).

Cor mileage.-The number of miles run by passenger cars on street and interurban railways in 1902 was $1,120,101,944$. The report of passenger car mileage in $1890,383,178,085$ miles, did not cover the entire number of street railways in operation. The length of line of the railways for which the 1890 figures were reported was $4,375.81$ miles out of a total of $5,783.47$
miles. Most of the companies which failed to report car mileage, however, were those with light traffic. The number of passengers carried by companies reporting car mileage in 1890 was $1,775,174,685$, or 87.7 per cent of the entire number of passengers for all street railways. If it be assumed that the car mileage represented the same proportion of the total car mileage for all street railways, the increase in car mileage from 1890 to 1902 would be about 155 per cent. Presumably, however, the car mileage reported in 1890 was a somewhat smaller proportion of the total car mileage than the proportion which passengers carried by companies reporting car mileage was of the total number of passengers, so that the actual increase in car mileage may have been slightly less.

The average number of fare passengers per passenger car mile has decreased slightly. Those companies which reported in full both passengers and car mileage in 1890 carried on the average 4.63 passengers per car mile. The railways which did not report car mileage were, for the most part, newer lines with light traffic, and it is possible that if their returns had been secured they would have served to reduce the average' number of passengers per car mile for 1890 more nearly to the figure for 1902 , which was 4.26 . Since street cars are now of much larger size than in 1890, and are probably quite as crowded, the decrease in the number of passengers per car mile is doubtless due chiefly to the fact that the average ride is longer than formerly, and that the street railway service has been extended to areas where the density of the traffic is comparatively low.

Receipts and expenditures.-The total operating earnings for companies reporting earnings in 1890 were $\$ 90,617,211$. On the assumption of a 5 -cent fare, which is a trifle more than the average for companies which reported both passengers and earnings, the passenger earnings ( $\$ 89,711,829$ ) would represent $1,794,236,580$ passengers, or not quite nine-tenths of the number carried by all street railways in that year. The operating earnings of all street railways in 1890 were probably, therefore, in the neighborhood of $\$ 100,000,000$, as compared with $\$ 247,553,999$ for the 799 operating companies which reported this item in 1902.

The operating expenditures reported for 1890 , representing the same companies which reported operating earnings, amounted to $\$ 62,011,185$, as compared with $\$ 142,312,597$ in 1902. Of the reported earnings from operation in 1890, 99 per cent consisted of the receipts from passengeus. In 1902, on the other hand, passenger earnings were only 94.5 per cent of the total receipts. There has been a great increase in the revenue derived by street railway companies from the sale of electric current, from treight, mail, and express service, and from advertising:

A comparison of the ratio of operating expenses to receipts for the two census periods can be made with approximate accuracy, since the companies reporting
these items were fairly typical of the street railway business generally at both censuses. Such a comparison shows an extremely interesting change. In 1890 the operating expenses reported were equal to 68.4 per cent of the operating receipts, while in 1902 the corresponding proportion was only 57.5 per cent. The street railways which in 1890 operated exclusively by animal power, and which were at that time much the most important group, showed a ratio of operating expenses to earnings of 73.7 per cent. The great reduction in the ratio of expenses to earnings is not due to an increase in the number of passengers carried per mile of track or per car mile, but is chiefly attributable to the economy of operation which has resulted from the introduction of electric traction. The increase in the size of cars and other less important changes in methods have also contributed to lessen expenses. While current expenses have thus been materially reduced in proportion to the traffic, it must be remembered that the fixed charges of street railways have been augmented, for in large measure this economy of operation has been made possible only through larger, though not necessarily proportionately larger, investment of capital.

Distribution of income.-The following table shows the distribution of gross income of street railway companies to different purposes in 1890 and 1902. Since the financial statistics of both censuses, particularly those for 1890 , omitted some of the companies, the absolute figures should not be compared, but the proportions which the items bear in each case to the total represent fairly the financial operations of street railways in general at the respective periods.

Table 6.-Distribution of the gross income of operating companies to leading items of expenditure: 1902 and 1890.

|  | amount. |  | percentage. |  |
| :---: | :---: | :---: | :---: | :---: |
|  | $100{ }^{1}$ | 1800 | 1902 | 1800 |
| Gross income from all sources | \$250, 504,627 | 891, 721, 845 | 100.0 | 100.0 |
| Operating expenses............ | 142, 312, 597 | 60, 011,185 | 56.8 | 67.6 |
| Fixed charges, total... | 77,595, 053 | 13,978,908 | 31.0 | 15.2 |
| Taxes and licenses.. | 13,078,899 | 8,308, 190 | 5.2 | 3.6 |
| Interest | -26,518, 38.085 | 2,561,343 | 10.2 | 2.8 88 |
| Miscellameous. | -912,018 | -120,154 | 10.2 | (2) 8 |
| Dividends | 15,882,110 | 10, 180, 726 | 6.8 | 11.1 |
| Miscellaneons payments |  | 1,217,193 |  | 1.3 |
| Surplus .............. | 14, 714, 867 | 4,338, 838 | 5.9 | 4.8 |

${ }_{2}^{1}$ Not including 18 companies with a trackage of 378.90 miles.
${ }^{2}$ Less than one-tenth of 1 per cent.

Aside from the relative decrease in operating expenses, already discussed, the more conspicuous changes since 1890, shown by this table, are the great increase in the proportion of total income devoted to taxes, to rentals of leased lines, and to interest on debt. The dividends paid by operating companies were a smaller proportion of their income in 1902 than in 1890. In 1890 the amount paid as interest by such companies was only four-fifths as great as the amount paid in dividends, while in 1902 it was more than twice as great. A comparison of the distribution of income, based on the returns of lessor as well as of operating companies, can not be made because no separate returns of lessor companies were made in 1890.

Capital stock and funded debt.-The statisties of the capitalization of street railways in 1890 were not complete. The length of line for companies reporting both trackage and capitalization at that census was $4,542,88$ miles, or 78.5 per cent of the total mileage. The capital stock of these companies amounted to $\$ 272,441,843$ and their funded debt to $\$ 176,611,826$. The returns for 1902, which are essentially complete, show capital stock of $\$ 1,315,572,960$ and funded debt of $\$ 992,709,139$. The length of line in 1902 being $16,651.58$ miles, it will be observed that the capitalization has increased much faster than the mileage.

The average total capital liabilities per mile of line in 1890 for companies reporting capitalization were $\$ 98,848$. In 1902 the capital liabilities, not deducting that part of the capital stock and funded debt which is represented by investments in securities or nonrailway property, but excluding about 50 miles of line leased from steam railroads, amounted to $\$ 139,778$ per mile of line. The comparison, based on length of line rather than on length of track, is necessarily imperfect, but the figures on the basis of trackage are not available in the census of 1890 . Some of the rensons why an increase of capitalization per mile should be expected are mentioned in Part I, Chapter IV. It is evident that the track, the power plant, and the equipment of a modern electric railway must cost much more than the old-fashioned horse car track and its equipment. The increase in funded debt since 1890 hias been more than in proportion to the increase in capital stock. Capital stock constituted 60.7 per cent of the total capital liability reported in 1890 and 57 per cent of the total in 1902.

## OHAPTER III.

## TRAFFIC.

## I.

thaffic of compantes, classified according to power.

From the standpoint of the public welfare the most important information regarding street and electric railways is that which has to do with their traffic.

The details of traffic on each street and electric railway of the country are shown in Table 97, which also presents the totals for each state. The operations of 815 out of 817 operating companies, representing all but 57.29 miles of the trackage, or about 99.8 per cent of the total, are included in this table. Four companies failed to furnish information regarding traffic. As shown in footnotes, moreover, a number of other companies furnished incomplete returns, and therefore the figures for passengers carried and car mileage have
been estimated when necessary, on the basis of other data in the returns or of unofficial information. Two of the 813 companies included in the table handle freight business only.

The totals of the more important items for the United States as a whole are presented in Table 7, which also groups the statistics according to the kind of power and character of service, as explained in Chapter I. It will be remembered that a considerable number of companies classed as electric surface lines operate in part by animal or cable power or on elevated tracks. It should be noted also that the distinction between electric lines which operate lighting plants and those which do not operate them is of much less significance in connection with traffic statistics, as in this table, than in connection with those for finances.

Table 7.-TRAFFIC OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902. ${ }^{1}$

|  | Total. | alectric, surface. |  |  | Animal, | Steam and electric elevated. | Cable, surface and inclined planes. | Steam, surface. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Withont commercial lighting. | $\begin{aligned} & \text { With } \\ & \text { commercial } \\ & \text { lighting. } \end{aligned}$ | Part time only, |  |  |  |  |
| Sumber of emmpanies. | ${ }^{9} 813$ | 570 | 112 | 57 | 52 | 5 | 14 | 3 |
| Fare passengers. | 4,774, 211, 904 | 4,062,447,908 | 305, 838, 612 | 8'7, 788, 491 | 38, 556, 832 | 315, 105, 775 | 19,359, 341 | 169,945 |
| Transfer pasengers . . . . . . . . . . . . . . . . . . . . . . . . . | 1,062,403, 402 | 994, 91616,668 | 48, 099, 1778 | 2,327,853 | 11, 978,789 | - | $5,049,909$ |  |
| Fare massengers per mile of track construeted...... | 3 $1,120,12,217$ 101,94 | 942,021,415 | 84, 124, 1731 | 12, 815,404 | 5, $\frac{214,983}{6.18,107}$ | $1,381,437$ $72,226,315$ | \% 784,698 | 14, 092 |
|  | 1,120, 2013.26 | 9F2, 021,4818 | $8,173,113$ 3.63 | 12, 810,688 | 6, 618,107 | 72, 226,315 4.80 | $3,142,756$ 6.16 | 79,650 2.13 |
| Mileage of freight, mail, express, and miscellaneous pars | 424, 328,522 | 611,776,54t | 869,823 | 200, 460 | 21,546 | - 11, 421, 099 | 1,400 | 28,650 |
| Total car miles .i.................................... | 1, 144, 430, 46i6 | 983,797, 185 | 85, 042,986 | 13,020,0.18 | 6, 669, 653 | 88,647, 414 | 3,144, 156 | 108,300 |
| Far milts yer mile uf track construeted................. | 1, 50,820 | - 50,737 | -3, 34, 565 | 15, 665 | 36,316 | 306, 714 | 94,961 | 8,980 |
| Eerens killed. | 1,217 | 1,059 | 105 | 21 | 6 | 25 | 1 |  |
| Fersome injured | 47,129 | 42,740 | 4,1988 | 242 | 18 | 157 | 74 |  |

${ }^{1}$ Exchacive of requrts for 4 companies which failed to furnish this information.

- Inchates 2 railways carring freight only.

4 Fuchave of trackage of 2 railways carrying freight only.
4 mathdes $15,201,57$ car miles run by locomotives on Brooklyn Rapid Transit and Manhattan (elevated) railwas


Trimber of prassengers.-The entire number of fare passengers carried by the street and electric railways during the census rear was $4,774,211,904$. Of the companies reporting 57 were in operation less than the entire year. These companies, however, were of much less average importance than the full-time companies. Their trackage was only 4 per cent of the total for all companies, and the number of passengers carried ly them, $37,738,491$, was less than 1 per cent of the tetal number.

The relation between the number of passengers and the population of the country, both total and urban, has already been presented in connection with the comparison between 1890 and 1902.
The total number of free-transfer passengers carried in 1902 was 22.2 per cent as great as the number of fare passengers. Free-transfer passengers are not to be considered as constituting strictly an addition to the amount of street railway traffic. Of the 811 companics reporting, 408 , or almost exactly one-half, grant free
transfers. The total number of transfer points reported is 4,455 , an average of nearly 11 for each of the 408 companies. ${ }^{1}$ In the few instances where a charge is made for transferring passengers they are counted as fare passengers.

The street railways of the United States carried in 1902 more than seven times as many fare passengers as the steam railways, which transported $649,878,505$ persons during the year ending June 30,1902 ; but such a comparison means little, since steam railway journeys average very much longer than those on street railways. The average distance traveled by passengers on steam railways is 30.3 miles. ${ }^{2}$ Though no similar figures can be given for street railways, as they do not-and most of then could not-lkeep records of the distances traveled by their passengers, it is probable that the total distance traveled by passengers on the street railways is less than the total distance traveled by those on steam railways. Another view of the relative importance of passenger traffic on the two classes of railways may be gained by comparing their reccipts from passengers. The steam railways in 1902 received $\$ 392,963,248$ from passengers; the street railways, $\$ 233,821,548$.

Railways which used electric power primarily and which operated chiefly on the surface, carried 42.3 per cent of the fare passengers of all street and electric lines. Though a considerable amount of animal, cable, and elevated trackage is included in this group, it is safe to assume that seven-eighths of the traffic of all the railways covered by the investigation is carried on surface tracks operated by electricity.

The electric lines which operate lighting plants in connection with their railway business, though they are one-fifth as numerous as those without lighting plants and operate more than one-eiglth as much track, carried only one-thirteenth as many passengers in 1902. The reason for this condition lies in the fact that, as shown in Table 96, with a few exceptions, the electric railways which operate lighting plants are confined to small and medium-sized towns. The financial statistics show that of urban centers having more than 100,000 inhabitants, only Milwaukee, Toledo, and St. Joseph have railway companies which do a lighting business worthy of the name. There are economies in combining the two kinds of service in smaller towns which do not accrue in such large measure in great cities. In some cases, moreover, particularly in the larger cities, state or municipal law does not permit street railways to do a lighting business. Perhaps the most important reason why street railways in the largest cities do not operate lighting plants lies in the fact that electricity was commercially applied to the production of light before it was applied to street railways. Lighting plants were already established in many cities before

[^0]the horse railways had begun to change to electric traction.

Of the other kinds of street and interurban railways those operating exclusively by animal power carried in 1902 only about two-thirds of 1 per cent of the fare passengers. The 5 strictly elevated railways carried about 6.6 per cent of the total number. Of the passengers on these elevated railways, the Manhattan Elevated Railway of New York carried about two-thirds. The 3 purely cable roads in San Francisco carried 15,562,352 passengers, and the 11 inclined-plane cable roads carried $3,796,989$.

Density of traffic per mile of track. - No other single factor in street railway business exercises such a powerful influence upon its profitableness as the density of traffic. The number of passengers carried by each street railway per mile of track operated is shown in Table 97. The figures for each individual company are based on the total length of track operated by it, including in a number of cases a certain amount of track belonging to other companies and operated jointly under trackage rights. From the standpoint of the individual railway this method gives a more correct basis for caleulating the density of its traffic than a computation based on the trackage owned or leased by the company for its exclusive use, for the operating expenses include those incurred upon the tracks used under trackage rights, and the payment to other companies for such use is virtually equivalent to a fired charge on part of the capital invested in the tracks so operated. The mileage basis used in computing the density of traffic for the United States and for the separate states and groups of companies is the mileage of track constructed, regardless of the question whether any part of such track is operated by more than one company.

The number of passengers per mile of track for the country as a whole is 212,217 . If only companies operating the entire year be considered, the number of passengers carried per mile of track is 218,016 . This number is independent of the length of journeys, and of course does not represent the number of persons who actually pass over a given length of street railway track during the year. The average density of traffic on electric railways which furnish commercial lighting is less than three-fifths as great as on other electric railways. This results naturally from the fact that the railways furnishing commercal lighting are mainly in the smaller towns of the country. The average density for all full-time electric surface railways combined is 205,478 passengers per mile of track. The fact that roads operated exclusively by animal power show a still greater density of traffic is due to the influence of the four horse car lines in New York city, which carried more than 90 per cent of the total number of passengers reported by the 52 exclusively horse roads in the United States. The average number of fare pas-
sengers per mile of track owned on these four railways was 989,100 . If, however, the mileage operated under trackage rights, which is largely owned by companies primarily electric, be included, the average number of fare passengers per mile of track was 693,923 . The other 48 companies of this group, operating in very small towns that do not afford enough traffic to justify the installation of electricity, carried an average of only 24,523 passengers per mile.

It is also primarily because the elevated railways are situated in very large cities that they show a much greater density of traffic than the average for other classes of railways, $1,381,437$ passengers per mile of track. Elevated roads perhaps have a somewhat greater possible carrying capacity than surface roads because of their large cars, long trains, and high speed. It may be noted, however, that the number of passengers per mile of track on the Manhattan Elevated Railway in New York city, $1,837,625$, only slightly exceeds that on the Third Avenue and Interurban surface systems in that city, $1,612,630$ and $1,434,088$, respectively. But in making such comparisons it should be recalled that traffic on surface railways is probably somewhat more evenly distributed through the day than that on elevated railways, and also that the average ride on the elevated railways is considerably longer than on the surface lines in the same cities.

The density of traffic on the ordinary cable railways and the inclined plane cables is also high as compared with that of electric railways as a group. The three ordinary cable railways, all in`San Francisco, show an average density of 564,877 per mile, which is twice as great as the average density for electric railways in cities of from 100,000 to 500,000 inhabitants. On account of the heary initial investment required, cable railways are profitable only where traffic is very dense, and they do not, therefore, extend into suburban districts as electric lines do. The still higher density of traffic on inclined planes, 682,912 passengers per mile, is due to the fact that these lines are very short and that the passengers in most instances ride only a fraction of a mile. These inclined plane cables are built, in most cases, up the steep bluff's of river valleys, as, for instance, in Pittsburg.

Car mileage.-Statistics of car mileage are unsatisfactory because of the difference in the size of cars and in the conditions under which they are operated, Car mileage on a fast interurban railway, which runs cars 50 or 60 feet in length with 150 -horsepower motors at an average speed of 20 miles per hour, means quite a different thing from that on a horse railway operating cars 16 feet long at an average speed of 5 or 6 miles per hour. The use of "trailers" is also a source of confusion in some cases. On important street railway lines in Chicago, Washington, and one or two other cities, from one to three trail cars are regularly attached to the power car, while on some other railways trailers are
attached to carrs during rush hours, either every day or occasionally. The practice of companies with -regard to registration of car mileage where trailers are used is. not uniform; sometimes the entire train is treated as the unit; sometimes the individual car. Thus one of the systems in Washington, D. C., uses the first basis for computing car mileage while the other system uses the second. In Chicago, where trailers are more extensively employed than in any other city, the mileage of each car in a train is counted. Where trailers are used the individual cars are usually comparatively small, and in some cases the entire train may carry few more passengers than an ordinary large single car on other urban railways. However, the use of trailers is not sufficiently common to affect materially the totals for groups of companies. The car mileage on the elevated railways represents single cars, but includes that of steam locomotives.

The total distance traversed by street and interurban railway cars, including steam locomotives on elevated roads, in 1902 was $1,144,430,466$ miles, or more than 45,000 times the circumference of the earth. About 92 per cent of this mileage was upon railways operating wholly or chiefly by electric traction, and on the surface of the street. Further, the car mileage per mile of track constructed for the country, as a whole, was 50,820 . In other words, each mile of track in the country was traversed by an average of 50,820 cars during the year, or 139 cars each day. There is a wide range in the number of car miles per mile of track upon different railways, as is seen in the statistics of companies classified according to population.
On elevated railways each mile of track was traversed on an average by 366,714 cars a year or 1,005 a day. On these railways, cars are usually run in trains of from 3 to 6 cars. The number of car miles per mile of track on the three ordinary cable railways was 103,676 ; on inclined planes it was 51,776.
The distance traveled over all street and interurban railways by express, mail, freight, work, and miscellaneous cars was $9,126,947$ miles in 1902, or less than 0.8 per cent of the total car mileage. The mileage of such miscellaneous cars on elevated, cable, and horse railways is insignificant. The travel of steam locomotives on the elevated railways amounted to $15,201,575$ miles. A considerable proportion of the express, mail, and freight traffic is handled on passenger cars, but reference to the statistics of street railway receipts shows that the income from these classes of traffic amounts to only about three-fourths of 1 per cent of the total income of street and interurban railways.

Density of passenger traffic per car mile.-The ratio of the number of fare passengers to the number of car miles run has a very important bearing upon the prosperity of the street railway business. For the country as a whole the average number of fare passengers per
car mile in 1902 was 4.26 , the cars running, therefore, on an average, nearly one-fourth of a mile for each fare collected. The figures for each company are given im Table 97. Differences in the size of cars and the length of rides on different railways and groups of railways render comparisons of the density of traffic per car mile misleading, unless the local conditions are thoroughly known. Where passengers ride long distances the number of passengers per car mile is proportionately reduced, and thus a street railway whose cars are always crowded may yet be less profitable than another with apparently lighter traffic, but whose passengers ride shorter distances.
In the absence of information as to the average length of rides, it is impossible to determine in what proportion the capacity of the street railway cars of the country, considered as a whole, is occupied. There are times of the day on most railways, particularly in large cities, when the cars are greatly overcrowded; but there are other times on many railways when the maintenance of a schedule considered satisfactory by the people means the operation of half-empty cars. Not infrequently a railway finds it advantageous to grant liberal transfer privileges, reduce fares, or extend the possible length of journey, in order that new traffic thus created may fill the cars which the regular patrons would in any event consider necessary to a satisfactory schedule. With slight qualifications it may be said that it costs no more to operate a car full than a car empty. When, however, increase of traffic thus secured involves a corresponding addition of cars to the schedule, the advantages to the railway company may disappear.
Though cars on elevated railways are considerably larger than those on ordinary surface lines, the average journey on the elevated is longer, so that the number of fare passengers per car mile is only a fraction greater on these railways than on the electric surface lines as a whole. Indeed, the number of fare passengers per car mile is less on the elevated railways than on the leading surface railways of the same cities. The Manhattan Elevated Railway, of New York, shows 4.78 fare passengers per passenger car mile as compared with 6:51 for the Interurban, and 6.59 for the Third Avenue line.
Similarly, though, the cars operated by animal power are smaller than those operated by electricity, the average ride on the horse car is so much shorter that the ratio of fare passengers to car mileage in New York city, where the greater part of the traffic is found, is higher on horse railways than on electric railways. Three of the 4 horsepower companies in New York city report more fare passengers per car mile than either of the 2 leading electric surface systems in Manhattan borough. A large proportion of the passengers who pay fares on these horse railways are transferred, without charge, to the electric lines. The railways operating by animal power outside of New York, how-
ever, have onty 2.25 passengers per car mile, a figure which points to a very low rate of profit.
The 3 ordinary cable railways report $5.09,5.10$, and 5.79 passengers, respectively, per car mile. The rides on the inclined-plane cable railways are so short that they all present a very high ratio, the average being 13.26 fare passengers per car mile. The Monongahela Incline Plane Company, of Pittsburg, shows even 69.15 fare passengers per mile run.

Car hours.-Statistics for the number of hours during which street railway cars run are of significance, since in connection with the statistics of car mileage they show the average speed maintained. Moreover, the number of passengers per car hour is a datum which, to the street railway manager, sbould be scarcely second in interest to the number of passengers per car mile, since upon it largely depends the outlay for wages of motormen and conductors, as well as various other items of expense. Thus a railway which has fewer passengers per car mile than another may yet be more profitable, if each of its cars earns more fares within a given length of time.

Unfortunately, however, less than half the street railways of the country keep records of car hours. The total number of car hours reported in 1902 by the 390 companies which gave this information was $65,869,342$. These companies carried $2,176,886,559$ fare passengers; therefore, each car carried an average of 33.28 passengers per hour of operation. Most of the companies reporting car hours are operated by electricity. The $\pm$ elevated railways in Chicago have from 43.21 to 56.93 passengers per car hour; these figures, as might be expected from the high speed of elevated trains, being considerably larger than for most surface railways in great cities:

Accidents.-The following table shows the figures for accidents on street railways. The details for each company are shown in Table 97.

Table 8.-Acoidents on shreet and electric railways: $1908 .{ }^{1}$

|  | Persons killed. | Persons injured. |
| :---: | :---: | :---: |
| 'rotal | 21,218 | 47,429 |
| Passengers | 265 | 26, 690 |
| Employees | 122 | 3, 699 |
| Other persons | 881 | 17,040 |

${ }^{1}$ Exclusive of 4 companies which failed to furnish information concerning ccidents.

20ne company, with 1,323 accidents, failed to distinguish those killed from those injured, and they are all included in the second column. Three companies, with 23 persons killed and 1,988 injured, reported accidents to pas* sengere and employees under "other persons.". One company, with 12 persons killed and 666 injured, reported "other persons" under passengers.

The returns show 1,218 persons killed and 47,429 injured by accidents on street railways. It is believed that the total for persons killed is essentially correct, but the reports of persons injured are known to vary in their completeness as between different companies,
according to the degree of injury deemed sufficient to justify recording. Some companies stated to the agents of the Bureau of the Census that their return of aceidents included only injuries of a really serious charatter; while others asserted that it was impracticable for them to distinguish accurately between serious injuries and the many wholly unimportant accidents reported by conductors, and they, therefore, included all aecidents in their report.
In another place will be found statistics showing the larges amount of damages collected from railway companies and the large legal expenses incurred in connection with damage suits. It is asserted by the street railway companies that a large proportion of the claims made upon them for damages are altogether unwarranted or greatly exaggerated.

It is noteworthy that 831 , or 68 per cent of the pernons killed by the street railways, were neither passengers nor enployees. The number of passengers killed was 1 for every $18,015,894$ fare passengers carried; while 1 passenger was injured for every 178,876 fare pasengers carried. The number of street railway employces killed was 122, or 1 out of 1,095 wage-earners empluyed (omitting officers and clerks). Injured employees numbered 1 for every 36.1 wage-earners. Corresponding proportions for steam railways in the year ending June 30,1902 , were 1 killed to 401 , and 1 injured to $2 t$ employed. The risk of accidental death to street railway employees is, therefore, apparently less than two-fifths as great as the risk to steam railway employees, and the risk of injury about tro-thirds as great.
The following table shows the number of accidents in relation to the number of car miles operated, for the rarious groups of street railways as classified according to power:
Table 9,-Accidenta on railuays, classified according to power: 1909. ${ }^{1}$


1 Exelusive of reports for 4 companies which failed to furnish information
reatang this item. morng lom.
The tutal number of accidents, particularly those of a fatal character, is so small on the animal power, elevated, and cable railways that comparisons based on the returns of a single year have little value for general conclusions. On the face of the statistics it appears that the elevated railways are much less dangerous than the surface lines. The number of car miles run for each person killed on the elevated lines is $3,345,897$, as compared with 887,646 for electric surface railways.

Persons other than passengers and employees are not likely to be killed or injured on elevated railways, while such persons are probably less likely to suffer accidents from horse cars than from other surface cars. The number of persons injured but not killed is, according to the returns, much greater in proportion to the car mileage on electric and cable railways than on animal power and elevated roads.

Traffic by states in relation to population.-The statistics of traffic by states, as presented in Table 97, require no special comment. Comparisons among states are less significant than those among individual cities or groups of cities. It is interesting, however, to compare the amount of street railway traffic in the several states with their population, and more particularly with their urban population, in places of 4,000 inhabitants and over. These data, based on the population census of 1900 , are presented in Table 10, which also shows the proportion of arban population to the total population for each state. Similar comparisons for the grand divisions of the country have already been presented in connection with the summary of statistics for 1890 and 1902.
The most important factor in determining the extent of street railway traffic in the different states is obviously the presenceor absence of cities, and particularly of large cities. Thus the relative rank of the states in the proportion of street railway rides to total inhabitants corresponds quite closely with their rank as regards the proportion of urban to total population. The proportion of rides to the total population is greatest in the District of Columbia, where the whole population is urban, and is next greatest in Massachusetts, which ranks third among the states in respect to proportion of urban population, 86.9 per cent of all its inhabitants living in places of 4,000 inhabitants and over. In New York, which ranks fourth in the proportion of urban population, the number of rides per inhabitant is next to that for Massachusetts. There are 14 states in which more than 40 per cent of the population is urban; and all of these 14, except New Hampshire and Delaware, report more than 60 street railway rides per inhabitant. On the other hand, only 2 states that have an urban population less than 40 per cent of their total population, namely, Washington and Missouri, report more than 60 rides per inhabitant. There are 7 states and territories which show less than 10 street railway rides per inhabitant, and in no one of these, except Kansas, does the proportion of urban to total population exceed 12 per cent.

A comparison of the number of rides with the number of urban inhabitants in the several states gives some idea of the comparative extent to which street railways are developed, and also of the extent to which they are patronized by those within reach of their service. The number of rides and the number of
urban inhabitants are somewhat less closely related items in such states as Michigan, Ohio, and Indiana, where interurban railways have been developed very
extensively, than in states like New York and Pennsylvania, where the great bulk of railway traffic is still confined to urban areas.

Table 10.-RELATION OF PASSENGER TRAFEIO TO TOTAL POPULATION AND URBAN POPULATION (PLACES OF 4,000 INEABITANTS OR OVER), BY STATES AND TERRITORIES: 1902. ${ }^{1}$



States having one or two very large cities may be expected to show a higher proportion of rides to urban inhabitants than states which have an equally large percentage of urban population scattered in smaller towns. Thus, in California, which has the highest proportion of rides to urban population (251), the cause is found in the fact that a large proportion of the street railway trackage is in San Francisco, whose hilly streets compel general resort to this method of travel. New York, with her enormous metropolis, ranks third in the ratio of passengers to urban population. The steep streets of the cities in Washington account in part for the high ratio of rides to urban inbabitants in that state. The other states which show more thán 150 rides per urban inhabitant are, in the order named: District of Columbia, Pennsylvania, Missouri, West Virginia, Colorado, Massachusetts, Illinois, Maryland, Oregon, Louisiana, Rhode Island, anḍ Ohio.

Only 5 states report fewer than 20 rides per urban inhabitant, and in noue of these except Kansas is there a city of more than 25,000 population. The report of the total number of rides for Kansas is quite misleading, since the passengers belonging to Kansas City, Kans., and smaller adjacent towns are included in the returns of the Metropolitan Street Railway, of Kansas City, Missouri.

## II.

TRAFELO OF GOMPANIES, OLASSIFIED ACCORDING TO POPulation.

Table 11 is a summary of the most important items relating to traffic for street and electric railways as classified on the second basis described in Chapter I, according to the population of the centers in which they lie, with the further distinction of "tast, long," and "other" interurban railways.

Table 11.-TRAFFIC OF COMPANIES, CLASSIFTED ACCORDING TO POPULATION: 1902. ${ }^{1}$

|  | Total. | URBAN CENTERE, POPULATION. |  |  |  | interurban railwayg. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Over 500,000. | $\begin{gathered} 100,000 \\ \text { but under } \\ 500,000 \text {. } \end{gathered}$ | $\begin{gathered} \text { '25,000 } \\ \text { but under } \\ 100,000 . \end{gathered}$ | $\begin{aligned} & \text { Under } \\ & \text { 25,000. } \end{aligned}$ | Fast, long. | Other. |
| Number of emmpanies. | 2813 $4,774,211,904$ | 2,456,542, ${ }^{670}$ | 994, ${ }^{4} \mathbf{4 7}$ | 433, 04985 | 195,219,315 | 113, 820.75 | 581, 251, 824 |
| Fare passengers ....... | 1,774, 211,934 $1,062,403,392$ | $2,450,542,270$ $608,062,946$ | 294, $2767,401,373$ | 433, $6794,895,795$ | $195,219,320$ $17,255,506$ | $113,820,795$ $12,158,768$ | $581,251,824$ $80,829,009$ |
| Trantier phesengers ...i...................ed | 1,02212, 217 | 40, 491,418 | - 279, 320 | -15, 150,278 | 17, 87,711 | $12,158,709$ 40,139 | 80, 829, 96,888 |
|  | 1,120, 101, 944 | 504,811,418 | 239, 940, 699 | $115,411,493$ | 68,571,907 | $45,358,873$ | 151,007,554 |
| Frate pasemgers per passenger-car mile. . . . . . . . . . . . . . . . | 424, 325,522 |  |  | 364,733 | 617,901 | 1,719, ${ }^{2.51}$ | 3.85 $2,902.533$ |
| Miledge of frelght, mail, express, and other misuelaneous cars | 1, 144, 430,466 | 522,653, 523 | 240, 762,647 | 115, 775,826 | 617,901 $64,189,808$ | $1,719,402$ $47,078,275$ | $\begin{array}{r} 2,902,583 \\ 753.970 .187 \end{array}$ |
| Totar mides mer mile of track eonstructed......................... | 1,14, 50, 820 | 104,554 | 67,693 | 15, 40,176 | -4, 28,840 | -16,627 | $\begin{array}{r} 70,087 \\ 25,568 \end{array}$ |
| Actiderits | 1,217 | 491 | 221 | 124 |  |  | 202 |
|  | 47, 429 | 18,289 | 19,518 | 3,109 | 632 | 1,481 | 202 4,400 |

${ }^{2}$ Exelusive of reports for 4 eompanies which failed to furnish this information.
EIncindes 2 railways carrying freight only.


The data in Table 12 are for the same statistical inquiries as in Table 11, but they apply only to full-time
electric surface railways not furnishing commercial lighting.

Table 12.-TRAFFIC OF FULL-TME ELECTRIC SURFACE RAILWAYS, WITHOUT COMMERCIAL LIGHTING, CLAESIFIED ACCORDING TO POPULATION: 1902.1

|  | Total. | URban centers, poptlation. |  |  |  | interubban railways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Over 500,000. | $\begin{aligned} & 100,000 \\ & \text { but under } \\ & 600,000 . \end{aligned}$ | $\begin{gathered} \text { 25,000 } \\ \text { but ninder } \\ 100,000 \text {. } \end{gathered}$ | Under 25,000. | Fast, long. | Other. |
| Number of companies. | ${ }^{2} 570$ | 48 | 38 | 68 | 168 | 42 | 206 |
| Fure masemgers..... | 4,062, 447,908 | 2, $107,329,902$ | 902,383, 125 | 821, 659, 518 | 128, 002,963 | 85, 162, 271 | 517, 360, 134 |
| Traneier pasungers . ......................... | $\begin{array}{r}991,946,863 \\ 3216,365 \\ \hline 20\end{array}$ | 591, 326,985 | 251, 242,686 | 68, 195,785 | 10, 913,058 | 9,227, 851 | 71,040,648 |
| Fare prasemgers jer mile of track constructed | 912,021,415 | 427,973, 469 | 220,024, 58. | 86, 230,739 | 39, 925,204 | - 38,2263 | -130 101, 7798 |
| Fare pasengers per pasenger-car mile | 4.31 | 4.4.92 | 4. 10 | 3.78 | 3. 3.26 | 50, 28.39 | 132, 776, 316 |
| Milduge of freight, mail, express, and othermiscellaneouscars | 4 11, 776, 544 | 46,419,906 | 821,948 | 219,872 | 312,973 | 1,369,315 | 2,682, 380 |
| Total ear miles, ............................................... | 953,797, 959 | 434, 893, 375 | 220,846, 582 | 86, 45\%, 506 | 39,786, 232 | 36,954, 468 | 135, 408, 846 |
| Car miles per mile of track construeted.......................... | 60, 737 | 92,045 | 67,921 | 40,517 | 29,417 | 16,588 | 26,471 |
| Accidents: |  |  |  |  |  |  |  |
| Peroms killed. | 1,059 42,740 |  | 16. 200 | - 96 | 57 | 68 | 178 |
| Persminsinjured... .............................................. | 42,740 | 18,117 | 16, 974 | 2, 440 | 453 | 1,133 | 3,623 |

Exclusive of reports for 2 companies which failed to furnish this information. a 2 ralways carrying freight only

Though the presence or absence of a lighting plant in connection with a street railway does not materially affect its traffic conditions, yet for the purpose of comparison with the financial tables, the group of electric railways without commercial lighting only is included in Table 12.

Number of passengers.-The first conspicuous fact which appenrs in Table 11 is that $2,456,542,270$, or more than one-half of all fare passengers on street and interurban railways, were carcied by companies in the few urban centers of more than 500,000 population. Urban railways in cities and towns of less than 100,000 population carried less than one-seventh of all fare passengers.
It should. be noted that a considerable proportion of the fare passengers of companies classed as interurbon are carried wholly within the limits of urban communities, and especially of communities of less than 100,000 population. Thas the whole urban traffic of several important cities, such as Detroit, Mich., Lawrence, Lowell, Worcester, Springfield, and Fall River, Mass., Hartford and New Haven, Conn., and Canton, Akron, and Youngstown, Ohio, is handled exclusively by companies classed, in accordance with the criteria mentioned in Chapter I, as interurban. Even with the deductions indicated, however, the amount of interurban street railway traffic in its strict sense is very con-

Exclusive of trackage of 2 rall ways carrying freight only
${ }^{4}$ Includes $8,883,73 \mathrm{c}$ carmilesrun by Locomotiveson Brooklyn Rapid Transit Railway.
siderable. The relative importance of the traffic on the fast, long interurban lines does not fully appear from. the statistics of the number of fare passengers, since the average length of journey of passengers and the average fare paid by them on these railways are considerably greater than on urban railways. On the slower interurban lines included in the last column of Table 11, it is frequently the practice to collect separate 5 -cent fares for different stages of a journey, so that a single passenger may be reported two or more times; but this practice does not usually prevail on the faster interurban lines, where the business is conducted more in the manner of a steam railway.

The use of free transfors is naturally more developed in great cities having many interlacing street railway lines than in small towns, where cars often run over only a single route, or on interurban railways. The free transfers of elevated railways are not reported, even when they are allowed. In judging the extent to which the transfer system is developed in cities of different sizes, it is preferable to confine attention to full-time electric surface railways without commercial lighting.

For such railways the proportion of free transfers to fare passengers for the largest urban centers, 28.2 per cent, is about the same as for those of the second group, 27.8 per cent. The corresponding proportions
of transfer to fare passengers on railways falling within the other groups are as follows: Urban centers of 25,000 to 100,000 inhabitants, 18.1 per cent; urban centers of less than 25,000 inhabitants, 8.5 per cent; fast, long interurban lines, 10.8 per cent; other interurban lines, 13.7 per cent.
Relation of traffic to population as affected by size of cities.-The influence of the size of cities served by street railways on the amount of their business can be measured only by comparing the number of passengers within each of the urban groups in Table 11 with the aggregate population of the group. Such a comparison, however, is difficult, since many railways that are primarily urban in character extend into rural communities, though serving only an unknown fraction of the population of such communities, while roads that are essentially interurban in character also carry urban passengers. These complexities are so conspicuous in the case of the smaller cities and towns that it is impossible to make a satisfactory comparison between traffic and population for the two groups of urban centers of less than 100,000 population as a whole. From these two groups, however, a considerable number of typical urban centers have been selected, in which the largest part of the street railway traffic lies within municipal limits. The names of the centers thus selected and the population and traffic in each are shown in Tables 13 and 14.
Table 13.-Relation of trackage and traffic to population in selected urban centers with population of from 25,000 to 100,000: 1902.

| NAME OF CENTER. | Population of center. | number of pasSENGERS. |  | NUMBER OFMLES OFTRACK. |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total. |  | Total. |  |
| Total. | 1,258, 615 | 135,842,812 | 107.9 | 951.93 | 0.76 |
| Montgomery, Ala | 30,346 | 1,849,395 | 60.9 | 20.00 | 0.66 |
| Little Rock, Ark | 38,307 | 3, 841, 415 | 100.8 | 20.70 | 0.54 |
| Sacramento | 29, 282 | 3,948,791 | 134.9 | 23. 50 | 0.80 |
| Pueble, Colo | 28, 157 | 4, 065, 162 | 144.4 | 86, 25 | 1.29 |
| Meriden, Wallingford, Conn... | 31, 038 | 2, 889,787 | 83.5 | 19.50 | 0.68 |
| Augusta, Summerville, Ga.... | 42,686 | 2,360,674 | 55.3 | 31.02 | 0.73 |
| ria, Peoria Heights, In....... | 60, 340 | 6,750,000 | 111.9 | 41.25 | 0.68 |
| Quincy, Ill | 86,252 | 2, 127,623 | 58.7 | 17.38 | 0.48 |
| Rockford, Ill | 81, 051 | 1,989,080 | 64,1 | 28.00 | 0.74 |
| Springfield, Ridgely, Ill | 35, 328 | 3, 532,018 | 100.0 | 23.88 | 0.67 |
| Evansville, Howell, In | 60, 428 | 3, 629,534 | 60.1 | 90. 50 | 0.50 |
| Dubuque, Iowa | 36,297 | 2,391,355 | 65.9 | 20.85 | 0.57 |
| Sioux City, Iowa; South Sioux City, Nebr | 84,000 | 4,188,944 | 121.7 | 48.00 | 1.26 |
| Topeka, Kans. | 88,608 | 2,780, 287 | 81.2 | 28.63 | 0.85 |
| Lexington, KY | 26, 369 | 2,350,682 | 80.1 | 15.13 | 0.57 |
| Bay City, West Bay City, Essexville Mich | 42,386 | 1,986,982 | 46.9 | 28.30 | 0.55 |
| Duluth, Minn.; Superior, Wis.. | 84, 060 | 9,418,517 | 112.0 | 73.84 | 0.88 |
| Dayton, Ohio | 85, 333 | 14, 667, 094 | 171.9 | 52.88 | 0.62 |
| Springfleld, Ohio .............. | 38,253 | 3,784, 338 | 98.9 | 28.18 | 0.74 |
| Altoona, Gaysport, Juniata, Bellwood, Pa | 46,034 | 4,759, 279 | 103, 4 | 27,50 | 0.60 |
| Williumsport, South Williams- |  |  |  |  |  |
| port, ${ }_{\text {pallas, }}$ | 32,085 42,688 | $\begin{aligned} & 2,582,297 \\ & 6,574,779 \end{aligned}$ | $\begin{array}{r}80.5 \\ 154.2 \\ \hline\end{array}$ | 16.41 46.30 | 0.51 1.09 |
| Galyeston, Tex | 37,789 | 2, 851,603 | 75.5 | 85.86 | 0.95 |
| San António, Tex | 63,321 | 5,268, 627. | 98.8 | 45.51 | 0.85 |
| Salt Lake City, Murray, Utah.. | 66,833 | 10,631,591 | 187.1 | 78.04 | 1.87 |
| Richmond, Va | 85,050 | 16, 318,560 | 191.8 | 48.96 | 0.52 |
| Spokane, Wash | 86,848 | 5, 028,388 | 186.5 | 86.55 | 0.99 |
| La Crosse, Onalaska | 30,263 | 1,706,728 | 56.4 | 17.11 | 0.57 |
| Oshkosh, Neenah, Wis | 34, 238 | 1,973,843 | 57.7 | 32.00 | 0.93 |

Table 14.-Relation of trackage and traffic to population in selected urban centers with papulation of less than 25,000: 1902.

| name of center. | Population of center. | NUMBER OF PASSENGERS. |  | NUMBER OF MHES OFTRACK. |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total. | Per <br> unit of <br> рори- <br> lation. | Total. | Per 1,000 of popirlation. |
| Total | 718,254 | 49,179,495 | 68.5 | 485.95 | 0.68 |
| Fort Smith, A | 11, 587 | 731,558 | 68.1 | 8.93 | 0.77 |
| Riverside, Cal | 7,973 | 547,051 | 68.6 | 9, 52 | 1.19 |
| San Diego, Cal | 17, 700 | 2,220,000 | 125. 4 | 16.60 | 0.94 |
| Santa Barbara, Ca | 6,587 | 814,465 | 123. 6 | S. 50 | 1.29 |
| New London, Conn | 17, 548 | 1, 320,791 | 75.3 | 8,51. | 0.48 |
| Stamiord, Greenwich, Co | 18, 417 | 1,327,617 | 72.1 | 12.69 | 0.69 |
| Pensacola, Fla | 17,747 | 998,290 | 50.12 | 9.00 | 0.51 |
| Athens, Ga.... | 10,245 | 356,969 | 34.8 | 0.53 | 0.64 |
| Alton, North Alton, Upper Alton, Ill | 17, 487 | 1,497,130 | 85.0 | 15.25 | 0.70 |
| Cairo, Ill | 12,566 | 870,838 | 69.3 | 9.67 | 0.77 |
| Kankakee, Bradley, Bourbonnais, T1. | 15,708 | 714,769 | 45,5 | 12.78 | 0.81 |
| Vincennes, Ind | 10,249 | 450,000 | 43.9 | 8.00 | 0.78 |
| Burlington, Iowa | 23, 201 | 1., 600,000 | 69.0 | 14.50 | 0.62 |
| Muscatine, Iowa | 14,073 | 805, 120 | 01.5 | 8.60 | 0.61 |
| Ottumwa, Iowa | 18, 197 | 1,211,028 | 86.6 | 10.00 | 0.55 |
| Atchison, Kan | 15, 722 | 538,867 | 34.0 | 9.00 | 0.67 |
| Wichita, Kans | 24,671 | 1,460,000 | 59.2 | 18.50 | 9. 75 |
| Shreveport, La | 16,013 | 1,450,000. | 90.15 | 8.80 | 0.55 |
| Biddeford, Saco, Me | 22, 267 | 728,909 | 32.7 | 8.15 | 0.37 |
| Benton Harbor, St. Joseph, Mich . | 11,717 | 1, 198,896 | 102.3 | 10.50 | 0.90 |
| Marquette, Mich.................... | 10,058 | -873,672 | 37.2 | 7.00 | 0. 70 |
| Menominee, Mi | 12,818 | 529,764 | 41.3 | 6.71 | 0.52 |
| Vicksburg, Miss | 14,834 | 1,188,289 | 80.1 | 8.75 | 0. 59 |
| Springfleld, Mo | 28,267 | 1,700,715 | 73.1 | 19.10 | 0.82 |
| Great Falls, Mon | 14,930 | 939, 436 | 6.9 | 11.90 | 0.80 |
| Concord, N. H | 19,632 | 1,510,856 | 77.0 | 12.71 | 0. 65 |
| Laconia, $\mathrm{N} . \mathrm{H}$ | 8,042 | 486,171 | 54.2 | 8.87 | 1.10 |
| Long Branch, Deal, Allenhurst, Asbury Park, Bradley Beach, Neptune City, Relmar, N. J.... | 16,148 | 3,737,541 | 231. 1 | 23.68 | 1.47 |
| Perth Amboy, Netuchen, N. J.... | 19,485 | 880,128 | 45.2 | 9.06 | 0.46 |
| Dunkirk, Fredonia, N. Y. | 15, 743 | 681,770 | 43.3 | 7.00 | 0.44 |
| Kingston, N. Y. | 24,535 | 2, 217,334 | 90.4 | 9.16 | 0.37 |
| Ogdensburg, N, Y | 12,083 | 478,283 | 37.9 | 10.00 | 0.79 |
| Ashtabula, Ohio | 12, 949 | 999,857 | 77.2 | 5.75 | 0. 44 |
| Lima, Ohio . | 21,723 | 1,375,979 | 68. 3 | 18.55 | 0.85 |
| Tiftin, Ohio | 10,989 | 482,000 | 48.9 | 7.33 | 0.67 |
| Zanesville, Ohio ................... | 23,588 | -1,800,000 | 76.5 | 10.00 | 0.42 |
| Sayre, Athens, Pa; Waverly, N. Y. | 9,481 | 1,059,507 | 111.8 | 9.11 | 0.96 |
| Tarentum, New Kensington, Pa.- | 10,137 | 622, 447 | 61.4 | 6.61 | 0.65 |
| Greenville, S. C. ..................... | 11,860 | 537,603 | 45.3 | 7.00 | 0.59 |
| Austin Tex. | 22,258 | 1,213,703 | 54.5 | 13.38 | 0. 60 |
| Waco, Tex. | 20,686 | 1, 605, 625 | 77.6 | 16.29 | 0. 79 |
| Ogden, Utah | 16,813 | 861,910 | 52.8 | 11.00 | 0.67 |
| Burlington, Winooski, V | 22,423 | 1,270,136 | 58.6 | 11.22 | 0.50 |
| Everett, Wash. | 7,888 | 971,650 | 124.0 | 9,65 | 1.23 |
| Ashland, Wis. | 13,074 | 603,658 | 38.5 | 7.68 | 0.69 |
| Janesville, Wis. | 13,185 | 304,398 | 23.1 | 7.41 | 0.56 |

The totals for the selected towns are shown in Table 15, which also presents a comparison of population and traffic for the two groups of urban centers of more than 100,000 population, the statistics including all the cities of each group. The details for individual cities of these two groups are given on page 24.

Table 15.-Relation of trackage and traffic to population in groups of urban centers: 1909.


The totals of population and traffic for the four groups present a fairly correct view of the density of street railway traffic in its relation to the size of cities. The table also shows the relation of trackage to population. A discussion of the relation betreen population and tratfic in the case of interurban railways will be found in Part I, Chapter VII.

The proportion of street railway trackage to the population is considerably less in cities of orer 500,000 population than in other cities. In the largest cities, with their closely built houses and tenements, the number of inhabitants tributary to a given trackage is greater than in smaller cities, even though street railways in the more thickly populated parts of these large cities may be run on almost every street. In the smallest cities, however, the total populated area is so restricted that a large proportion of the people find little occasion to use street railways at all, and so the proportion of trackage to population is not materially different from that in cities of from 100,000 to 500,000 inhabitants, though the population of smaller cities is much more scattered. Indeed, the trackage per 1,000 inhabitants in selected centers of less than 25,000 inhabitants is actually less than that reported for centers of from 25,000 to 100,000 inhabitants.
As the size of the urban center diminishes the number of street railway rides per inhabitant decreases rapidly. In cities of more than 500,000 inhabitants each person, on the average, rode 289 times during the year, while in the selected centers of less than 25,000 inhabitants each person rode, on the average, only 68 times during the year. In comparing passengers with population in the larger cities it should be borne in mind that the great numbers of transient visitors to such cities, who are not enumerated in the census of population, contribute materially to the street railway traffe. Due allowance for this fact having been made, it yet remains true that the permanent residents of such cities patronize the railways much more than the inhabitants of small towns. The reason for this fact is obvious. As cities increase in size a constantly greater proportion of the people, despite the crowding together, live far from their places of business and are forced to use the street railway daily.

Density of trafic per mile of track. -In comparing the number of passengers per mile of track in urban centers of different sizes, as shown in Tables 11 and 12, it should be borne in mind that the average distance traveled by passengers is greater in the large cities than in those of smaller population. Despite this fact, the proportion of fare passengers carried to track mileage increases very rapidly as the size of urban centers increases. In urban centers of the first group the railways, as a whole, in 1902 carried 491,418 fare passengers per mile of track, while the full-time electric surface railways, without commercial lighting, as shown in Table 12, carried 446,527 fare passengers per mile. The traffic on
such electric surface lines in urban centers of 100,000 to 500,000 population is only about three-fifths as dense; in centers of 25,000 to 100,000 inhabitants, about onethird as dense; and in still smaller urban centers, about one-fifth as dense, as on similar railways in the Jargest cities.

The number of fare passengers per mile of track on fast, long interurban lines, without commercial lighting, operating the entire year, was 38,226 , and on other interurban lines covered by Table 12, 101,593. On the fast, long interurban railways the average ride of passengers, however, is decidedly longer than on urban railways.

Averages for density of traffic might be vitiated by the undue influence of a few companies having extremely high or extremely low density of traffic. To guard against such errors Table 16 has been prepared, which shows the number of street railways within each popalation group reporting traffic of different degrees of density.
Table 16.-Distribution of full-time electric surface railway companies without commercial lighting, in the various poputation groups, according to number of fare passengers carried per mile of trach operated: 1902.²


1 exclusive of reporis for companies carying freight only and 2 companies
hien failed to fumish this information.
T primarily electric surface railways, and not furnishing commercial lighting. The companies, of course, differ greatly in the amount of track operated. Thus there are in some of the large cities a considerable number of small railway lines, usually in the outskirts, the traffic of which is insignificant as compared with that of the one or more great systems which serve the larger part of the population. For this reason, while the average number of passengers per mile for all full-time electric surface railways without lighting plants in urban centers of more than 500,000 population was 446,527 , only 13 of the 48 such companies had more than 400,000 fare passengers per mile of track. These 13 companies, however, operated $2,486.69$ miles of track, or 52.7 per cent of the mileage for the entire group.
Only 4 of the 38 companies operating in urban centers of from 100,000 to 500,000 inhabitants showed more than 400,000 fare passengers per mile, and these

4 companies reported only 347.84 miles of track, or less than 10 per cent of the total for the entire group. On the other hand, 15 companies, with 45.6 per cent of the entire trackage of the group, fall within the limits of 200,000 to 300,000 fare passengers per mile of track. The average number of fare passengers for all fulltime electric surface railways without lighting plants, in cities of this group, 277,509 per mile, thus corresponds fairly with the figures for a large proportion of the companies and the larger part of the trackage.
In cities of from 25,000 to 100,000 population there are no electric surface railways with more than 400,000 fare passengers per mile, and only 10 with more than 200,000 , while 40 out of the 68 companies carried between 100,000 and 200,000 fare passengers per mile. Here again, then, the proportion for the larger number of companies corresponds broadly to the arithmetical average for the group as a whole, 150,739 passengers per mile.

Only 8 of the 168 full-time electric surface companies in urban centers of less than 25,000 population reported more than 200,000 fare passengers per mile of track, while 75 of the companies carried between 50,000 and 100,000 passengers per mile of track. The average for the entire group, $95,20 \pm$, is thus seen to correspond fairly with the ratio of passengers to trackage in the case of a large proportion of the companies in the group. Much the larger proportion of interurban railways of both classes carried, in 1902, less than 100,000 passengers per mile of track, and a considerable number of companies in each of these groups reported less than 25,000 passengers per mile of track.

Further information in regard to the relation of density of traffic to population may be gained from the statistics for indiridual urban centers presented in Tables 13, 14, and 19.

Of the 8 centers of more than 500,000 population, 3 show more than 400,000 fare passengers per mile of track, and all but Baltimore show more than 300,000 . Of the 24 urban centers of from 100,000 to 500,000 population, only 3 report less than 200,000 passengers per mile, and only 2 show more than 400,000 . Of the 29 selected urban centers of from 25,000 to 100,000 population, 9 have less than 100,000 passengers per mile of track, and only 2 have more than 200,000 . Of the 46 selected towns of less than 25,000 inhabitants, 27 show less than 100,000 passengers per mile of single track, and only 6 report more than 150,000 .

Car mileage.-The figures showing the number of car miles run in urban centers of different sizes and on interurban railways (Tables 11 and 12), require no special comment. The relation of car mileage to trackage and to passengers carried is more significant, although comparisons between different population groups are rendered uncertain by the great difference in the size of cars. The proportion of car mileage to the length of track naturally increases, like the proportion of pas-
sengers to trackage, as the population of the area served increases. The number of car miles per mile of track for companies of all classes ranges from 28,840 in centers of less than 25,000 population to 104,554 in centers of more than 500,000 population. On interurban railways, particularly those of the fast, long class, larger cars are run than in cities, a fact which accounts, though of course only in part, for the smaller number of car miles per mile of track.
Passengers per car mile.-The average number of fare passengers per passenger-car mile on all street railways in urban centers of more than 500,000 inhabitants was 58 per cent more than the average for urban centers of less than 25,000 , the figures being 4.87 and 3.07, respectively. For full-time electric surface railways, without commercial lighting, the largest urban centers show 4.92 fare passengers per passenger-car mile, and the smallest 3.26. Between the two extremes there is a steady gradation in the density of traffic per car mile.
Naturally these proportions do not show such wide differences between the groups of urban centers as appear in regard to density of traffic per mile of track, since the number of cars can be adjusted rather closely to the amount of patronage. It is probable that as between the largest cities and the smallest urban centers there is as great a difference in the average size of cars as in the number of passengers per car mile. The effect of this difference in size, however, is almost beyond question fully counteracted by the longer average rides of passengers in great cities. The statistics of passengers per car mile, therefore, seem to indicate that the cars are more generally crowded in large cities than in smaller towns, a point which is borne out by cómmon observation. The ratio of passengers to car mileage on fast, long interurban railways as a group can not properly be compared with the similar ratios for urban lines.

Table 17 shows, by population groups, the number of full-time electric surface railway companies, without commercial lighting plants, reporting specified numbers of fare passengers per passenger-car mile.

When the relative length of track operated by each company is taken into account, the figures confirm in a general way the conclusion, drawn from the averages in Table 12, that the number of passengers per car mile is greater in the large urban centers than in the small ones and greater on urban lines than on interurban lines. While only 18 of the 48 companies in urban centers of more than 500,000 population report 4 or more passengers per car mile, these companies have $3,612.35$ miles of track, or 77 per cent of the total mileage for the group. A detailed examination of the other data in Table 17 will show that the average number of passengers per car mile for all railways of this class, in the various other population groups, corresponds fairly well with the actual ratio reported by the greater number of companies in the respective groups.

Table 17.-Disiribution of full-time electric surface railuwy companies without comemercial lighting, in the various population groups, according to number of fare passengers carried per passenger-car mile: 1902. ${ }^{1}$

| parsengers per carmle. | number of companies. |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Total, | Urban eonters, population. |  |  |  | Interurban railways. |  |
|  |  | 500,000 and over. | 100,000 | $\begin{gathered} 25,000 \\ \text { but } \\ \text { buder } \\ 100,000 . \end{gathered}$ | $\begin{aligned} & \text { Under } \\ & 25,000 \text {. } \end{aligned}$ | Fast, long. | Other. |
| Total. | 568 | 48 | 38 | 68 | 168 | 42 | 204 |
| Under $1 . .$. | 4 | 2 |  |  |  | 1 | 1 |
| 2 but under 3 . | 146 | 10 | 6 | 18 | 68 | 9 | 4 |
| 3 but under $4 . . . . . . . . . .$. | 174 | 14 | 16 | 18 | 47 | 5 | 74 |
| 4 but under $5 . .$. | 98 | 6 | 11 | 21 | 20 | 4 | 36 |
| 5 but under 6 | 41 | 5 | 5 | 6 | 11 | 2 | 12 |
| 6 but under $7 . . .$. | 14 | , |  | 1 | 4 |  | $\stackrel{4}{3}$ |
| 7 and over... | 8 | 2 |  |  | 4 |  |  |

Mileage of freight, mail, cappress, and other miscellaneous cars.-For all classes of companies the greatest absolute mileage run by freight, mail, express, and other cars, including steam locomotives, as shown by Table 11, is found in urban centers of more than 500,000 population, the distance covered by such cars in these centers being $17,842,405$ miles, or 3.4 per cent of the total of the car mileage for this group. Of this mileage 15,201,570 miles represent the distance traveled by stean locomotives on the elevated lines in New York and Brooklyn. The mileage of freight, mail, express, and other nonpassenger cars on street railways in urban centers of from 100,000 to 500,000 population and in urban centers of from 25,000 to 100,000 population is, in each case, less than $0 . t$ per cent of the total car mileage, and in centers of less than 25,000 inhabitants, less than 1 per cent. On fast, long interurban railways the mail, and still more, the froight and express traffic, are relatively much more important than on urban lines. The mileage run by other than passenger cars on such fast, long interurban railways was 3.7 per cent of their total car mileage in 1902, and on the other group of interurban railways 1.9 per cent of the total. A single company, however, the Old Colony Railway, of Massachusetts, contributed 700,927 of freight, mail, express, and other car miles, or more than one-fourth of the total for the sixth group.
Some idea of the complexity of the business of modern large street railway systems may be gained from the following classified presentation of the statistics of car mileage of two of the leading companies of New York, the Brooklyn Rapid Transit Company and the Manhattan Elevated Railway Company, for the year ending June 30, 1902. The Brooklyn system reports a much greater variety of cars, for the reasons that it operates both surface and elevated lines and that it keeps its records in greater detail than the Manbattan Company.

Detailed statistics of ar mileage of Brooklyn Rapid Transit Company and Manhattan Ruilway Company.

| class of cars. | Number of car miles. |  |
| :---: | :---: | :---: |
|  | Brooklyn Rapid Transit. | Manhattan (elevated) Railwas. |
| Passenger cars: |  |  |
| Revenne.............. | $\begin{array}{r} 52,684,980 \\ 951,519 \end{array}$ | $\begin{array}{r} 4,631,618 \\ 440,125 \end{array}$ |
| Total | 53,636,529 | 45, 071, 743 |
| Miscellaneous cars: |  |  |
| Mril. | 163,785 |  |
| Express. | 159, 662 |  |
| Foreign compunies | 21, 798 |  |
| Flat | 72,166 | 141,851 |
| Wrecking. | 2,035 |  |
| Pay... | 12,005 | 6,788 |
| Ash... | 67,123 |  |
| Shop cars. |  | 23,174 |
| Collectors and ticket cars |  | 31,449 |
| Sprinkling . | 2,240 |  |
| Snowplows and sweepers. | 2,305 |  |
| Sther....... | ${ }_{6}^{4,596}$ |  |
|  |  |  |
|  |  |  |
| Ingines (elevated) : |  |  |
| Light (nomrevenue) | - 5888,728 | 10, 985,792 |
| Supply and miscellaneous. | 58, 616 | 90, 897 |
| Total | 3,983,738 | 11,217,837 |
| Total mileage of all sort. | 58, 189, 766 | 56, 492, 842 |

A conspicuous feature of these statistics is the large amount of mileage of passenger cars and of locomotives in passenger service on the elevated lines from which no direct revenue is derived. Such "light" mileage oceurs chiefly in the switching of cars, in running cars to the barns or terminals after their day's service is completed, and in taking the additional cars required during the rush hours to and from the part of the line where they are needed. The mileage of "light" cars is included in the passenger-car mileage in the general tables. The school cars mentioned are used for the instruction of motormen. The ash cars carry away the ashes from locomotives and from power-plant boilers. Flat cars and working cars of other sorts are used in conveying coal and other operating supplies and in construction and repair work.

Car hours.-The incompleteness of the returns of car hours makes it impossible to present an accurate comparison of the different groups of urban centers as regards the number of fare passengers carried per carhour operated. Some idea of the relative density of traffic as thus measured may be gained, however, from the statisties for selected companies. Of important surface railways in urban centers of more than 500,000 inhabitants only five keep records of car hours, three of these being in Chicago, one in Boston, and one in St. Louis. The number of passengers per car hour ranges from 26.99 for the Consolidated Traction Company, of Chicago, Ill., to 41.04 for the St. Louis Tramsit Company, of St. Lotis, Mo. Fourteen of the leadingrailways in urban centers of from 100,000 to 500,000
population present these statistics, and with them the number of passengers per car hour ranges, on the face of their returns, from 12.62 for the Louisville Railway Company, of Louisville, Ky., to $64.3 t$ for the St. Joseph Railway, Light, Heat, and Power Company, of St. Joseph, Mo. The figures for the other reporting companies in this group vary between 24.94 and 45.97 . Fifteen of the selected companies-Table 13-in centers of from 25,000 to 100,000 population, and twenty of the selected companies-Table 14-in centers of less than 25,000 population also reported car-hour figures. For all electric surface companies reporting car hours in the first two groups of urban centers and for the selected companies in the other two urban groups the average numbers of passengers per car hour were re-
spectively as follows: In urban centers of more than 500,000 inhabitants, 39.96 ; in centers of 100,000 to 500,000 inhabitants, 31.35 ; in centers of from 25,000 to 100,000 inhabitants, 25.42 ; in centers of less than 25,000 inhabitants, 24.04. The ratio of fare passengers to car hours appears, therefore, to increase regularly with increasing population.
Accidents.-The following table shows for all street railways, and separately for all full-time electric surface railways (including those with commercial lighting) classified according to population of the urban centers served, the number of persons killed and injured during the census year 1902, and the proportion which fatal accidents bear to car mileage:

Tabis 18.-ACCIDENTS ON RAILWAYS, CLASSIFIED ACCORDING TO POPULATION: 1902.

|  | Total. | urban centers, population. |  |  |  | interurban hailways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | $\begin{aligned} & \text { 100,000 but } \end{aligned}$ | $\begin{gathered} 25,000 \\ \text { but under } \\ 100,000 \text {. } \end{gathered}$ | $\begin{aligned} & \text { Under } \\ & 25,000 \text {. } \end{aligned}$ | Fast, long. | Other. |
| All street railways: |  |  |  |  |  |  |  |
| Persons killed | $11,21.7$ 47,429 | 18, 4989 | 19,521 | 124 3.109 | 189 608 | + 981 | 4. 202 |
| Number of car miles run to each person kilied | 940,370 | 1,06.4, 468 | 1,089, 424 | 939,676 | 721, 234 | 523,092 | 762,228 |
| Electric suriace funl-time rail ways: |  |  |  |  |  |  |  |
| Persons killed. | 11, 168 | 460 | 220 | 119 | 187 | ${ }^{85}$ | 199 |
| Persons injured - ${ }^{\text {Number of car miles rum to exch person kilied }}$ | 46,988 | 18,117 | 79, 148 | 3,054 | 611 | 1,4144 | 4,299 |
| Number of car miles rum to each person killed | 892, 477 | 9:44,383 | 1,080,450 | 984,993 | 605, 140 | 616,448 | 782,914 |

${ }^{1}$ This number does not include one fatal accident on a railway not reporting car miluage. See also notes to Table s.

While according to the returns more than twice as many persons were killed on street railways in urban centers of over 500,000 population as on those in centers of from 100,000 to 500,000 population, the number of injured reported was actually smaller. In the absence of detailed knowledge of local conditions, it is impossible to present any sufficient explanation of this wide discrepancy. It may be due in some measure to differences in the degree of completeness with which returns of injuries are made.
Taking the average for all railways, $940,370 \mathrm{car}$ miles were run to each person killed. The risk of fatal accident was apparently least in cities of from 100,000 to 500,000 population. That it was somewhat greater in the largest urban centers than in urban centers of from 100,000 to 500,000 population is perhaps due to the greater crowding of the streets. The fact that the proportion of fatal accidents to car mileage was in 1902 higher in cities of 25,000 to 100,000 than in the larger cities, and still higher in cities of less than 25,000 population, is not readily explicable. There remains a large element of doubt as to whether the figures reported for the single year are typical of general conditions.

As might have been expected, the risk of fatal accidents was apparently considerably higher on fast, long interurban railways than elsewheré, one person being killed to each 523,092 car miles operated by such railways. The high speed maintained by interurban cars, combined with the inadequate protection of crossings and the often imperfect signaling devices, serve to explain, at least in part, this high proportion of fatal accidents.

## III.

## IRAFFIC AND TRACKAGE IN SELECTED URBAN CENTERS.

A more vivid picture of street railway conditions, and of the development which has taken place between the two census periods, can be obtained from the data for individual cities than can be gained from averages. Table 19 shows for 1890 and 1902 the length of track, the number of passengers carried, and the car mileage of street railways in each urban center having in 1900 more than 100,000 population. It shows also the relation of traffic to population at the two census periods and, for 1902 only, the ratio of passengers carried to trackage and to car mileage.

Table 19.-TRACKAGE AND TRAFFIO IN URBAN CENTERS OF 100,000 POPULATION AND OVER: 1902 AND 1890.

| URBAS CESTER. | POPUJATION, |  | MILES OF TRACK. |  | MEIES OFTRACK PERE1,000 POPU-LATION. |  | FARE PASSENGERSCARRIED. |  | PASSENGEAS PER INHABITANT. |  | Passengers per MILE OF TRACK. |  | PASSENGERcar hilles. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 10091 | 1890 | 1902 | 1890 | 1902 | 1890 | 1002 | 1800 | 1902 | 1890 | 1902 | 1890 | 1902 | 1902 |
| Albany "Trov, Rensselaer, N. Y... | 216,530 | 207. 300 | 75.83 | 58, 57 | 0.35 | 0.88 | 26, 417,076 | 11, 197, 414 | 122 | 54 | 348,372 | 191,180 | 7,449, 410 | 3.5 |
| Abany, Troy, Rensselaer Md | 210, 288 | 435.887 | $36 \overline{0} .12$ | 156.55 | 72 | . 36 | 96,763,878 | 40,659, 982 | 190 | 93 | 265,019 | 259,725 | 23,330, 292 | 4.1 |
| Boston, Cambridge, Chelsea, Ererett, Malden, Nevton, Somerville, Brookline, Waltham, Mass | 927,991 | 704,768 | 451.68 | 271.94 | . 49 | . 38 | 228, 1.79,308 | 116, 646, 388 | 246 | 166 | 505,179 | 428,941 | 47, 524, 724 | 4.8 |
| Buffalo, Niagara Fulls, Lockport, Forth Tonawanda, N, Y | 421, 694 | 302,373 | 320.48 | 72.27 | 76 | . 24 | 74, 188, 881 | 17, 24, 388 | 176 | 57 | 231,381 | 238, 611 | 17, 290, 756 | 4.3 |
| Chicago, Inl. Hammond, Ind. | 1, 769,951 | 1,136,816 | 1,086. 24 | 390.33 | . 58 | . 34 | 410,284, 094 | 180,326, 470 | 232 | 159 | 395,935 | 461,985 | 102,366, 407 | 4.0 |
| Cincimati, Ohio; Newport, Cov- |  | 370,850 | 268.57 | 147.80 | . 61 | .40 | 86,208,384 | 41, 440,045 | 201 | 112 | 327, 080 | 280,379 | 23, 940, 175 | 3. 6 |
| ington, Ky | 429,137 | 264, 114 | 237.04 | 158.88 | . .58 | . 60 | 81, 370,202 | 39, 164, 773 | 201 | 148 | 343,276 | 246,505 | 18,768,515 | 4.3 |
| Clevelund, Ohio, and vicinity..... | 127, 422 | 204,114 89,479 | 106. 43 | 158.88 34.75 | . 84 | .39 | 20, 489, 927 | 8, 202, 662 | 208 | 92 | 248,895 | 236,048 | 5, 619, 476 | 4.7 |
| Columbus, Ohio, and vicinity ..... | 123, 1328 | 82,473 106,713 | 149.77 | 130.75 | 1. 12 | 1. 22 | 31,085, 443 | 21, 535,735 | 232 | 202 | 207, 554 | 164,709 | 6,458,908 | 4.8 |
| Denver, Cols <br> Indianerolis Ind | 169, 164 | 105, 436 | 109.86 | 70.00 | . 65 | . 66 | 80, 005, 026 | 9,863, 000 | 177 | 94 | 273, 120 | 140,900 | 6, 921,490 | 4.3 |
| Jersey City, Elizabeth, Hoboken, Patenson, Passaic, Newark, Bay" onne, Orange, N.J | 969,736 | 666,389 | 403.04 | 178. 89 | , 48 | . 27 | 148,09\%, 623 | 47,039,699 | 153 | 70 | 314,639 | 268, 395 | 24, 589,773 | 6.0 |
| Kankas City, Independence, Mo.; Kansas City, Argentine, Rosedule, Kans | 285,042 | 188,573 | 181.24 | 143. 08 | . 76 | . 76 | 57, 148, 083 | 41,669, 894 | 241 | 221 | 315, 317 | 291, 235 | 15,979,864 | 8.6 |
| Los Angeles, Pasadena, Santa Ana Orange, Cal. $\qquad$ | 118,746 | 60,394 | 164.16 | 144.79 | 1.38 | 2,40 | 30,803,080 | 10,524, 966 | $259^{\prime}$ | 174 | 187, 641 | 72, 691 | 9,533,269 | 3.2 |
| Inouinville, Ky........................... | 204, 731 | 161,129 | 147.13 | 128.00 | . 72 | . 79 | 34,508, 388 | 21,281, 584 | 168 | 132 | 234,510 | 166, 262 | 9,566,844 | 3.6 |
| Memphis, Teni. .................... | 102, 981 | 64,034 | 71.88 | 40.00 | . 70 | . 71 | 16,598,823 | 4,300,000 | 161 | 66 | 230,924 | 93,478 | 3,653,681 | . 5 |
| Milwauke, Whitefish Buy, Wauwatosa, Wis | 301,701 | 212, 557 | 145.50 | 97,06 | . 18 | . 46 | 46,974, 873 | 14,512,156 | 156 | 68 | 322,848 | 149,517 | 9,148, 023 | 6.1 |
| Minneapolis, St, Paul, stilwater, | 378,923 | 309,841 | 251.02 | 158.79 | . 66 | . 51 | $68,009,957$ | 26, 357, 532 | 166 | 85 | 251,016 | 165,990 | 12,895,343 | 4.9 |
| New Orleans, La.................... | 287,104 | 242,039 | 180.31 | 158. 14 | . 63 | . 68 | $53,184,273$ | 30, 510, 662 | 185 | 126 | 294, 960 | 199,234 | 17,810,169 | 3.0 |
| New York, Yonkers, White Plains, Mt. Vermon, New Rochelle, Pelham; N. Y. | 3,548, 096 | 2,564, 403 | 1,299.10 | 775.78 | . 37 | . 30 | 943, 687, 316 | 600, 413,862 | 266 | 234 | 726, 416 | 773,949 | 180, 499, 539 | 5.2 |
| Oakland, Alameda Berkeley, Hayward, Emeryville, Cal | 101,872 | 66,595 | 122,80 | 17.98 | 1.20 | . 27 | 17, 247, 022 | 2, 807,956 | 169 | 42 | 140, 448 | 156, 171 | 5, 449, 713 | 3.2 |
| Omaha, South Omaha, Dundee, Nebr: : Council Blufis, Iowa..... | 155, 268 | 169,988 | 105.95 | 119.03 | . 68 | . 70 | 21, 418,791 | 13, 613, 288 | 138 | 80 | 202, 159 | 114, 368 | 6,373,697 | 8.4 |
| Philadelphia, Pa,................. | 1,293,697 | 1,046, 964 | 517. 53 | 351.12 | . 40 | .34 | 331,304,685 | 165, 117,627 | 256 | 158 | 640, 165 | 470, 260 | 61, 175,495 | 5.4 |
| Pittsburg, Allegheny, McKeesport, Bellevue, Sharpsburg, MeKees Rocks, Carnegie, Wilking- |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| burg, Braddock, Homestead, Connellsville Uniontown, Pa.. | 640,380 | 428,005 | 469,47 | 113.32 | . 73 | 26 | 168,682, 389 | 46,209,227 | 263 | 108 | 359,197 | 408,571 | 34, 811, 111 | 4.9 |
| Providence, Pawtucket, R. I . | 268,916 | 205, 923 | 137.05 | 59.48 | . 51 | . 29 | 45, 188, 704 | 18, 473, 722 | 168 | 90 | 329, 542 | 310,587 | 8,016,662 | 5.6 |
| Rochester, Irondequoit, N. | 178, 833 | 148, 899 | 95, 86 | 60.17 | , 5.4 | . 42 | 20, 171, 260 | 11, 372, 596 | 113 | 76 | 210, 424 | 182, 927 | 5,196, 819 | 3.9 |
| St. Joseph, Mo..................... | 102,979 | 52,324 | 35.15 | 22.88 | . 34 | . 44 | 8,584,278 | 2,014,868 | 83 | 88 | 242,796 | 88, 062 | 2,198, 630 | 3.9 |
| St. Louis, Mo.; East St. Louis, Granite, Ill. | 614,328 | 468, 087 | 396.21 | 169.22 | - 64 | . 36 | 129,596,027 | 68,299, 479 | 211 | 135 | 327, 089 | 374,066 | 31, 014,097 | 4.2 |
| San Francisco, San Mateo, Cal.... | 344,614 | 298, 997 | 276.50 | 156. 22 | . 80 | . 52 | 117,357, 877 | 80,619,005 | 340 | 270 | 424,441 | 516,061 | 20,553, 252 | 5.7 |
| Scranton, Dunmore, Olyphant, Jermyn, Carbondale, Pa | 155,655 | 112,385 | 76.68 | 30.00 | . 49 | . 27 | 8,331,663 | 8, 023,493 | 5. | 27 | 108, 655 | 100,783 | 2,322, 162 | 3.6 |
| Syracuse, Onondaga, Geddes, De <br> Witt, N. Y. | 123,776 | 09,409 | 68.16 | 44.13 | . 55 | . 44 | 14,234, 508 | 6, 487,197 | 115 | 65 | 208,840 | 145,869 | 3,704,195 | 3.8 |
| Toledo, Ohio | 135, 271 | 85,505 | 97.78 | 42. 00 | . 72 | . 49 | 20, 104, 076 | 6,656,813 | 149 | 66 | 205, 605 | 134, 686 | 5, 517, 484 | 3.6 |
| Washington, D. O | 279,940 | 231,901 | 139.67 | 83.00 | . 50 | . 36 | 63, 829,752 | 31,032,187 | 228 | 134 | 457,004 | 373,882 | 15,577,212 | 4.1 |

1 Population shown for 1902 is that reported at the census of 1900.

As most of the cities increased materially in population during the two years between the 1900 census of population and that of street railways, the apparent increase in the proportion of trackage and traffic to population since 1890 is somewhat exaggerated.

The method of selecting the areas which should be considered as a single urban center in preparing this table has been described in Part I, Chapter I. Attention was there called to the fact that, becanse of the complications arising where urban railways extend into rural districts, or where part of the strictly urban traffic is carried by railways that are primarily interurban, comparisons between cities in respect to the proportions which trackage and traflic bear to population are not exact. Nevertheless, except with regard to two or three cities which hare been omitted from the table, the data, especially those showing traffic, are not sufficiently affected by these complications to vitiate conclusions.

Relation of trackage to population.-In 1890 the development of street railway service, as shown by the amount of trackage constructed, varied widely in dif-
ferent cities. In a few urban centers new electric systems had recently been installed and trackage had increased considerably, but in other cities the limits of the horse railway had not yet been escaped. During the interval between the two census periods most of the cities which had been more backward in street railway enterprise made a rapid advance, so that at present the proportion of trackage to population is more nearly uniform than it was in 1890. Some of the urban centers, therefore, show a great increase in the length of track per 1,000 inbabitants since 1890 , while others show little increase, and 8 of the 32 cities even show a a decrease, which, however, with a single exception, is slight.

The extension of the leading railway system of Buffalo, N. Y., to Lockportt and Niagara Falls, N. Y., and other neighboring places, accounts in part for the conspicuous increase in the ratio of trackage to population in that urban center. Similar suburban and interurban extensions also explain in large.measure the marked addition to trackage in the great iron and steel center
of which Pittsburg, Pa., is the leading city, and in Oakland, Cal., and vicinity.
In two of the very largest cities, New York and Philadelphia, the rate of increase in trackage since 1890 has been only about one-fifth greater than that in population. This is primarily because the tremendous demand for rapid, transit in these cities had forced a greater development of street railways even in 1890 than was found in many of the less densely populated urban centers. In Chicago, however, the proportion of trackage to inhabitants increased about 70 per cent during the interval between the two census periods. The only urban center which shows a conspicuous decline in the proportion of trackage to population since 1890 is that of Los Angeles, Cal., and the neighboring municipalities. In 1890 there were no less than 2.4 miles of track for each 1,000 inhabitants in that center, a much greater proportion than was found in any other. This extreme development was doubtless attributable in part to the boom then prevailing in southern California. Street railways were built partly in the expectation that great cities would grow up throughout the section, and partly with the purpose of facilitating the sale of real estate. The street railways of this urban area carried three times as many passengers in 1902 as in 1890, but their trackage had increased by only one-seventh, while the population had nearly doubled.

In comparing the different urban centers at the present time it may be observed that length of track is a less accurate meassure of street railway development than the number of passengers carried or the car mileage operated. The amount of track required to serve adequately the needs of the people depends largely on the density of population and the topographical conditions of the city. Thus, largely because of the dense population in New York city, the proportion of trackage to population there is lower than in any other urban area except Albany and Troy, N. Y., and St. Joseph, Mo. Philadelphia and Boston also show considerably less track per 1,000 inhahitants than most of the smaller cities. The population of Chicago is more scattered than that of the large cities just named, and it has, therefore, a larger proportion of trackage to population. The greatest length of street railway track per 1,000 of population is found in the western cities, Denver, Colo., and Oakland and Los Angeles, Cal. This is explained by their scattered population and also by the fact that the companies operating there have a considerable suburban and interurban trackage.

Relation of traffic to population.-While many urban centers of more than 100,000 inhabitants show little increase, and some show an actual decrease, in the ratio of trackage to inhabitants since 1890, there is no center in which the proportion of street railway passengers to inhabitants has not increased, and there are few in which the increase has not been a large one.

The slightness of the increase in the proportion of
passengers to population in New York city is in part explained in another part of this report (see pages 31 to 38 passim). Up to the present time the railways of that city have not been able fully to meet the demand for transportation. In a few other cities in which street railway traffic was most fully developed in 1890 the increase in the proportion of passengers to inhabitants also las been slight. Denver, Colo., and Kansas City, Mo., are conspicuous instances.

On the other hand, Baltimore, Philadelphia, Boston, Chicago, and Pittsburg-Allegheny, among urban centers of more than 500,000 population, show a very marked increase in the proportion of passengers to inhabitants. In 1890 a large part of the railway systems of Chicago, Pittsburg, and Philadelphia was still operated by horsepower. The subsequent increase in traffic is, therefore, partly due to the superior convenience of electric traction. The number of rides per inhabitant in Pittsburg and vicinity was 108 in 1890 and 263 in 1902. Another: illustration of the increase in traffic that has followed the introduction of electricity is seen in Baltimore, where in 1890, with a system confined almost entirely to horse cars, there were but 93 passengers per inhabitant, while in 1902, the system having become entirely electric, 190 rides per inhabitant were reported. Several smaller cities, which were almost wholly dependent on horse cars in 1890, also present very marked increases in the density of traffic. Altogether there are 12 out of the 32 centers in which the proportion of passengers to population doubled between 1890 and 1902.
Other conditions being equal, the extent to which the people of a city will patronize its street railways will depend largely on the size of the city. This is borne out by the figures in Table 19. The rank of the cities in 1902, as regards the ratio of passengers to inhabitants, bears a rongh parallelism to their rank in population. Other factors, however, also influence the relative amount of street railiway traffic, among which are the shape and general topographical features of the city, especially the presence or absence of hills; the density of population per unit of area; and the situation of the business sections with reference to the residence sections. The average wealth of the masses of the people and their habits and customs of life also affect their patronage of the street railways.
Of the 8 urban centers of more than 500,000 population, 7 show little difference in the degree of street railway patronage, the range being only from 190 to 266 rides per inhabitant. The eighth of the urban centers of this class, showing only 150 rides per inhabitant, consists of the neighboring cities of northern New Jersey and differs from the others in material characteristics.
San Francisco, though falling in the second group of urban centers, has by far the largest ratio of street railway rides to inhabitants. On the average, each inhabitant of that city took about one ride per day during 1902. The city abounds in steep hills, and the manu-
facturing and commercial interestsare mostly centralized within a small area, while the residence section is extensive and comparatively thinly populated.

Among the centers of less than 500,000 population, Los Angeles, Cal. Kansas City, Mo., and Washington, D. C., follow San Francisco in the ratio of passengers to inhabitants. The patronage of street railways is least per indabitant in the Scranton, Pa., center. The low ratio is probably due to the fact that the patronage comes largely from a mining population, with a low average of per capita wealth and with residences near the place of work. St. Joseph, Mo., Rochester, and AlbanyTroy, N. Y., are also conspicuous for the small degree of street railway patronage.

Powsengers pur mile of truck.-The column in Table 14 indicating the number of passengers carried per mile of track in the largest urban centers needs little comment.

With seven exceptions the number of passengers carried per mile of track in these 32 urban center's has increased since 1890 , and despite the fact that the average ride in practically all of the cities has doubtless lengthened materially during this period. The decline in the density of trafic per mile of track in Buffalo, New York city, Čbicago, Pittsburg, St. Louis, San Francisco, and Oakland is attributable to the extension of railways into thinly populated parts of these cities and into suburban and rural districts where trafic is comparatively light. Beyond question in these, as in other cities, the traffic upon tracks which were already built in 1890 has increased since that time. If attention be confined to those cities in which the increase in trackage since 1890 has been relatively slight, a very great increase in the ratio of passengers to trackage appears in nearly every case. Thus, of the 12 urban centers named in Table 19, in which the length of track per 1,000 inhabitants did not increase more than one-fifth between 1890 and 1908, 1 -Los Angeles, Call, Memphis, Tenn., Milwaukee, Wis., and St. Joseph, Mo.-more than donbled the number of passengers per mile of track; 4 othersIndianapolis, Ind., Louisville, Ky., New Orleans, La., and Omaha, Nebr:-show an increase of more than 40 per cent; and 3 others-Denver, Colo., Cleveland, Ohio, and Philadelphia, Pa.--show an increase of between 25 and 40 per cent. In New York city the number of passengers per mile is 726,416 , and in Philadelphia, 640,160̆, while Boston, Sau Francisco, and Washington are the other cities which report more than 400,000 passengers per mile. The ratio is least in Los Angeles and Oakland, Cal., becatse of their extensive suburban lines, and in Scranton, Pennsylvania.

A comparison of these statistics for individual cities in 1902 bears ont in a general way the opinion that the larger the city the greater tends to be the number of passengers who will be carried per twit of track, but many other infuences also enter in and often counteract that of population.

Pussengers per car mile.--Because of differences in the size of cars and in the arerage length of rides a bare comparison of the number of car miles operated in the different indiridual cities and of the number of passengers per car mile is much less instructive than the other comparisons thus far presented. It is impossible, from the statistics, to trace any connection between the size of the city and the number of passengers carried per car mile. The highest ratio of passengers to car mileage is reported from the great urban center in northern New Jersey, of which Sersey City, Newark, and Paterson are the most important constituents; yet this center, as has been explained, was the only one of the eight centers having a population severally of 500,000 and over that showed a ratio of passengers por inhabitant below 190. Other cities showing more than five passengers per car mile are, in the order named, San Francisco, Providence, Philadelphia, New York, and Milwakee. The lowest ratio of passengers per car mile, that of New Orleans, was 3 , while that of both Los Angeles and Onkland was 3.2.

Statistics of the relation of passengers and trackage to population, for selected cities and towns of from 25,000 to 100,000 inhabitants and of less than 25,000 inhabitants, respectively, are to be found in Tables 13 and 14.

## IV.

## THE URDAN STREET RAILWAY AS A SOCTAL FAGTOR.

The enormons movement of human beings on the street railways shown by the statistics must evidently constitute a factor of great importance in the social and economic life of the people. The social service of the street railways in the largest cities is so much more fundamental in importance than in smaller towns that it deserves special consideration. It is chiefly to such cities that attention is now directed. The benefits which have resulted from the recent development of interurban and rural electric railways are more fully discussed in Part I, Chapter VII.

Distribution of urban population by street railuays.The chief function of the street railway in a great city is the distribution of the population over a wider area than it would otherwise be possible to occupy. Economic and social forces tend powerfully to draw multitudes of people into luge urban communities, and as the inhabitants increase in numbers, they must either crowd ever closer and closer together, to the detriment of health and comfort, or they must find some means by which, without intolerable waste of time and strength, they may live farther from one another and from their places of business. The introduction of street railways. in large cities, as well as the extension of their tracks and every improvement in respect to speed and com-. fort, came in response to an imperative social need. The relation between such improvements in street railway . service and the demand for them is, of course, a recip-
rocal one. Had not the enterprise of street railway managers offered the opportunity for the wider distribution of population, the people would not have realized fully the unsatisfactory character of their housing conditions.

As more fully shown hereafter, a constant increase in the density of population, even since the introduction of street railways, has taken place in certain of the older crowded quarters of our great urban centers which continue to be used for residence purposes. But the fact is significant that a large majority of urban inhabitants have escaped the necessity of living in these crowded quarters. The occupied area of cities has extended steadily and rapidly. It is not true that the street railway has been the sole cause of this extension. To some extent it has been due to the establishment of manufacturing and commercial enterprises in the outlying parts of cities. The street railway, however, has been probably the most important single influence in dispersing urban population. The greater part of the breadwinners in the outlying sections of our largest cities are people who must rely upon street railways as a means of going to and from their places of daily employment.

The influence of the street railway in the distribution of urban population is often concretely illustrated by the manner in which the residence sections have followed the lines of the railways. In many cases the boundaries of the built-up area of a city, instead of being fairly uniform, consist of long fingers or tentacles reaching out from the more solid center, each owing its growth to a radiating street railway.

A few illustrations of the manner in which the outer areas of cities have increased in population during the decade from 1890 to 1900 will serve to indicate the influence of the street railway, particularly since the greatest development of street railway service has taken place during this decade. In the following discussion, where comparative statistics for the population of city wards or other areas are given, the area covered is the same in 1900 as in 1890, account having been taken of changes in boundaries.

The population of Manhattan borough of New York city grew from 1,441,216 in 1890 to 1,850,093 in 1900, an increase of 408,877 . Of this increase, 231,556 , or considerably more than one-half, took place in the Twelfth ward alone, the population of that ward haring practically doubled during the decade. This ward comprises that part of Manhattan Island lying north of Eighty-sixth street, which is approximately 7 miles from the southern extremity of the city. The great majority of the breadwimners of this ward do business elsewhere and make daily use of the street railways.

The population of Bronx borough, which lies northeast of the Harlem and even more distant from the business center of the city than the thickly settled part of the Twelfth ward, increased from 88,908 in 1890 to 200,507
in 1900. Without surface and elevated railways but a small fraction of this great addition to the population above the Harlem would have been possible. The manner in which the street railways bave affected the growth of this borough may be understood by ohserving how the dwellings have followed the lines of the elevated railway and the Third arenue surface system.
The borough of Brooklyn, a large part of whose breadwinners find their employment either in Manhattan or in parts of Brooklyn which are reached from the residential sections only by street railways, shows a much more rapid growth in population than Manhat$\tan$. During the decade between the last two censuses the inhabitants increased from 838,547 to $1,166,582$, or about 39 per cent, as compared with about 28 per cent for Manhattan borough. Much the greater part of this addition to the population of Brooklyn has taken place in the outlying wards. Thus the extensive wards numbered $8,18,22,24$, and 26 , in 1890 , together with the still more distant wards known at that date as Flatbush, New Ctrecht, Gravesend, and Flatlands, advanced in population from 234,929 in 1890 to 455,264 in 1900 , the increase amounting to more than two-thirds of the total increase of the population of Brooklyn. While the population of these outlying wards nearly doubled during the decade, that of the remaining 21 wards increased only 18 per cent. The transportation facilities of even the most distant residential sections of Brooklyn are almost wholly confined to the electric surface and elevated railways.

The borough of Queens shows an even more remarkable increase of population than Brooklyu, the imhabitants numbering 87,050 in 1890 and 152,999 in 1900 and the increase has been largely in the more distant and thinly populated wards, which are largely occupied by people doing business far from their homes. Thus the ward known as Tamaica shows an increase from $14,4+1$ to 30,761 , and Newtown an incrense from 17,549 to 40,903 . The transportation facilities of these sections are, in part, furnished by steam railways, but it is believed that the electric surface and elevated lines carry the greater proportion of the traffic. There has been a marked increase in the street railway facilities of these wards in recent years. Indeed, a detailed examination of the maps of both Brooklyn and Queens boroughs shows distinctly that the extension of population has largely been determined by the location of such railways.

The city of Boston, with the immediately adjacent cities of Somerville, Cambridge, and Chelsea, and the town of Brookline, furnish another conspicuous illustration of the influence of electric railways in distributing population. Of the seven wards lying nemrest to the business center of Boston, five showed a decrease in population from 1890 to 1900 ; although in the Sixth and Eighth wards, which are largely occupied by the poorest immigrant classes, there was an
increase from 31,473 to 40,085 . The Eleventh and Seventeenth wards, which lie next to these central wards, added only moderately to their population, and the same is true of the three wards across the Charles river in Charlestown. On the other hand, the Eighteenth, Twentieth, Twenty-first, Twenty-second, Twenty-third, Twenty-fourth, and Twenty-fifth wards, which are farthest from the center of the city toward the southwest, increased in population from 149,978 in 1890 to 243,373 in 1900 . The increase of 93,395 inhabitants in these outlying wards was nearly fivesixths of the total increase for the city of Boston. The Twenty-fourth ward, whose nearest boundary is several miles from the business center of the city, increased in population from 29,638 to 61,676 . During the interval between the two censuses, moreover, the population of Cambridge, Somerville, Chelsea, and Brookline increased from 150,192 to 207,536 , or much more rapidly than that of the older parts of Boston. A very considerable proportion of the breadwinners, both of the outlying wards of Boston and of the adjacent cities mentioned, are employed in the husiness clistrict of Boston and depend for transportation upon the electric railways.
The change in the distribution of the population of Philadelphia since 1890 has been no less remarkable. Almost all of the wards in the heart of the city show a decrease in population, while several of the large outlying wards to the west and nortb of the business center have added greatly to the number of their inhabitants. Thus Ward 34 , which lies west of the Schuylkill and comprises a part of what is known as West Philadelphia, increased from 23,721 in 1890 to 43,706 in 1900. Wards 28,37 , and 38 (which constituted one ward in 1890) situated to the northwest of the basiness center, increased from 46,390 to 99,480 , and the adjoining Ward 33 increased from 33,171 to 65,372 . At their nearest boundary these last-mentioned wards are nearly 3 miles from the city hall, and they extend to a distance of more than 4 miles from that point.

Chicago also shows the influence of railways in scattering population. It is searcely necessary, however, to present additional statistics to illustrate this movement in the largest cities. But even cities of the second class have experienced a similar tendency toward the pushing of their population into the outlying districts. Thus the inhabitants of that part of the city of Cleveland which was included within city limits in 1890 increased from 261,353 in that year to 356,923 in 1900. Of this gain of 95,570 , more than two-thirds took place in the wards 18 to 27 , inclusire, the population of which increased from 83,349 to 148,855 . These wards lie in a double row along the eastern and southeastern boundary of the city. They are at no point less than $2 \frac{1}{2}$ miles from the business center of Cleveland, and they extend to a distance of about 6 miles from that center.

Street railways not only help to prevent excessive crowding of urban population, but in most cities they even aid a large fraction of the people in continuing the practice, so characteristically American, of living in independent houses instead of in tenements. This is true even in such large cities as Philadelphia, Chicago, and Boston, a thing which would be obviously impossible if the occupied territory were as contracted as it would have to be in the absence of the railways. The social advantages of the individual dwelling house need no emphasis. The street railway likewise aids in such a spreading of the population of many of our medium-sized cities-such, for instance, as Buffalo, Detroit, and Cleveland-as to permit a large proportion of the dwellings to be detached structures with open yards, which add greatly to the health and pleasure of the people.
In still smaller towns the street railway becomes less essential as a means of dispersing population. As might be expected, the proportion of railway rides to inhabitants is much less in such places than in great cities. Even here, however, the same function of the electric railway manifests itself to some extent as one of the influences that makes possible houses with large yards and placed in the most pleasant situations. The demand for street railway service in such towns varies greatly with local topographical conditions. Sometimes these conditions, or other causes, clictate that industrial establishments shall be situated at some distance from the most desirable residence sites. Sometimes a town is shat into a narrow valley, or confined along the borders of a river, so that the expansion of population must be chiefly in one direction. In either of these cases, more demand for street railway transportation will be found than in a compact town of equal population. For these and other reasons, it is impossible to generalize with regard to the extent of the patronage which street railways may expect in places of small size. Many of the railways which serve towns of this sort find it necessary to seek interurban business as well.

Influence of electric raitways on suburbs.-The electric railway has given a powerful impetus to suburban life in the vicinity of our large municipalities. Prior to its adyent the suburban dweller was confined to the steam. railway as a means of transportation. Suburbs were, of necessity, situated chiefly along the lines of the great through railways, since it would not usually prove profitable to construct a local steam line primarily for suburban traffic. The electric railway has not by any means wholly superseded the steam road as a means of transportation for suburban residents, but a large proportion of the suburbs which were formerly accessible only by steam roads are now served also by electric lines, while many new suburbs have been created by the extension of electric railways. The possible area for suburban life has thus been increased and the way opened to many farorable sites which were
previously inaccessible. The relative adrantages of the street railway and the steam railway for suburban traffic differ in different cases. On account of having its own right of way, the steam railway can run its trains faster within the limits of the closely built area of the city than can most electric railways, which traverse the public streets. Evenoutside of the closely built area, the speed of the steam train is at present greater than that of most suburban electric cars. The electric railway has counter adyantages. Its cars run much more frequently (which may more than offsetany advantage of the steam railway in regard to speed); it is free from smoke, and, more important still, it can usually carry the suburban passeuger more nearly to the precise point which he desires to reach. The steam railway has at most but a few stations within the city limits, and its nearest station is often a considerable distance from the business center of the city.
The census of 1900 shows a very marked increase in the suburban population in the vicinity of our great cities since 1890. To be sure, the growth of suburbs has in most instances been no faster than that within the limits of the city. In considering this fact, however, it should be noted that the limits of several of our great cities are so extensive that a considerable number of the inhabitants in their outskirts are living under an approach toward suburban conditions. Since a large fraction of the addition to the population of such cities is in these outlying districts, it is not proper to judge of the relative importance of the growth of suburbs by comparing the population of the villages outside the city limits with the total population inside.
Urban centers differ materially from one another in the degree to which the growth of their suburbs has been aided by the electric railway. On account of the great geographic areas within the limits of New York city and Chicago it is probable that the larger part of the passenger traffic between these cities and the suburban villages outside their boundaries is at present carried by steam railways. Electric suburban service is about to be introduced on the leading steam railways entering New York city, and new exclusively electric lines for fast suburban service have been recently built or are planned in both Cbicago and New York. Boston illustrates more clearly the influence of the electric railway. Several of Boston's residential suburbs, the people of which patronize the trolley railway much more than the steam lines, show marked increases in population since 1890 . Thus the population of Newton rose from 24,379 in that year to 83,587 in 1900; that of Hyde Parls from 10,193 to 13,244; that of Medford from 11,079 to 18,244; and that of Arlington from 5,629 to 8,603 . The population of several other residential suburbs increased in similar proportions. Philadelphia is another city whose suburbs are served largely by electric railways, and their population has considerably increased since 1890. The population of St. Louis
county, Mo., which adjoins the city of St. Louis, increased from 36,307 in 1890 to 50,040 in 1900; that of Milwaukee county, Wis., outside the city of Milwaukee, from 28,500 to 44,702 ; and that of comparable areas of Cuyahoga county, Ohio, outside the city of Cleveland (the city limits having been extended cluring the decade), from 34,522 to 57,352 . The traffic of the suburbs of all three of these cities is, in considerable measure, carried by electric railways.

Effect of strect railways in concentrating business.The presence of a rapid and cheap means of passenger transportation permits the manufacturing establishments, and still more the commercial establishments of a city to be located in a manner which will be most convenient and economical for themselves and their patrons. With regard to retail and wholesale trade, and to office business, there is a great economic advantage in concentration in specialized centers. The same is true in varying degree of many classes of manufacturing concerns. It is often advantageous to have those of the same character near together, or even to have the entire manufacturing business of a city concentrated in one district. Without effective methods of transporting passengers, such concentration could not have been accomplished to the same extent.

A conspicuous illustration of the advantages of local concentration in business is found in the retail sections of our great cities. By means of the street railway, customers from all parts of the city are able to come to a common center where they find huge stocks, wide variety, and effective competition, all of which would have been largely lacking had they been compelled to patronize small local concerns within walking distance from their homes. The large scale on which retail business in cities is now conducted, with its resultant economies, would not have been possible in any such degree without the opportunity of bringing widely separated customers to a single shopping section. The department store could never have attained its present importance except through the aid of the street railway.
There are no satisfactory statistics regarding the degree to which the business of cities has become concentrated in narrow areas. Mr. B. J. Arnold, in his report on the Chicago Transportation Problem, presented to the city council toward the end of 1902, estimated the daily movement of people into the central section of Chicago, by means of the surface street railways alone, at about 225,000 . He assumed that 20 per cent of the total surface railway traffic was carried by cross town lines which did not reach the business center, but that only 25 per cent of the trunk-line traffic consisted of short rides, the remainder representing travel to and from the business center. A still larger proportion of the traffic on the elevated railways, which carry more than a fourth of the city's passengers, was to and from the same center, which has an area of scarcely more than a square mile. It has been estimated
that the day population of Manhattan Island below Canal street is about half a million greater than the night population, and a large proportion of this enormous number of persons is brought thither by street railways.

Fiffect of street railways on land values and rents.Closely connected with the influence of the street railway in spreading out the residential sections and concentrating the business sections of cities is its influence upon the values of land and upon rents. Every extension of a railway line into new territory increases the selling and rentil value of the real estate in the vicinity. In numerous cases real estate syndicates have built railwars for the purpose of rendering their lands accessible to the people and increasing their price. This was conspicuously true during the "hooms" in the Western states.

While the street railway is thus a creator of land values in certain sections, it sometimes helps to destroy them in other sections by making it possible for the population and business to move else where. Broadly speaking, the railways tend to distribute and equalize land values in the residential parts of cities and to prevent the excessive rents in certain sections which would follow from overcrowding. On the other hand, the street railmay tends to increase land values in those sections of a city which become specialized as centers of industry and trade.

Relution of street ruiluays to the social life and pecreations of the peonle.-The street railway has done much to increase the opportunities of city dwellers for enjoyment and improrement. To a large proportion of the city population it is the usual conveyance employed in making social calls and carrying on other forms of sorial intercourse. The distances which must be covered for these purposes in large cities are so great that social intercourse would be very much restricted without cheap and rapid transit. Again, the street railway enables thousands to attend theaters, music and lecture halls, and other places of entertainment and instruction, who would otherwise either be excluded altogether, or be compelled to confine their patronage to establishments of a neighborhood character which could not offer such attractions as are now rendily accessible.

More important is the social service rendered by street railwars in carrying the people from the crowded parts of cities to places of outdoor recreation and atusement. The publie parks of our municipalities find their usefulness immensely enhanced by the cheap and easy means of access afforded by street railways. The large country parks which have recently been opened at some distance from the closely built areas of Boston, New York, and several other gxeat cities, depend almost wholly on this means of transportation for their patronage. In this connection it may be suggested that the restriction of urban land values which is so largely due to the influence of street railways, has
made it possible for cities to set aside parks even within their more closely populated areas. Bathing beaches, race tracks, ball grounds, and private amusement and recreation parks of all sorts owe their accessibility in no small measure to the electric railway. A very considerable proportion of the people of our large cities obtain numerous outings in the erenings or on holidays and Sundays, which would be impossible without the aid of this form of transportation. While the forms of recreation thus obtained are not always of a high character, they are in general far more beneficial than none at all, or than those which would be available in the crowded city. In this way, as in many others, the clectric railway is an important factor in improving the health and increasing the happiness of city people.

The street railways of smaller towns likewise render an important service in furthering the social life and the recreations of the people. Indeed it is probable that a larger proportion of the traffic of railways in such places may be considered pleasure travel than in the great cities.

Street vailway parks.-An interesting development in the street railway business, which has taken place almost wholly since the introduction of electricity, is the establishment of parks and resorts by the street railways themselves. A very large proportion of street railway companies now operate, either directly or indirectly, amusement and recreation places of some sort. The companies which reported to the Bureau of the Census that they maintained such enterprises numbered 259 , and some of these hare two or more parks. Table 97 indicates, for each company, the number of parks operated. An attempt was made, in connection with the present investigation, to obtain a statement of the number of persons visiting these street railway resorts during the census year. It was found, however, that many of the companies. were unable to make even the roughest estimate on this point, while others submitted estimates that were obviously very far from correct, and the data were, accordingly, omitted from the report.

It is much more common for street railway companies to maintain parks in the medium-sized and smaller cities and towns than in the great cities, where places of recreation are amply supplied by public authorities or by independent private enterprise. Of urban centers of 500,000 or more inhabitants the only ones in which important parks are operated by urban railway companies are Philadelphia, Pittsburg, and Baltimore. The Pitts. burg Railways Company reports $2,113,3 \pm 0$ visitors' to its parks during the census year. The centers of from 100,000 to 500,000 population in which street railway parks of importance exist are Washington, D. C.; Minneapolis-St. Paul, Minn., where the company has 4 parks, with an estimate of $1,000,000$ visitors during the year 1902; Kansas City and St. Joseph, Mo.; New Orleans, La. ( 965,000 visitors); Indianapolis, Ind.; Columbus, Ohio ( 455,000 visitors); and New Haven, Conn.
(600,000 visitors). The interurban railways radiating from some of the other large cities also operate parks. Among other companies whose parks are an important feature may be mentioned the Connecticut Railway and Lighting Company of Bridgeport and surrounding towns, which estimates that 800,000 persons risited its 3 parks in 1902; the People's Railway Company of Wilmington, Del., with 750,000 visitors; the United Traction Company of Reading, Pa., with $1,103,000$ visitors; the Boston and Northern Railway Company, with $\pm$ parks and 800,000 visitors; the Old Colony Railway Company of Massachusetts, with 600,000 visitors; the Butte (Mont.) Electric Railway, with 350,000 visitors; the Portland (Me.) Railroad Company, with 750,000 visitors; and the Seattle Electric Company, with $\pm$ parks and 750,000 visitors.

In the case of some of the still smaller railways the traffic connected with the parks constitutes a very large proportion of the total business. The Bridgeton and Millville (N. J.) Railway estimates the visitors to its park at 350,000 , while the total number of fare pussengers for the year was $1,698,227$. In judging of the importance of the traffic connecterl with the park in this, as in other cases, it should be remembered that probably most of the visitors to the park pay two fares. The railway at Muskegon, Mich., reports 250,000 park visitors, and total fare passengers, 1,655,762. The Kingston (N. Y.) Consolidated Railway estimates 500,000 visitors to its park, and total fare passengers, 2,217,584. The Youngstown (Ohio) Park and Falls Railway had 366,000 park visitors, its fare passengers numbering 1,241,016. Youngstown, however, has other more important railways. The Holyoke (Mass.) Street Railway Company reports $1,280,000$ park visitors and $6,336,300$ fare passengers.

In practically all cases street railway resorts are located at some distance from the closely built parts of cities and towns. One of the chief attractions to the patrons is the long, swift ride in the open car with the cooling breeze created by the motion. In a considerable number of instances the railways charge a second fare for the outer part of the trip to the resort. Thus the large park operated by the Union Traction Company of Philadelphia is about 13 miles from the city hall, and a fare of 5 cents is collected in addition to the city fare. The grounds are often of considerable size and present the attractions of woodland, sea, lake, or river, but since these natural features are not sufficient to create the traffic upon which the railway company depends for the profitableness of its resort, except possibly on Sundays and holidays, forms of amusement suitable for erening are usually provided. Some companies have invested large sums in fitting up their parks with theaters, merry-go-rounds, switchback railways, and similar attractions. Decorative and brilliantelectric illumination is usually a prominent feature.

Many street railway companies incur beary expense
in the operation of such resorts and parks. Admission to the grounds is almost always free, and while there is ordinarily a charge for some of the amusements, the statistics show that the total direct receipts from parks seldom materially exceed the running expenses and usually leave a deficit. The company expects its profit in the increase of transportation business. Some street railway men assert that even from this standpoint the maintenance of a park or resort is often an unprofitable enterprise. Local conditions vary widely, and a place of recreation which would pay well in one city would prove a failure in another. Among the difficulties mentioned are the facts that the traffic created is largely confined to a few months of the year and to pleasant days, that it is so heary during certain hours in the season as usually to necessitate a double track, that empty cars must be accumulated to take people home at the close of the day or evening, and that it is often difficult to combine successfully in one individual the qualities of an efficient railway officer and director of recreation grounds.

## V.

inadequacy of present street raitway facilities in great oities.

Inaderpate speed and carrying capacity--Remarkable as have been the strides in methods of transportation, and important as are the social benefits which they confer, it is generally recognized that the lailway service of our greatest cities is still inedequate. Indeed it may be doubted whether, as compared with the needs of the people, the facilities in such cities at present are any more adequate than they have been in the past. The city of Now York naturally presents the most striking evidence of insufficient transportation, both on account of its enormous population and on account of the physical limitations upon the distribution of its population. The long and narrow Manhattan Island is cut off from the broad areas to the enst and west by wide rivers, the facilities for crossing which have hitherto been hopelessly inadequate, so that the expansion of the population in these directions has been seriously hindered. More relief for that city will be secured by the construction of bridges and tumels than by any improvement of railway service alone.

Leaving aside the question of fares in their relation to the use which the people make of the street railways, the inadequacy of street railway service consists chiefly in the insufficient speed of transit and the insuffieient number of cars. These conditions are so familiar that they scarcely need to be illustrated.
Notwithstanding the immense saving in time effected by the street railways as compared with walking, the total number of hours which are still spent by the people of a metropolis in monotonous travel represents a great social waste. It is quite probable that the average citizen of such cities as New York, Philadelphia,

Boston, or Chicago, who takes the railway to and from his place of business regularly, spends not less than an hour every day on the cars, while thousands upon thousands spend two hours or more daily in this way. The uncertainty as to the length of time required to make a journey, due to the frequent blocking of traffic, is a further source of annoyance and loss. Naturally, the consumption of time in travel is usually more serious for those who live in the suburbs than for those in the city itself. The time required for the suburban end of the journey, however, is generally less than for that in the city proper, where the speed of cars is greatly restricted.

An illustration of the extent to which railway cars in large cities are habitually overcrowded at certain times of the day was given in connection with the proposal recently made by one of the elevated lines in New York to put on several additional trains during the afternoon hours in order to relieve congestion. The press in estimating the relief which would be afforded assumed that each train, according to the customary practice, would be able to carry 700 , when, as a matter of fact, each train would seat about 300 persons. A count of the actual passengers on the surface cars passing north and south at the cormer of Madison ayenue and Fifty-ninth street in New York on December 29 , 1902, showed the following conditions during rush hours: From 7 to $9 \mathrm{a} . \mathrm{m}$. about 3,000 seated passengers passed to the south, with about 1,700 standing. From 6 to $7 \mathrm{p} . \mathrm{m}$. about 4,300 seated passengers were carried to the north, with more than 3,200 standing. At several other points on surface lines during the same hours the overcrowding of cars was nearly as great. ${ }^{1}$

In several of our cities surface railways may be said to have accomplished practically all that is possible toward meeting the need for ample and rapid transportation. All, or nearly all, the streets in the business centers of these cities are already occupied by tracks, and, as shown herenfter; the number of cars run over the tracks in those centers has reached the limit of safety. The introduction of electricity made possible some increase in speed, and thus not merely saved time but increased the number of cars which could be run over a given track, at the smo time permitting the use of larger cars. The great incrense in the number of passengers on the surface railways in our largest cities inmediately after the substitution of electricity for animal power showed the importance of the relief afforded. But the demand for more and longer rides outran the progress of the surface railways. Difficulties more fully set forth below have made the increase of speed much less than would otherwise have been possible. The average schedule speed of electric surface cars in Chicago has been estimated at 8.22 miles per hour, which is only $2 \frac{1}{4}$

[^1]miles per hour faster than the schedule time with horsepower. ${ }^{2}$ In the more crowded streets in all great cities the speed is much less than the average, so that to take the car for a short trip may consume more time than to walk. Even the addition of elevated railways to surface systems has failed to meet fully the needs of transportation in our greatest cities.

Effects of inadequacy in transportation. - Some of the results of this inadequacy of urban railways are familiar. Rather than ride in slow and overcrowded cars, thousands of people walk even considerable distances to their business and on social errands. The growth of suburbs has been far less rapid than would have been the case with proper transit facilitics. Although, as pointed out above, there has been a marked absolute increase in the number of suburban dwellers since 1890 , the proportion of people who do business in the city and have their homes in the suburbs is still small, and great numbers, who would prefer to reside there, are unable to do so under present transportation conditions. Strictly suburban life is still almost wholly confined to the well-to-do.

Nor do the street railways accomplish all that could be desired in distributing population within the city itself. In several of our great cities are found overpopulated quarters occupied by the poorer working classes, composed largely of the foreign born and their. immediate descendants. Most of these people do not use the street railways to any considerable extent, but live within walking distance of their places of employment. Of course, inadequacy of transportation is not the sole cause of overcrowding in such sections; other important influences contribute to it. In othercases city dwellers, although they live in quarters where there is no marked crowding, yet find their bealth and comfort impaired by the proximity of the smoky, dirty, noisy factories in which they must find their employment. The inadequacy of transportation agencies is one of the most important causes of these unsatisfactory adjustments of population. Doubtless to some extent the failure of certain classes to use the railways is due to poverty, and patronage would increase if fares were reduced; though, even under present conditions, the lower rent in outlying districts would often offset the cost of street car journeys. But the poor can not spare the time for railway rides. The time required to reach a less crowded section of the city is quite a different matter to the working man or woman who toils ten, eleven, or twelve hours every day at a regular occupation, from what it is to the business man or clerk who, is employed from six to nine hours only.

The lower East Side of New York city is the most conspicuous illustration of a section tenanted by people who do not, to any important extent, patronize street. railways. In the Seventh, Tenth, Eleventh, Thirteenth,

[^2]and Seventeenth wards (all below Fourteenth street and east of the Bowery), a population of 455,173 is huddled into an area of 979 acres (exclusive of parks and cemeteries). About one-fourth of the population of Manhattan Island thus occupies less than one-twelfth of its habitable area. Despite all the improvements in transportation the population in these wards has continued to grow, the increase from 1890 to 1900 being 34.1 per cent. While the density of population in the upper wards of Manhattan ranges from 90 to 180 per acre, these five wards have from 381 to 678 inhabitants per acre. Much the greater part of the people in this excessively crowded section find their employment in the immediate vicinity.

One other illustration may be taken from Philadelphia, a city which is subject to no such physical limitations upon its extension as New York, but which still has an overcrowded section. The Second, Third, and Fourth wards of the city, lying south of Market street, near the Delaware river, have a combined area about one-fifth as great as that of the Thirty-third ward, and less than one-fifth of that of the Twenty-eighth, Thirty-seventh, and Thirty-eighth wards jointly. The total population, however, of the Second, Third, and Fourth wards in 1900 was 82,461 , or about one-fourth greater than that of the Thirty-third ward and only about one-sixth less than that of the three other wards mentioned. Furthermore, these three overcrowded wards increased their population 14.7 per cent between 1890 and 1900.

Several conditions which confront the street railways in cities of the first rank contribute to make the problem of furnishing adequate transportation an infinitely more difficult one than is encountered in smaller places. These conditions are not only to a large extent incapable of removal, but they grow more serious from year to year. They point to the necessity of comprehensive and far-seeing plans for the reorganization of methods of transportation.

Increase in demand for transportation more rapid than inorease in population.-The comparative statistics of street railway traffic for urban centers of different sizes heretofore presented (page 19) show clearly that the number of street railway rides tends to increase faster than population. This tendency is even stronger than the traffic statistics indicate, since in the largest cities the actual traffic, for reasons already indicated, does not equal the needs of the people. As a matter of fact, the relationship between street railway rides and population revealed in these figures is a necessary one. For in the first place it is evident that, as the city grows in population and area, a constantly larger proportion of its citizens must, or at any rate should, reside so far from their places of employment as to require means of transportation. Moreover, as the city grows, the distance which must be covered by the average passenger increases. Still another cause of this relationship is found in the fact that as the population of a city in-
creases its individual citizen widens his social and economic circle and needs to be put into connection with more people; hence he more frequently requires transportation.

Local concentration of traffic.-The modern tendeney toward greater local concentration of the business of a city, while itself a product, to a considerable extent, of improved methods of passenger transportation, constitutes in another sense a cause of the unsatisfactory condition of the street railway service. This concentration not only tends to increase the total number of persons needing transportation, but it draws so many railway lines and cars to a common center that the traffic there becomes congested by its very magnitude. One has only to stand for an hour at such a point as the corner of Madison and State streets in Chicago, the street railway terminus at City Hall in Nerw York, or the Park street station in the Boston subway, to appreciate how greatly the enormous magnitude of the traffic interferes with rapid handling of it.

Unequal distribution of traffic.-Perhaps the most important source of difficulty in urban transportation lies in the fact that the traffic is very unequally distributed throughout the day. A large proportion of the passengers consist of people going to their places of employment in the morning and returning at night. The flow of shoppers toward the retail centers is better distributed through the day, but the return tide of shoppers is at its height during the very hours when employees are seeking their homes.

This inequality of traffic, though striking, is perhaps not so great as is sometimes supposed. A careful estimate made by the Metropolitan (Interurban) Street Railway Company (now the New York City Street Railway Company, a surface line) for all its lines on December 17 1902, put the number of passengers carried during the five busiest hours, from $7 \mathrm{a} . \mathrm{m}$. to $10 \mathrm{a} . \mathrm{m}$. and from $5 \mathrm{p} . \mathrm{m}$. to $7 \mathrm{p} . \mathrm{m}$., at about 35 per cent of the total number carried during the twenty-four hours-practically the entire traffic of the company being carried during eighteen hours. The Union Railway Company and the Southern Boulevard Railway Company, whose lines are in the less densely populated Bronx borough, estimated that about 40 per cent of their passengers were carried during these same five hours. ${ }^{1}$

In every city there are certain points at which the distribution of traffic is much more unequal than is true of the street railway system as a whole, and at these points congestion of movement is likely to occur during the rush hours. This fact may be illustrated by further data regarding passengers on the north and south surface lines at Fifty-ninth street and Madison avenue in New York city. On December 29, 1902, about 4,700 passengers were carried on the southbound surface cars at that point during the hour from 7 to 8

[^3]a. m., while at the sane time less than 600 were carried north. From 9 to $10 \mathrm{a} . \mathrm{m}$, on the other hand, only about 1,300 passengers were carried south and about 500 north, the total traffic in both directions being barely one-thind as great as during the earlier hour. From 2 to 3 p. m. about 1,400 passengers rode toward the south and about 1,250 toward the north. From 6 to 7 p. m. only about 500 passengers were carried south, while nearly 7,600 passed toward the north, the total traffic being thus more than three times as great during this hour as from 2 to 3 o'clock. ${ }^{1}$

Street railway companies, of course, adjust the movement of cars, in some measure, to this great variation in the traffic. Since ordinarily it is impossible to allow cars to collect in the business center of a city, the operation of additional cars for the accommodation of the traffic during the rush hours means that many partly empty cars must be run in the opposite direction at about the same time. This is often the case even where the cars ruming in the direction of greatest travel are seriously overcrowded. The total number of cars in operation in both directions during the rush hours is usualls, moreorer, materially greater than the number employed at other hours.

In the particular instance just mentioned, the numher of cars passing Fifty-ninth street and Madison avenue toward the south from 7 to $9 \mathrm{a} . \mathrm{m}$. was about four-fifths greater than the number moving in that direction from 9 to $11 \mathrm{a} . \mathrm{m}$. The count of the passengers showed that while the cars south bound from 7 to if a. m. were greatly overcrowded, the cars north bound from 8 to 10 a. m. had less than one-thitd of the seating capacity occupied. The seating capacity of the cars running in both directions from 8 to $9 \mathrm{a} . \mathrm{m}$. was about $\pm, 500$, while during several hours in the middle of the day the seating capacity of cars moving in both directions was only from 3,000 to 3,500 per hour. From 6 to 7 p. m., on the other hand, the cars passing hoth mays had a seating capacity of 6,100 . Just before and during this rusb hour, the south bound cars had only about two-tifths of their seats occupied, while from 6 to $7 \mathrm{p} . \mathrm{m}$. barely halt of the north bound passengers could find seats. The number of crrs passing Madison avenue and Fitty-ninth street in the evening hours was smaller even than in the middle of the day, and yet a large part of the seating capacity of those south bound was unoccupied. A comparison with similar counts at other points on the Metropolitan Railway system shows that the degree of inequality in the total number of cars moved which exists at Madison avenue and Fifty-ninth street is by no means exceptional. The traffic in a city like Brooklyn, which is chiefly a place of residence, is even more irregular. In this city the state board of railroad commissioners found in 1908 that the leading surface system was operating an average of 545

[^4]cars per hour during nonrush hours, while during the busy period of morning and evening it expected to run about 1,200 cars per hour. ${ }^{2}$

This irregularity in the distribution of traffic on street railways tends in two ways to linder the provision of prompt and adequate service. In the first place, there are important instances in which, even though the railway companies might be willing to run a sufficient number of cars, they would be prevented from doing so by the physical limitations of their tracks. This point is more fully treated below.

In the second place, it costs more to handle a given number of passengers irregularly distributed than would be the case if they were evenly distributed through the day. Railway companies are, therefore, naturally indisposed to incur the expense which would be entailed by furnishing sufficient cars to seat all passengers during the busy hours. Even under present conditions, when cars are so greatly overcrowded, the inequality in the distribution of cars is a source of complaint amongstreet railwhy managers. They are constantly lamenting over the "peaks in the load line." A larger power" plant and more cars are necessary to maintain the present schedules than would be required if the number of cars could be evenly distributed throughout the day. Fixed charges per unit of traffic are accordingly increased. Fven the current expenses in the running of cars are somewhat augmented by the unequal distribution of traffic. Despite the most complicated adjustments of the trips of conductors and motormen to secure an even distribution of their work, most street railway companies in large cities are either forced to pay a certain number of their car-service employees full-time wages for operating cars only part of the day, or they must find men who are willing to work and draw pay for a part of the day and who usually must be paid at higher hourly rates than the full-time employees. The so-called, "tripper" problem constantly confronts the manager of an urban railway.

Ouses limiting specd and carrying capacity of surface railuatys.-Four facts connected with surface railway transportation put very rigid limits upon the speed and carrying eapacity of electric surface cars in cities, namely, the frequency of the necessary stops, the danger to pedestrians in crowded streets, the interference of cars with one another, and the blocking of the tracks. by other vehicles. The first two limitations are obvious. The danger of accident is indicated by the statistics elsewhere presented. The number of persons, other than passengers, who are killed or injured by street. cars is very considerable. The last two limitations require more extended consideration.
The number of cars which can be run over a given railway route, as a whole, depends upon the number which can pass the point where the greatest interference is encountered and where the speed is least. To increase

[^5]the speed over other parts of the route will not enable more cars to be operated. At many points where important railway lines cross one another in the business centers of cities, the extreme limit of the number of cars which can be safely operated has already been reached.

An investigation made at the instance of the Merchants' Association of New York in 1903 showed that the number of cars which passed the intersection of the Broadway and Twenty-third street lines was no less than 573 per hour. At Broadway, Sixth avenue, and Thirty-fourth street (Herald square), where two north and south lines and one cross town line intersect, the number of cars per hour was 464 . Several other points showed as great congestion of traffic. ${ }^{1}$ The crowding of surface cars at the New York end of the first East River bridge is likewise enormous. Here the difficulty is enhanced by the fact that the several car routes terminate at the bridge. Unlike the cars from Brooklyn, which pass around closed loops, the Manhattan cars run up to stub ends, and considerable delay is caused by the necessity of changing gates, fender, and controller handle to the other end of the car.

The traffic in the business center of Chicago is also hampered by the necessity, under present arrangements, of rumning many cars to stub terminals. The use of the cable system, with the difficulty at railway crossings due to the necessity of dropping the cable, tends still further to limit the number of cars which can pass over the tracks in the heart of Chicago. According to a recent report it is impossible to increase the number of cars on most of the lines which run into the business center, and very little improvement in service can be made without radical changes in methods. ${ }^{2}$

At the corner of Eighth and Market streets in Philadelphia, where a single track crosses a double track, 315 cars pass between 5 and 6 o'clock every afternoon. ${ }^{3}$

It is evident that even if there were no other vehicles besides cars it would be difficult to operate many more cars than now pass such points as have been described, but the situation is made much worse by other classes of vehicles. Interference from this source is inevitable in the business quarters of cities, particularly where, as too often happens, the streets are absurdly narrow and suited only to the primitive conditions under which they were laid out. A conflict of interests exists between the commerce and trade of the great city (which require the most speedy and convenient handling of merchandise) and the patrons of the street railways. It has frequently been asserted, not merely by street railway men, but by public authorities and citizens' organizations as well, that at present the owners and drivers of vehicles do not sufficiently regard the rights

[^6]of the street railway and its passengers. Truckmen prefer to drive on the lailway tracks because of the smooth surface afforded the wheels, and they do not always turn out as promptly as they could. Moreover drays are often backed up to the curb and left standing for some time in such a way as to make it impossible for street cars to pass; in many such cases it would be possible for the dray to avoid interference by standing lengthwise of the street. Again there are frequent blockades of vehicles, in part unavoidable with the enormous trafic, in part due to the lack of stringent and well-enforced "rules of the road."

How easily vehicle traffic may interfere with the movement of street cars may be judged from a count taken by the Metropolitan Street Railway of New York on December 27, 1902. During the hour from $11 \mathrm{a} . \mathrm{m}$. to $12 \mathrm{~m} .1,910$ vehicles, not including cars, crossed the tracks of the company at the junction of Broadway and Twenty-third street. From 3 to 4 p. m. 1,250 vehicles crossed the tracks at Canal street and West Broadway, while during the same hour at each of three points on lower Broad way more than 1,000 vehicles crossed. ${ }^{4}$ The New York State Board of Railroad Commissioners in 1903, after investigating the complaints regarding the inadequate service on the surface railways of Manhattan, asserted that "the very first and largest measure of immediate relief that can be obtained is that which could be derived from the regulation of independent vehicles in the streets." The board further expressed the belief that with adequate regulation of vehicles and with the removal of the obstructions due to the building of the subway, 25 per cent more cars could be operated, even during rush hours. In accordance with these recommendations certain new regulations have recently been adopted by the city authorities.

Elevated ruilways.-In view of the conditions which have been described, it is possible that a wholly satisfactory solution of the problem of transportation in great and rapidly growing cities may never be attained. What is wanted, eliminating the question of fares, is simply more cars and higher speed, but while there has been a steady progress in both of these directions, serious physical and financial difficulties stand in the way of adequately meeting the requirements. It long ago became apparent that in the largest cities the surface railways must be supplemented either by elevated or by underground lines, which would both increase the number of available tracks where the traffic was most. dense, and greatly add to the speed of travel, thus saving time and lengthening possible journeys.

The first elevated urban railway in the world was chartered in New York as far back as 1867. It was the Greenwich street and Ninth avenue line. Before 1880, the system in Manhattan had attained almost its present form, in which four trunk lines run lengthwise of the narrow island. The relief afforded by these elevated

[^7]lines was enormous. During the eighties an extensive elerated system was also built in Brooklyn.
The extension of the population northward, which the elerated lines of Manhattan had quickly aided, cleveloped a traffic which soon overtaxed their capacity. The laying of a third track over part of their structures increased somewhat the possible number of trains, and also permitted the operation of express trains which, by making very few stops, especially during the middle part of the trip, could carry passengers from the foot of the island to Harlem or the Bronx in about half an hour. These express trains were introduced almost solely to meet the heavier traffic at rush hours. But elevated lines suffer even more than the surface lines from the unequal distribution of traffic. The greater proportion of their passengers are persons going to their business in the morning and returning home at night. The longest train which the steam engines, formerly used in New York, could haul was five cars. It became impossible to increase further the number of trains at rush times; indeed, blockades at the terminals, which are quite inadequate in platform space and in number of switch tracks, were of frequent occurrence. In 1902 the vice-president of the Manhattan Railway Company stated that during the rush period 81 trains per hour, going north alone, passed the junction of the Sixth and Ninth avenue lines at Fifty-third street, a number which could not with safety be exceeded, since about half of the trains are compelled to cross tracks at this junction. ${ }^{1}$ For these reasons, tens of thousands of long-distance passengers in New York, who would have preferred to take the elevated trains, were compelled by the overcrowding to patronize the slower surface cars.

It is a remarkable fact that the number of passengers carried on the Manhattan Elevated Railway actually decreased considerably for several years. In the year ending September 30,1901 , the passengers numbered 191,152,316, nearly the same as in 1890, and more than $28,000,000$ less than in 1893 . The traffic on the Brooklyn elevated lines decreased still more, falling from $100,181,372$ passengers (including transfer passengers), in 1893 to 62,587,361 in 1901. This decrease in elevated traffic is doubtless attributable chiefly to the improvement of the surface railways, which offered advantages to short-distance passengers in the greater number of their lines and the frequency of stops.

The installation of electricity on the elevated lines of New York and Brooklyn during the years 1901 to 1.903 has materially increased their carrying capacity, by making it possible to operate trains of six cars and to maintain a somewhat higher average speed. As a result the passenger traffic has risen rapidly, the number of passengers carried by the Manhattan Railway reaching $255,565,390$ in the year ending September 30, 1903, an increase of more than 30 per cent over 1901. But

[^8]the present elerated lines of Manhattan bave now almost reached the limit of improvement, and they do not begin to meet the demand for rapid long-distance transportation. The capacity of the Brooklyn elevated railways has heretofore been limited chiefly by the concentration at a single bridge terminal. It is now proposed, however, to make use of the new Williamsburg bridge for elevated trains, and this will greatly relieve the congestion.
Begimning in 1892, four elevated railway systems, radiating from the business center, were constructed in Chicago. While the traffic of these lines is much lighter than in New York, the single loop around the business center, which is used by all of them jointly for all trains, has virtually reached the limit of its capacity.
It is, of course, possible to increase considerably the number of elevated lines in any city, even in New York, and thereby to relieve the congestion of traffic. The construction of additional tracks in the crowded busiuess centers toward which trains converge would alone add greatly to the carrying capacity. But serious objections lie against elevated railways in the more important streets. The pillars interfere with traffic on the surface; the structures are usually ugly and shut out the light from the street and buildings below; and the noise of the trains is a very great annoyance. As a result, the value of real estate on certain streets occupied by elevated railways, particularly in the residential sections, has either been diminished or has increased less rapidly than elsewhere, and the companies have been compelled to pay large sums for damages to property. For these reasons the attitude of the people and of municipal authorities is usually one of strong opposition to the erection of additional elevated structures in the business centers or on the more important residential streets. It is doubtful whether any new elevated lines would be tolerated on Manhattan Island.

Nevertheless, subway railways, which are the only alternative to elevated lines for rapid urban transportation, are much more expensive, and it is probable that a considerable extension of elevated railways in the suburbs of several of the leading cities of this country will be seen. Where the city is not contracted in area by geographic peculiarities it may prove socially and financially profitable to devote a few of the streets to these structures despite their disadvantages. The present tendency, as shown in existing or contemplated systems in Boston, Philadelphia, and Chicago, is toward the combination of elevated with subway construction for rapid transit railways. The fact that the elevated and subwuy lines in New York have come under the control of a single company may mean ultimately some passage of trains from elevated tracks to subway.

Subways.-Subways in connection with urban passenger transportation may serve two quite different purposes. They may be used to carry through the more densely crowded business center of the city the cars
which elsewhere operate on the surface, or they may be used in any part of the city for the operation of cars and trains at higher rates of speed than would be possible on the surface. These two classes may be conveniently designated by the terms subways for surface cars and rapid transit subways. The two functions may in some cases be combined in a single subway. Subways for surface cars are naturally comparatively short. If rapid transit is sought, either the subway must be greatly extended or it must connect outside of the business center with elevated lines.

European cities preceded those of our own country in the construction of subways. London's underground steam railroads date back many years. The first underground electric line was opened in Budapest about 1896. Within the past few years high-speed electric subway railways have been constructed in London, Berlin, and Paris, and very extensive additions to these lines are in process of construction or are planned.

Aside from a few short and insignificant tumnels for surface cars, such as those under the Chicago river, the first subway for urban transportation in the United States was that constructed by the eity of Boston, opened for operation in 1897. The narrowness and crookedness of most streets in the business center of Boston, and the concentration of traffic in Washington and Tremont streets, rendered the operation of surface cars utterly unsatisfactory. The present subway, most of which lies under Tremont street, has a total length of about $1 \frac{1}{2}$ miles. It accommodates both surface cars and high-speed electric trains, the latter emerging from the subway onto an elevated structure. For that part of its length in which the surface cars operate there are four tracks, two for each class of traffic. 'The subway is leased to the Boston Elevated Railway Company, which operates both the elevated and the surface systems of the city. The center of the elevated system is a large loop, of which the subway constitutes one side, inclosing the chief business section. From the loop radiate two lines, one toward the southwest, extending into Roxbury, and the other across the Charles river into Charlestown. The total length of the elevated and subway lines is about 8 miles of double track. Passengers coming from more distant points are given transfers to the elevated trains at the terminals, while, in the subway itself, passengers may transfer freely from surface cars to the elevated train, or from the elevated train to surface cars in cases where the cars are going in the same general direction. At present no surface cars run entirely through the subway. Those entering from one direction pass around a loop at Park street and return, while those from other directions pass around a loop at Scollay square. The short distance between these two loops is traversed only by elevated cars, but passengers, by a double transfer, can pass from the surface lines at one end of the subway to those at the other.

Great as has been the relief afforded by the Boston subway and elevated system, the situation is still far from satisfactory. The subway is so short as to necessitate sharp curves, and these diminish speed to such an extent that the subway accommodates with difficulty the cars which are already turned into it. To reliere the situation the city has planned to construct two practically parallel subways through the business center of Boston. One of these, under Washington street, will be used for the elevated trains, and the other, under Devonshire street, will be for surface cars. It is proposed when the Washington street subway is completed to withdraw the elevated trains from the Tremont street subway and devote it wholly to surface cars, part of which, at least, will then pass through its entire length instead of going around loops. A tunnel for street cars has just been completed under the bar to East Boston. When these plans are completed, the chief direction in which further development can be made will be in lengthening the present elevated lines and constructing one or more additional radiating lines for fast service, either on elerated struetures or in subways. Definite plans of this nature are already under consideration.

Much more ambitious is the purpose of the Now York Rapid Transit Subway, which will soon be ready for operation. The purpose here is to accommodate exclusively long-distance traffic. The tracks are kept underground for about three-fourths of their length, but for several miles in the northern part of Manhattan Island they are on a viaduct. The present subway extends from the city hall, where it terminates in a large loop, north on Center street and Fourth avenue to Fortysecond street, thence west to Broadway and north on Broadway. At One bundred and fourth street the subway divides, one branch crossing Central park and running northeast to Bronx park, while the other, or direct line, continues north to Kingsbridge. The total length of the present subway is 20.81 miles. The subway below One hundred and fourth street has four tracks. On two of these, "accommodation" trains will be operated, stopping at intervals of from one-fourth to onehalf mile, and maintaining an average speed of about 15 miles per hour. Over the other tracks will run express trains, making fewer stops and with much higher speed. The branches above One hundred and fourth street have two tracks. The upper parts of both branches reach into territory now rather sparsely built, which gives opportunity for considerable expansion of population. ${ }^{1}$

It has been estimated by experts that by the time the new subway is opened the long-distance trarel on Manhattan Tsland will fully equal the capacity of both subway and elevated lines, and that the congestion of traffic

[^9]will be as greatafter the subway is opened asit was before its construction was begun in 1900. The maximum capacity of the subway is estimated at 30 express trains and 50 local trains per hour in one direction, with a total seating capacity of 28,000 or a possible capacity when crowded of about 43,000 persons per hour. The elevated trains at present carry more than three times that number in one direction during rush hours. Nevertheless, a great relief will be afforded to the overcrowded elevated lines and to the thousands of long-distance passengers who now take the surface cars. The decrease in the amount of such traffic on the surface lines, by increasing the available space in the cars, will, it is believed, lead many people to ride short distances who now prefer to walk. Already plans are on foot for the construction of additional north and south subways in Manhattan Island, and it is evident that with the constant increase in population, only rapid progress in this direction will keep pace with the growing need for transportation.

Further relief for the population of Greater New York will result from the tunnels and bridges which are under construction, or planned, across the North and East rivers. These improvements are of a chararter so strictly bound up with the peculiar local geographic conditions that they thow less light upon the general problem of urban transportation than do the subways in Manhattan itself. It may be noted, however, that one prominent feature in the improvements which are to be effected in connection with these bridges and tunnels will probably be the additional use of elevated and subway tracks in the crowded parts of Manhattan and Brooklyn, both for the accommodation of surface cars and for the operation of fast trains.
In Philadelphia a comprehensive plan for securing rapid transit and for relieving the congestion of surface traffic is now in process of execution. The plan involves a subway about two miles long running under Market street, the leading business thoroughfare. The subway will pass around the city hall in a small loop. In addition, a larger loop, beginning at about the same place, will be constructed around the principal business center. This latter loop will have for its longer sides Arch street, two blocks to the north of Market street, and Walnut street, two blocks to the south. The subway west of the city hall will have four tracks, two tor surface cars and two for trains which are to pass upon elevated structures at the termini of the subway. For the rest of its length the subway will have two tracks only. The elevated lines to be opened first will consist of a short spur along the river front south from the eastern foot of Market street, and a wuch longer line west on Market street to Sixty-third street, about $4 \frac{1}{2}$ miles from the city hall. Several other elevated railways are planned, branching to the north and south at three different points on the central stem.

Plans for the improvement of transportation conditions in other cities by means of elevated railways and subways have not yet reached such an advanced stage of development. In Pittsburg it has been proposed to construct an elevated railway in the business center of the city, subway construction being practically out of the question on account of the physical conditions. In Chicago, among other measures for the relief of the transportation situation, such as the construction of additional loops on the present elevated railways in the center of the city, plans are on foot for the construction of an elaborate system of subways, running in both directions under several of the streets in the business renter, for the use of the surface cars.
An important point in connection with elevated and subway railways has to do with the relations between them and the surface lines. In Brooklyn, Boston, and Philadelphia, single companies control both systems, while in Manhattan and Chicago the elevated and surface lines are controlled by different companies; the Manhattan subway and elerated lines, however, being controlled by one company. It is evident that the most satisfactory service to the people will be rendered where transfer from one system to the other is easy and free. A normal arrangement would be one of radiating elevated or subway trunk lines, with interlacing and parallel surface lines, by which the passenger could more precisely reach his destination.
Satisfactory suburban and interurban service can be secured only in connection with elevated or sul),way lines in the densely populated parts of the great cities. There seems no reason why the suburban and interurban cars should not be run directly onto the rapid transit lines in the citr, as the cars could be so constructed that they could be connected with the regular elevated or subvay trains. Something of this sort already exists in Brooklyn where, at the ends of some of the elevated structures, the trains descend to the surface and continue into the suburbs. It will probably not be long before the interurban rail ways radiating from such cities as Cleveland, Detroit, and Cincinnati will take the initiative in the provision of some method by which their cars can reach the centers of these cities at high speed.
The chiet difficulty which stands in the way of a rapid development of subway systems for fast long-distance urban transportation is the heavy cost of construction. The cost varies greatly with local conditions. In New York, where an inmense amount of rock excavation has been necessary, the present subway and tracks, exclusive of power house and equipment, and of damages to abutting property, will cost the city about $\$ 36,500,000$, or about $\$ 1, \tau 00,000$ per mile of line. From the standpoint of profits, moreover, both elerated and subway railways intended for fast traffic are confronted by the facts that most of their passengers ride long distances; that a majority must be carried to a single business cen-
ter; and that a very large proportion of the traffic is during the few rush hours. As population, aided by the facilities offered, extends farther from the center of the city, these peculiarities will become more marked. Nevertheless there is every reason to believe that, either through private or public enterprise, additional subways will gradually be constructed in New York and other cities. It is conceivable that, as subways and elevated railways become more adequate to handle the entire long-distance traffic, while short-distance traffic becomes the chief business of the surface lines, some difference in fares between the two may be established, presumably by a reduction in the present fares of the surface railways.

## VI.

## STREET RAILWAY FARES.

Prevalence of the 5-cent fare.-The rate of fare on about two-thirds of the urban street railways in the United States is s cents for any distance covered by a single car. The journey is often extended by means of transfers to other cars, a practice which will be fully discussed in the succeeding section. The practice, very common in Europe, of grading fares according to distance, does not exist in any proper sense in American cities. In some cases the restrictions on transfers are such that certain journers within the city limits can be accomplished only by paying two fares. Naturally this is usually the case where different parts of a city are served by distinct companies. The most conspicuous illustration is in Cbicago, where the railway systems of the south, west, and north sides are operated as independent units. The oue-city one-fare principle is being strongly urged for Chicago. Consolidation of street railways has already virtually brought this about in most cities. American street railway managers very generally maintain that the uniform fare is more advantageous to the public than fares graded according to distance. Their strongest argument is that the graduation of fares would tend to restrict the expansion of the residential area of cities. They sometimes claim that this effect would be the more certain because to reduce fares for short distances to, say, 2 or 3 cents would make it necessary to raise the charge for longer distances above 5 cents. This necessity might, indeed, arise in cases where the present 5 -cent fare brings only a low return to the railway companies, although the reduction in earnings through a lower fare would be at least partly offset by increased traffic. It is of interest to observe that in several German cities, where graded fares formerly prevailed, the uniform charge for all distances, at least within city limits, has lately been substituted.
The 5-cent fare likewise prevails on a majority of interurban lines, which either are so short that a fare of 5 cents will cover a ride over their entire length, or
else collect this amount at different stages of longer journeys. The longer and faster interurban railways in most cases, however, collect single fares for the entire distance traveled by the passenger, issuing tickets in somewhat the same way as do the steam railways.

For the street railways of the country as a whole the average fare during the census year, obtained by dividing the receipts from passengers by the number of fare passengers carried, was 4.94 cents. On urban railways in cities of more than 500,000 inhabitants the average fare was 4.82 cents; in urban centers of from 100,000 to 500,000 inhabitants it was 4.93 cents; in those of 25,000 to 100,000 inhabitants, 4.78 cents; and in those of less than 25,000 inhabitants, 4.83 cents.
The fact that the average fare on urban railways of each group is thus somewhat less than 5 cents per passenger is due to the existence on certain railways of lower rates open to all passengers; to special rates on other railways for certain classes of passengers, particularly for children and workmen; and to some extent to the counting of transfer passengers as full-fare passengers in cases where an extra charge less than the full fare is made for a transfer. This latter practice prevails, for example, in Philadelphia.
Reduced fures open to all classes of passengers. -The returns made to the Bureau of the Census show that more than one-third of all the operating street railways in the United States offer fares of less than 5 cents to all of their patrons under certain conditions. In almost all such cases the cash fare for a single trip is 5 cents, but tickets for a number of trips are sold at reduced rates. Sometimes these tickets are good only during the busy hours of the morning and evening. The reports in the present investigation do not, in some cases, indicate whether the reduced fares are so restricted or not. More than 200 railway companies offer tickets at a price of approximately 4 cents each. By far the most common practice among such railways is to sell 6 tickets for 25 cents. Sometimes a further reduction is made if a larger number of tickets is bought, 25 tickets being frequently sold for $\$ 1$, and sometimes 26 or even more. On some railways the reduced fare is granted only to those who buy tickets to the value of $\$ 1$. It is quite common for such companies to sell 24 or 25 tickets for $\$ 1$. This is the custom, for instance, on the lines of the Connecticut Railway and Lighting Company, and on the systems at Springfield, Ill., Des Moines, Iowa, Muskegon, Mich., Syracuse, N. Y., Chattanooga, Tenn., Seattle, Wash., and a considerable number of smaller places. Occasionally, the purchase of a still larger number of tickets is required in order that the reduced fare may be obtained. Thus the Torrington and Winchester Railway in Connecticut sells 75 tickets for $\$ 3$, and the companies at Atchison, Kans., and Cumberland, Md., with one or two others, sell 100 for $\$ \pm$. Two railways, in Olean, N. Y., and Bradford, Pa., require the passen-
ger to buy 900 tickets in order to get a 4 -cent fare, while the Altoona and Logan Valley Electric Railway Company of Altoona, Pa., offers 500 tickets for $\$ 20$. It is evident that a great majority of passengers will not take advantage of reduced fares if they are required to buy more than a dollar's worth of tickets at a time.

The approximately 4 -cent fare in the varions forms mentioned is found for the most part in cities and towns of medium or small size. In no urban center of more than 500,000 inhabitants are tickets sold to all classes of passengers at reduced rates. The largesteities in which, at the time of the census, 6 tickets were sold for 25 cents were Washington, D. C., Detroit, Mich., Milwaukee, Wis., Dayton, Ohio, Indianapolis, Ind., Reading, Pa., Worcester, Mass., Utica, N. Y., Wilmington, Del., and Richmond, Va. In Detroit, however, these tickets are good only during the "rush hours" of morning and evening, and the same may be true in some of the other cities named. Subsequent to the date of the census, the two railway companies in Cleveland, Ohio, reduced fares to the same basis, but they later restored the straight 5 -cent fare.

The sale of tickets to patrons generally at reduced rates is quite rare among the street railways of New England, although a few of them grant lower rates to passengers who buy a dollar's worth of tickets. In the smaller cities and towns of New York, a considerable number of railways sell 6 tickets for 25 cents. This is the practice, for example, in Binghamton, Oswego, Rome, and Schenectady. On several railways in this state 24 or 25 tickets are offered for $\$ 1$. Pennsylvania has even more railways which sell 6 tickets for 25 cents than New York. Among the more important Pennsylvania railways offering this rate are the Chester Traction Company, of Chester and vicinity; the Conestoga Traction Company, of Lancaster and vicinity; the Lebanon Valley Traction Company, of Lebanon and vicinity; the Schuylkill Valley Traction Company, of Norristown and vicinity; the Wilkesbarre and Wyoming Valley Traction Company; the Warren Street Railway Company; and the United Traction Company, of Reading. Altogether, there are more than forty street railways in this state which have approximately a 4 -cent fare.
In the Middle Western states of Ohio, Michigan, Indiana, Illinois, and Wisconsin, the reduced fare, usually in the form of 6 tickets for 25 cents, is more common than elsewhere, and may almost be said to be the prevailing rate, except in two or three of the largest cities and on interurban railways. Practically all urban street railways in Indiana and Wisconsin sell 6 tickets for 25 cents, and the same is true of more than twentyfive of the street railways of Ohio. A fare at least as low as $4 \frac{4}{8}$ cents is available for all passengers in every city of more thin 25,000 inhabitants in Ohio, except Youngstown, Toledo, and Cincinnati. A fare of approximately 4 cents appears also in about a dozen places
in Iowa, the largest of which is Des Moines. Similar rates are also found occasionally in the Western and Southern states.
Fares even lower than 4 cents exist in a few cities and towns. The most familiar instance is Detroit, Mich., where, on part of the system now operated by the Detroit United Railways Company, 8 tickets for 25 cents are sold, in accordance with the terms of the franchise under which these lines were constructed. The new Central Market Street Railway in Columbus, Ohio, sells 8 tickets for 25 cents, while the older street railways in this city offer 7 tickets for 25 cents. The rate of 7 tickets for 25 cents also prevails in Salem and Delaware, Ohio, while in two or three other towns of the state where 6 tickets are sold for 25 cents, 27 may be bought for $\$ 1$. A rate of 7 tickets for 205 cents is also made on the Pittsburg, McKeesport, and Greensburg Railway, of Pennsylvania, while in Kansas one of the minor companies offers 28 tickets for $\$ 1$ and another 30 .
In addition to railways which thus practically fix their fares at 4 cents or less, there are a number which grant slight reductions from the 5 -cent fare. The rate of 11 tickets for 50 cents exists in Pueblo, Colo., on two interurban railwrays of Maine, and in several other places. In Mobile, Ala.; Santa Barbara, Cal.; Colorado Springs, Colo.; Auburn, N. Y.; Lincoln, Nebr.; Toledo, Ohio; Spokane and Tacoma, Wash.; and a number of other places, the railways sell 22 tickets for $\$ 1$. The leading companies of northern New Jersey offer 21 tickets for $\$ 1$, while on a number of railways of minor importance in various parts of the country, from 105 to 110 tickets are sold for $\$ 5$.

Reduced fares for particulur classes of passengers.Sometimes street railway companies carry young children in company with their parents for half-fare. In Baltimore, Md., for example, the fare for children is 3 cents. It is probably more common, however, to charge full fare for children above a certain age and carry others free. A more important practice is that of granting reduced fares to school children. In such cases the most common rate is $2 \frac{1}{2}$ cents, though sometimes 3 or 4 cents is charged. In New England, it is almost universal for street railways to carry school children at reduced rates. Outside of New Englancl, the practice is frequently found in smaller cities and towns, and in a few instances, in large cities also. Among the important cities which offer a fare of $2 \frac{1}{2}$ cents to school children are Boston, St. Louis, San Francisco, and Denver. Street railway companies presumably act on the theory that, by thus reducing the fares of school children, they will secure a considerable amount of traffic from those who would otherwise walk.
The practice of granting special rates to working people is comparatively rare in the United States. The returns to the Bureau of the Census do not indicate, in some cases, whether such special rates reported are limited in any way, and in other cases they do not show pre-
cisely the restrictions imposed; but usually there is no restriction except as to the time of day at which the journey is taken. In general, it may be said that the reduced fare for workingmen is confined to the hours from about 6 to 8 in the morning and from about 5 to 7 in the evening. Naturally any person who rides at that time may usually avail himself of the reduced fare. The special rate is sometimes confined to particular routes or distances. The practice is more common in New England than elsewhere. About sixteen of the street railway companies of Massachusetts reported reduced fares for workingmen, the most common rate being $2 \frac{1}{2}$ cents, although several railways reported 3 or 4 cents. The most important company which makes special rates for workingmen is the Boston and Northern Railway Company, which serves many cities and towns in eastern Massachusetts.

Among other instances of reduced fares for working people may be mentioned the practice of certain railways in the mining districts of Pennsylvania. For example, two companies centering at Shamokin, and several others elsewhere, sell 30 workingmen's tickets for $\$ 1$. The Detroit and Port Huron Shore Line and the Saginaw Valley Traction Company sell 8 tickets for 25 cents to workingmen, while the railways of Zanesville, Ohio, and Clinton and Dubuque, Iowa, make a $2 \frac{1}{2}$-cent rate. When the elevated railways were first opened in New York they charged a 10 -cent fare, but were required by law to carry passengers for 5 cents during the rush hours morning and evening.

It is rarely if ever true that workingmen taking advantage of such special rates are confined to particular cars. One frequently hears the suggestion, on behalf of the more well-to-do patrons of American street railways, that a class distinction in cars and fares should be made systematically, as is frequently done in European cities. It is complained that the presence of laborers in a crowded car is often distasteful to many of the passengers, and that, in some cases, their working clothes soil those of the other passengers. Aside from the general objection that such a plan would be contrary to American ideas of equality, street railway officers are very generally opposed to it from a business standpoint. Presumably it would mean a loss in revenue in many cases, since the distinction probably would have to be made by lowering the fares of second-class passengers rather than by raising those of first-class passengers. It is also argued that the attempt to enforce any such distinction would be virtually impossible in those cities where traffic is heavy, and where to wait for a car of the desired class would be most annoying. In all probability, the cars or compartments with reduced fares would be largely patronized by all classes of people, and would be greatly overcrowded, while the first-class cars and compartments would run partly empty. ${ }^{1}$

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## VII.

## TRANSEERS.

Prevalence of transfer system. - The fact that transfers were issued to more than one-fifth of the fare passengers on street railways in 1902 indicates the great importance of this practice in connection with the social service of street inilways. As already pointed out, the proportion of passengers who transfer is highest in the large cities, where the railway lines are complex and where the distances to be covered are great. An examination of the detailed statistics for individual companies shows that there is scarcely an important surface railway in a city of more than 100,000 inhabitants which does not grant transfers on an extensive scale. The proportion of transfer to fare passengers, however, varies greatly among these railways. In the case of the Pittsburg Railways Company, which has 70 transfer points, only 11.4 per cent as many transfer as fare passengers are carried; and in Louisville, $\mathrm{K}_{\mathrm{y}}$., the proportion is still lower, 7.5 per cent. On the other hand, the great railway system of Boston, with only 38 transfer points, grants transfers to 51.7 per cent of its fare passengers. 'The construction of the elevated system in Boston, connecting by free transfer with many of the surface lines, has greatly increased the number of trans: fers granted. The Interurban Street Railway Company in New York has no less than 318 trausfer points, and its transfer passengers are equal to about 40 per cent of its fare passengers. The Brooklyn Rapid Transit Company has a still larger number of transfer points, but the proportion of fare passengers who take transfers is much smaller-20 per cent. The Chicago Union Traction Company has 300 transfer points, and the proportion of transfer to fare passengers is 41 per cent.
The differences in the relative number of transfer stations and in the proportion of transfer passengers are due less to differences in the liberality with which transfers are granted than to differences in the geographic characteristics of cities, in the location of railway lines, and in the arrangement of continuous trips. Generally speaking, in most of our large cities, transfers are granted in such a way that a passenger can go from any point to any other point within the city limits, reached by the cars of the same company, unless the trip involves a return to approximately the starting point. Sometimes transfers are granted only on cash fares, not upon other transfers.

While transfers are given without charge in the great majority of instances there are a ferv exceptions, particularly where the transfers are between lines of separate companies. An arrangement of the latter type existed until recently between the Manhattan Railway's elevated lines and the Third Avenne Railroad Company's surface lines in New York, 3 cents being charged for a transfer ticket. The only important company
which requires payment for a large proportion of all transfers is the Union Traction Company of Philadelphia. An "exchange ticket" on its lines costs 8 cents, or 3 cents in addition to the single-trip fare. But the ticket is of indefinite duration and good at many different points, so that it can be held by the passenger until he has occasion to take a ride for which the transfer will serve. The company claims that the system has practically resulted in reducing the fares for a considerable portion of its patrons to a 4 -cent basis, and that it is preferred by them to the granting of free transfers limited as to time and place. A considerable number of free transfer points also exist in Philadelphia.
Cuses of the extension of transfer privileges.--The granting of transfers is largely a recent development. The consolidation of the street railways in most cities into one or two companies has offered opportinity for the extension of the system to a degree previously impossible. The transfer has served to increase greatly the possible length of ride which can be taken for a single fare, and to lengthen materinlly the average ride of all passengers. Moreorer, the use of transfers makes it possible, without adding to the aggregate number of car miles operated, to increase the frequency of service between the more widely separated parts of a city. It might be possible for a railway company to corer the trip from a point on one line to a point on another line by a continuous car. In fact, in some European cities, complicated routes are arranged so that a person can go from any part of the city to ulmost any other part without change of cars. To carry out such an arrangement to its full extent, however, meins that the cars which cover a given trip between widely separated points must rum on a very infrequent schedule unless they ran largely empty. By breaking the possible jounneys into separate units comected by means of transfers, it becomes possible to operate on each unit of track the number of cars which the amount of its traffic demands, and often also to collect into a single car passengers transferred from several different lines.
The extension of the transfer system is partly the result of a direct popular demand. This demand, in the opinion of various street railway managers, would have expressed itself in a movement for lower fares had it not heen met by greater liberality in regard to transfers. In several cities transfers are now made compulsory by law. Thus the present street railway law of the state of New York provides that any company, which has obtained its franchise since the law was passed, nust, for a single fare, carry passengers between any two points within the limits of a single city which can be reached by its lines. When the control of the Third Areme Railroad and its sulbsidiary lines was secured by the Metropolitan (Interurban) Street Railway Company, it was at first held by the latter company that the two railway systems were distinct,
and that transfers between them were not obligatory under the law, but the courts hare taken the opposite position in a recent case. The same decision, however, upheld the railway company in its refusal to issue transfers at certain points, on the ground that the congestion of traffic there renders the transfer of passengers dangerous to life and limb.
In Chicago the city council, under its authority to regulate the charges of railway companies, has passed an ordinance requiring every street railway to grant a free transfer from a car on which a cash fare has been paid to the cars of any other of its lines with which it connects. Transfers are good only if used within one hour. The supreme court of Illinois has held that the power to regulate fares includes the power to require the issue of transfers, or, in other words, the power to regulate the fare charged for trips over more than one line of the same company. It has also held that transfers must be granted between the lines of the Chicago Union Traction Company and those of the Chicago Consolidated Traction Company, since the former corporation controls the latter. ${ }^{1}$

As a rule street railway companies themselves have been liberal in their policy regarding transfers, and have made most of the extensions of the transfer privilege on their own initiative, in the belief that traffic and profits would be increased thereby. The head of one of the largest street railway systems in the country has stated that, in his opinion, nothing since the adoption of electric traction has done more to increase the receipts of his company than the giving of transfers. Other highly favorable opinions regarding the financial results of the system have frequently been expressed by prominent street railway managers. It is reasoned that for many people the extent to which street cars are patronized depends largely on the convenience of the service; that street car riding is, in some measure, a matter of habit which can be cultivated; and that, as a result of the longer possible rides under the transfer system, thousands of people live in the outskirts of the city or in the suburbs who would otherwise seek homes within walking distance of their places of business.

Difficulties in administration of transfer system.The use of transfers involves certain administrative difficulties which are not fully appreciated by patrons of street railways. The railway company can not reasonably be asked to issue a stop-over ticket which will allow the passenger an indefinite amount of time at the transfer point. Still less can it be expected to grant transfers in such a way that the passenger can return to his starting point without paying an additional fare. In most cities there are railway lines so situated that an unlimited grant of transfers would make this possible, particularly if transfers be issued upon transfers. For this reason companies sometimes decline to permit

[^11]transfers at certain points where they would be of material convenience to many people. Other companies, however, prefer to incur the comparatively small loss due to the failure of a few passengers to pay fares for what are practically return trips, rather than to displease the public by withholding transfers which can reasonably be demanded. An effective enforcement of the time limit on transfers would do away with many of the abuses of the system, but such enforcement is often found to involve considerable difficulty, and the railways naturally desire to aroid altercations between conductors and passengers as to the validity of transfers.

A further difficulty arises from the fact that passengers occasionally take transfers which they do not need and give them to other persons, who either use them themselves or sell them at a reduced price. Still more serious is the fraud sometimes practiced by conductors, by which they turn in transfers obtained from passengers, or from other conductors, in collusion in place of cash fares which have actually been paid. Much difference of opinion exists among street railway managers as to whether there is more opportunity for this practice when transfers are registered or when they are not registered.

Notwithstanding all these difficulties, street railway
officers quite generally favor the transfer system, and believe that their losses through its abuse are small in the aggregate as compared with its advantages to themselves and to the people.

An act passed by the legislature of the state of Rhode Island in 1902 contains provisions which represent in a general way the ideas of railway men as to what constitutes a fair system of transfers. It requires every street railway company to issue a transfer to any cashfare passenger in such a way as to enable him to reach any point in the city or town which can be reached by a second car, but which could not be reached ly the first. The passenger must demand the transfer ticket at the time he pays his cash fare, and mast continue his journey on the first car which passes the point of intersection. No company is required to issue a transfer which will enable a passenger "to return toward the point where he first took passage by a line rumning parallel with or in substantially the same general direction as the one to which he is transferred." Transfer tickets are not transferable, and any person who gives a transfer to another except to a conductor, or any person who offers to a conductor a transfer ticket which was not issued to himself, is subject to a fine. ${ }^{1}$

[^12]
## OHAPTER IV.

## CAPITALIZATION.

Busis of statistics and method of presentation.-Table 98 shows for each company, hoth operating and lessor, the amount of authorized capital stock, whether common or preferred, the amount issued and outstanding, and the dividends declared thereon; the amount of authorized and outstanding funded debt, with the rate of interest thereon; and the combined total of the capital stock and funded debt outstanding. A further column shows the capitalization per mile of track owned by each company, based on the net capital liabilities, as described more fully hereafter. The statistics of 7 companies operating 134.98 miles of track are not given. In the case of most of these companies the electric railway system is part of an ordinary steam railway system, and the capital properly assignable to the former can not be segregated from the general capitalization of the company as a whole. The capitalization of 52.97 miles of track leased from steam railways by electric companies is also omitted for the same reason.
Many companies have promissory notes for considerable amounts outstanding. The schedule, however, did not distinguish between notes of this sort and other floating obligations, such as accounts payable, audited vouchers, etc., and for this reason it is impossible to ascertain for companies individually, or for all companies combined, the amount of floating debt which can be strictly designated by the term "bills and notes payable." In many instances such floating debt has been incurred, not for the purpose of construction and equip. ment, but merely as an incident to current operations. There are, however, a considerable number of companies, particularly in Massachusetts, which have borrowed large sums on promissory notes, to be used for construction or equipment, and these properly constitute a part of their capital liabilities. It is possible that the prevalence of this practice in Massachusetts is connected with the strict regulation by the state law of the amount of capital stock and funded debt of street railmays. For companies having large floating debts of this character, the items in Table 93, showing the total capital stock and funded debt, and the net capital liabilities per mile of track, are, in a sense, misleading. In the case of various companies in Massachusetts, footnotes have been appended to the table calling attention to the fact that a large amount of floating debt is outstanding. To the extent that these floating debts are properly to be
considered capital liabilities, the total capital liabilities of street railway companies in the United States are understated. The amount so involved is, however, small as compared with the aggregate amount of capital stock and funded debt for the entire country.

A disturbing element in calculating the amount of capital liabilities per mile of track is found in the fact that many street railway companies own property other than the railway itself. Frequently one company owns securities of another street railway company. In the numerous cases in which an operating company owns the entire stock issue of a subsidiary company, the Census Bureau has usually dispensed with a report from the latter, and has treated the cost of its securities to the operating company as part of the cost of construction of the system of that company. In cases in which the securities owned are those of another company which reported to the Census Bureau, there is, of course, a duplication. Ordinarily the holding company has issued its orrn securities to an amount sufficient to cover the cost of the securities held, and expects to apply the dividends and interest which it obtains from the securities purehased to the payment of dividends and interest on its own issues based thereon. Even when securities are purchased by the use of a surplus, the transfer of part of the securities of one company into the treasury of another may be considered as, in a sense, reducing the aggregate amount of capitalization for the two combined. The holding company now derives (or at least hopes to derive) part of the income which its surplus should earn from the return on the securities owned, and need not demand so large a profit from the railway which it operates. For this reason the value of the securities of a reporting street railway which are owned by another reporting company should be deducted in determining the net capitalization based on the railway property of the holding company.
Again, it is very common for street railway companies to operate plants for the production of light and power for sale. The majority of such companies, however, declare that they are unable to distinguish at all accurately between the investment in the street railway branch and the investment in the light and power branch of the business. Accordingly, no attempt has been made in the returns of capitalization for individual companies or in the totals to segregate the value of light
and power plants. The fact that a company operates such a plant is indicated in a footnote in connection with the column showing the total capital liabilities, although, in the many cases where a company sells a small quantity of light or power without an appreciable extra investment of capital, no note is made of the fact. It is obviously improper to compare the capitalization per mile of track of street railways having light and power plants with that of other street railways. However, the figure of capitalization per mile of track for the United States as a whole, and the corresponding figures for most of the individual states and for groups of cities, are not largely affected by the presence of light and power plants. It is probable that the extra investment in such plauts by the street and interurban railway companies of the country as a whole does not exceed 5 per cent of their total investment of capital. This opinion is strengthened by the fact that the total revenue of railway companies from sale of light and power is only 3.1 per cent of their operating earnings.

Footnotes to Table 93 call attention to the instances in which street railway companies have permanent investments aside from those in light and power plants and in their own railways. The amount of such investments has been stated wherever the company gave its consent, and that amount has been deducted in the calculation of the net capital liabilities based on the railway property. The figures in the last column of Table 93, showing the amount of net capital liabilities per mile of track, are obtained, with respect to most individual companies and with respect to all state and national totals, by dividing the amount of trackage owned (not the amount operated) into the net capitalization, as ascertained by deducting from the sum of the capital stock and funded debt outstanding the value of securities of other reporting railways held and the value of other outside investments, the value being in each case that at which these securities or investments are carried in the balance sheets of the holding companies, desig-
nated as "other permanent investments," in the Census schedule." Much the larger part of the "other permanent investments" reported by all the companies combined represents the stocks and bonds of other reporting railways.
In many instances where street railways have been combined, either through stock ownership or through lease, the controlling company makes capital expenditures upon the lines of the subsidiary companies. The capitalization of the operating company may, therefore, appear exceedingly large in proportion to the trackage which it directly owns, being based in part on trackage of the subsidiary companies. On the other hand, the capitalization of the latter does not represent in such cases the total investment upon their lines. One of the most conspicuous illustrations of this situation is found in the Third Avenue system in New York. The Third Avenue Railroad Company itself has capital stock and funded debt outstanding to the amount of $\$ 55,995,800$, while it owns outright only 27.24 miles of track. But the company owns $\$ 10,455,290$ of the securities of its eight subsidiary companies, and, moreover, has advanced to them $\$ 11,383,476$ for construction work. The capital stock and bonds of several of these companies are much less in amount than their cost of construction. The system as a whole has 230.73 miles of track, and the net capital liabilities are $\$ 269,142$ per mile. In cases of this sort the parent and subsidiary companies have been treated as one system in computing the ratio of capital liabilities to the trackage, and any duplication of capital stock or funded debt due to the ownership of securities of one company by another has, as in other cases, been eliminated.
Capitaliaation of companies, classiffed acoording to power.-Table 20 is a summary of the statistics of capitalization for all street and electric railways and also for these railways classified according to power.

[^13]Table 20.-CAPITALIZATION OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902. ${ }^{1}$

|  | Total, | Electric, SURFage. |  |  | Animil, | Steam and electrie, elevated. | Coble, surfree and inclined planes. | Steam, streface. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Without commercial lighting. | With commercial lighting. | Part time. |  |  |  |  |
| Number of companies. | 980 | 724 | 121 | 58 | 54 | 6 | 14 | 9 |
| Track mileage .................... | 22,389,04 | 18,662.29 | 2,464,19 | 831,17 | 158.12 | 228. 10 | 33.11 | 12.06 |
| Capital stock outstanding, amount | \$1, 315, 579,960 | \$1, 072, 946,092 | \$116,777,854 | \$20,751,900 | \$5,469,114 | \$95, 531, 600 | \$4,000,500 | \$95,900 |
| Preferred. | 1, 197, 930, 179 | 91, 077,179 | 21, 644, 900 | 1,600,000 |  | 13, 708, 100 |  |  |
| Per mile of track | $1,187,642,781$ 58,700 | 981, 868, 913 | 95, 132,954 | 19,251,900 | $5,469,114$ | 81, 828, 500 | 4,000,500 | 95,900 |
| Funded deht outstanding, umount ${ }^{2}$ | 992, 709, 139 | 787, 788, 775 | 102, 753,197 | 10, 260,994 | 34,588 $4,647,923$ | 76, 4185,815 | 120,825 $2,028,200$ | 7,952 110,000 |
| Per mile of track....................................... | 882, 44, 389 | 707, 42,218 | 102, 41.699 | 19, 263,178 | $4,047,928$ 29,395 | 7, 888,735 | 2,028,200 61,256 | 110,000 9,121 |
| Total capital liabilities ................................ | 2, 305, 282, 099 | 1,860, 729,867 | 219, 581, 1151 | 40, 012,894 | 10,117,087 | 171, 656, 650 | 6,028, 700 | 205,900 |
| Investments in securities and nonrailway property. | 152, 513,997 | 141, 666, 468 | 9,267, 550 | 927,200 | 107,723 | 171, 92,390 | 458,676 |  |
| Net capital liabilities ................................... | 2, 155, 768, 102 | 1,719, 064, 409 | 210, 268, 601 | 39, 085,694 | 10,009,314 | 171, 564,260 | $5,575,024$ | 205, 900 |
| Per mile of track....................................... | 96,287 | 1,92,114 | 85, 328 | 47,025 | 68,802 | 752, 145 | 168,879 | 17,073 |

1 Exelasive of reports for 7 companies, having 184.98 miles of track, which failed to furnish this information, and exclusive of 52.97 miles of track leased from steam railway companies.
${ }^{2}$ Includes floating debt in the case of 7 companies which have not yet issued funding bonds.

The total authorized upital stock and funded debt of strent and electric milwars of the United States in 1902 wat $82,470,629,316$. Of this amount, $82,308,282,099$, or so. 4 per cent had been issued and was outstanding at the can of the fiscal years corered by the varions reports. This is exdusive of floating debt except in the case of 7 companies which have not yet issued intended funding homd.. Of the total outstanding capitalization, $\$ 532,-$ $s 18,31 \mathrm{~s}$ represents the securities of lessor companies, *252, 608,090 of this sum being stock and $\$ 200,209,428$ bounds.

The totul outstanding capital liabilities of companies operating primarily electric surface railways, inclading part-time roads, amounted to $\$ 2,120,275,812$, or 91.9 per cent of the total outstanding capital liabilities for all street and electric railways. Most of the remaining' capitalization is represented by elevated railways.

Of the total capital liabilities outstanding, capital stock constitutes 57 per cent and funded debt 43 per cent. The proportions which the two classes of securities bear to one another differ only slightly as between electric, animal power, and elevated railways. The great majority of the railway companies have funded debts, and in many individual instances, the amount of funded debt considerably exceeds the anount of capital stock. The United Railways and Electric Company, of Baltimore, Md., for instance, has $\$ 15,079,30 f$ of stock and $\$ 51,381,69 \pm$ of bonds; the Metropolitan Street Railway Company, of Kansas City, has $\$ 5,686,800$ of stock and $\$ 16,038,400$ of bonds.
The amount of preferred stock outstanding is a little less than one tenth of the total amount of capital stock. Only s5 companies have preferred stock. Nearly all of these companies also hare bonds. None of the animal power or cable railways has issued preferred stock.
The total amount of investments of street raiway companies, in securities and nonrailway property, aside from the investments in the railways which they own anc in electric light and power plants, as carried in the balance sheets of the companies, is $\$ 152,513,997$. Nearly all of these outside investments are held by companies operating primarily electric surface railways. Deducting the ralue of these investments, there remains, as the net capitalization represented by the railway and electric property of street railway companies, $\$ 2,155,765,102$.

Gapitalization per mile of track.-The combined total capital stock and funded debt of all street and electric railway companies is equal to $\$ 103,099$ per mile of track owned by them. When the value of "other permanent investments" is deducted the net capital liabilities per mile of track are $\$ 96,287$. The net capitalization of those companies which overate primarily electric surface railways and which do no commercial lighting amounts to $802,11 \pm$ per mile of track. From one standpoint this sum exaggerates slightly the capitalization of electric surface railways proper. For
among the companies included are two, Brooklyn and Boston, which have a considerable mileage of clevated track, and several which hare cable trackage in addition to their electric lines. Elevated railways and cable railways cost much more to build than the ordinary overhead trolley surface lines. The average capitalization of the exclusively elevated railways in 1902 was 8752,145 per mile of track and that of cable railways, including inclined planes, \$168,379. Eren the exclusively animal power railways show an exceedingly large capitalization per mile of track. An examination of the returns of separate companies, however, shows that $\$ 8,960,000$, or nearly nine-tenths of the total capital liabilities of these animal power railway companies, have been issued by four companies in New York city, which own only 30.82 miles of track. On the average these four companies are capitalized at $\$ 288,506$ per mile. The average capitalization of the remaining 50 animal railway companies in the United States is about $\$ 8,000$ per mile of track.

The figures of capitalization per mile of track just given appear at first glance very large. They greatly exceed the capitalization per mile of the steam raijways of the country. The Interstate Commerce Commission itself computes the relation of capitalization to trackage for such railways only on the basis of the length of line-that is, of first main track-nor does it make deduction of the amount of securities of other reporting railways held by the companies. The report of the Interstate Commerce Commission does not show the actual length of all railway tracks in the country. It does show the number of miles of track operated, including second tracks, sidings, switches, etc. This figure ( 274,195 miles in 1902) is several thonsand miles greater than the mileage constructed, by reason of duplication, in the statistics of track operated under trackage rights. On the basis of track operated the total capital liabilities of stean railways in 1902 ( $\$ 12,134,182,964$ ) were equal to about $\$ 45,000$ per mile of track. But in order to render the figures comparable with those for street railways it is necessary to deduct the large amount ( $\$ 2,208,518,793$ ) of stocks and bouds of reporting railways which are held by other railway companies. With this deduction the net capitalization of steam railways would be about $\$ 36,000$ per mile of track. ${ }^{1}$

The enormons increase in the capitalization of street railways per mile of track since 1890 has already been pointed out (page 11). It is not within the scope of this report to enter into a detailed discussion of the question whether or to what extent the street and electric railway companies of the United States may be overcapitalized. To do so would involve a consideration of unofficial estimates of cost of construction, which vary greatly in individual instances. It may be of value, however, to present a few general considerations regardiing capitalization, which may aid. in the interpretation

[^14]of the statistics just presented. The subject of the relation between capitalization and actual investment in the street railways is a very important one from the standpoint of the general public. Upon it hinges largely the question of the reasonableness of street railway fares and the question of taxation. Information regarding the amount of current expense necessary to carry a passenger can readily be secured. For the United States as a whole, the margin between operating expenses and fares averages a little more than 2 cents per passenger, while in the case of several important railways the margin is fully $2 \frac{1}{2}$ cents per passenger. (See page 86.) Though from this margin must be deducted an amount to cover the depreciation of property and taxes, much the greater part constitutes a net return to capital. The amount of dividends and interest actually going to stockholders and bondholders, taking the street railways of the country as a whole, represents less than the current rate of interest on an amount equal to the face value of their outstanding securities. Few companies pay a high rate of dividend. If the capitalization of the street railways of the country represented real value, dollar for dollar, earnings might appear to be not too great, but too small. The question of the reasonableness of profits thus becomes primarily one as to that of capitalization.

It is quite impossible to obtain accurate information as to the actual amount of money which has been spent in the construction and equipment of street railways in general or of most indiridual street railways. The item, "cost of construction," as carried on the books and balance sheets of street railway companies gives, in most cases, no idea whatever of the cash investment. The intervention of construction companies composed of the promoters of the railway has in many cases rendered the book value of properties misleading, and other similar reasons might be given. The most important difficulty, however, is that the greatest railway systems now existing have been built up by combination and recombination. The cost which a company enters upon its books when it buys another system is the amount of cash or securities which it has paid for the going concern. This amount is based upon the earning capacity, largely, if not wholly, irrespective of original cost. The records of cost of the absorbed companies are no longer accessible, and even if they were would probably not show correctly the actual investments. Estimates of engineers regarding the cost of construction hold good only for the conditions of the given time and place, and may be very far from correct as applied to the great majority of existing railways.

Causes tending to increase capitalization.-There are many causes which have tended to increase the capitalization of street railways during recent years. The cost of the roadbed of street railways is greater than is
ordinarily supposed and has increased very materially under change from horse traction to electric traction.

Steam railways must incur large expense for grading, for making cuts and fills, for bridging streams, and tunneling mountains. Street railways, in most instances, are built on streets and roads already graded; they largely make use of public bridges and seldom have need of tumels. Even in the case of urban yailways, howerer, the foundation and roadbed, aside from the rails, involve much expense, particularly in the large cities, where the construction is often immensely superior to that in small towns. The heavier cars which have come into use have necessitated the most careful and expensive methods in the preparation of the foundations for tracks. In cities street railways are required, ordinarily, to pare the streets between their tracks and for a short distance on either side. The expense thus incurred is often greater than the cost of the rails themselves and greater than the cost of grading for steam railways under ordinary circumstances. The recent estimate of Mr. B. J. Arnold, regrarding the cost of duplicating the Chicago strect railway system, places the expense of paring at from $\$ 6,808$ to $\$ 18,400$ per mile of track, according to the character of pavement used. ${ }^{1}$ Of course railways in small towns and many of the lighter interurban railways, particularly of those which are laid in or at the side of the country roads, have been subject to much less expense for grading, foundations, and paring than the best railways in the great cities. On the other hand, the highest type of electric interurban railway, operating on a private right of way, has a roadbed nearly if not quite as perfect and as expensire as that of steam railways in the same section of the country.

In the days of horse railways, the rails used were light in weight, often less than 40 pounds per yard. Nowadays the more important street railways in the cities, as well as the best fast interurben lines, are using rails of from 80 to 120 pounds weight per yard. These rails are heavier than those employed on a large proportion of the steam railmay trackage. All the special work which accompanies the track has similarly increased in weight and in cost. To the cost of the track must be added that of overhead electric construction, an element of expense wholly lacking in the case of horse and steam railways. Underground troller and cable construction are much more expensive still. The rolling stock of the modern electric railway costs far more than that of the old horse railway; the cars are larger, heavier, more comfortable, and more elegant; the motors cost far more than the horses which formerly hauled the cars; and the modern power house is a new and important source of capital expenditure.

Reconstruction in relation to capitalization.-One of

[^15]the most important points to be borne in mind, in considering capitalization of street railways, is the cost involved in the reconstruction which has been necessitated by progress in methods. It is a fact sometimes overlooked that the tracksand equipment of the old-fashioned horse railways had practically to be thrown away when cable or electric traction was introduced, and that, in most cases, the expense of the new system was almost as great as it would have been had there been no previous railway whatever. The capitalization of the different kinds of street railways in 1890 can not be segregated accurately, butit is probable that the horse lines were represented by securities to the amount of fully $\$ 250,000,000$, much the greater part of which was based on property that has since become valueless.

The cable railways which existed in 1890 have to a great extent been changed to electric operation, this being true even of two or three important cable lines completed since 1890. A considerable fraction of the large investment in cable railways has been destroyed by the change. The power honses, cables, and grips have been virtually thrown on the scrap heap; the subways in which the cables ran, the cost of which was very great, have been wholly abandoned in many instances; while in other instances the expense of reconstructing them for the use of the underground electric trolley, which has been done extensively in New York and Washington, is much greater than is ordinarily supposed. Mr. B. J. Arnold, in his report to the Chicago city council, declared that it would cost nearly as much to convert the cable lines of that city to the underground. trolley system as to construct the latter at first hand. The expense, as indicated in the report, would depend largely upon the size of ruils and the strength of conduit yokes used under the cable system. If, as in Chicago, heavier construction should be necessary to bear the strain of modern cars and speeds, the old work would be of little value. ${ }^{1}$
So, too, the change from steampower to electricity, particularly on the elevated railways of New York and Brooklyn, involved a great waste of cupital.
Finally, many street railway companies have, even within the short time since electric traction was introduced, largely reconstructed their plants and equipment. The earlier motors, notwithstanding their high cost, proved insufficient in power and unsatisfactory in other Ways. They have for the most part been replaced, and, in many instances, even these new motors have again been replaced. The small cars, unsuited to high speed, have given way to larger ones. The foundations of the roadbed and the tracks have had to be reconstructed and strengthened in many cases to meet the requirements of larger cars and increased speed. Even more conspicuous, perhaps, have been the replacements of the engines and dynamos in the power houses.

[^16]Changes of this sort result in greater economy of operation, and are usually profitable to the railway company even when the interest on the new investment is taken into account; but they have of necessity greatly increased the aggregate expenditure for construction and equipment. The railways, as they stand, have cost much more than they would cost if constructed de novo at the present time.
It is not true, however, that all street railways have been thus compelled to abandon or reconstruct properties representing large investments of capital. Most of the fast interurban railways have been built since the methods of construction and equipment were highly developed and have required as yet little reconstruction. Many railways in the smaller towns and cities, as well as a considerable part of the trackage even in large municipalities, date likewise from a recent period. In fact, as appears from Table 21 , the capitalization of many of these newer lailways is very much less per mile than that of older systems in large cities. No opinion is here expressed as to whether the present capitalization of street railways generally, or of any particular railway, corresponds to the total amount of money which has been actually invested in its present and past properties taken together. Attention is merely called to the fact that, taking the country as a whole, the aggregate waste of capital involved in the progress of street railway methods has been great. That waste must particularly be borne in mind in considering the capitalization of many individual companies.
The question at once occurs, however, to what extent property which has become valueless should continue to be represented by securities and to earn interest or dividends. It is commonplace in accounting that a certain amount should be charged aunually against earuings, to cover, not merely depreciation arising from ordinary wear and tear, but also the probable depreciation arising from progress in methods. Street railway companies ought, of course, to be permitted to charge fares high enough to provide for such a reasonable depreciation allowance. Under proper accounting the net capitalization represented by depreciating property is thus gradually reduced, and the amount required from earnings for dividends and interest is correspondingly lessened. Doubtless, in many cases, street railways have in the past earned profits high enough to enable them to make such depreciation allowances if they had seen fit to do so. Their policy, however, almost without exception, has been to pay out the greater part of net income in dividends, although a surplus is often invested in the construction of extensions to old lines. Had correct accounting methods been pursued, the capitalization of many horse railways would have been completely written off by the time electric traction had rendered the plants valueless.

During the years since electricity was introduced,
changes in methods on many railway systems have been so rapid, and capital has been expended so fast, that it would have been impossible to make a depreciation allowance sufficient to write off the waste capital within the period of time during which it existed, without practically excluding the possibility of interest and dividends. Moreover, sufficient experience had not been accumulated, at least during the earlier years of electric traction, to enable accountants to determine what would be a reasonable allowance for depreciation. In instances where property is being replaced so rapidly it seems reasonable that the capitalization should be temporarily increased beyond the sum which would be necessary to construct the improved railway system from the beginning. But it seems equally reasonable
that such eapitalization, in excess of the cost of reproducing the properties, should thereafter be reduced as rapidly as possible by the accumulation of a depreciation fund. There is little probability that such sudden and great changes in methods will be necessary in the future as in the immediate past, and it will be possible hereafter to estimate depreciation better: and to provide for it. Permanently to demand interest and dividends on securities issued for properties no longer in existence is unjustifiable.

Capitalization of companies, classified according to population.-Table 21 shows the statistics of capitalization of street and electric railways in urban centers, classified according to population, together with the tro groups of interurban railways.

TABLE 21.-CAPITALIZATION OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902.'

|  | Total. | urban centers, porulation, |  |  |  | intmrubian haidways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | $\begin{aligned} & \text { 100,000 } \\ & \text { but, inder } \\ & 500,000 \text {. } \end{aligned}$ | $\begin{aligned} & 25,000 \\ & \text { but under } \\ & 100,000 \text {. } \end{aligned}$ | $\begin{aligned} & \text { Under } \\ & 25,000 \text {. } \end{aligned}$ | Fast, long. | Other. |
| Number of companies. | 980 | 142 | 57 | 102 | 321 | 60 | 298 |
| Track mileage.................. | 81, ${ }^{22,389,04}$ | 9678, ${ }^{4,981.50}$ | \% $\begin{array}{r}3,531,02\end{array}$ | 8111 ${ }^{2,907.13}$ | \%,240,24 | 278,766. 23 | ${ }^{5100^{5,962.92}}$ |
| Capital stock outstanding, amount | \$1, $315,572,960$ | $\begin{array}{r}\text { 8678,097, } \\ 66,821 \\ \hline 60006\end{array}$ | $\$ 236,338,265)$ $20,650,000$ | \$111,533,682 | $\$ 50,086,219$ 2004,581 | 878, 773,875 | \$160, 848,748 |
| Common | 1,187, 642,781 | 611, 227,715 | 215, 688,265 | 98, 2577,495 | 48,081, 638 | 71,740,900 | 147,646, 780 |
| Per mile of track .............. | -589,760 | 488, 1364,123 | 666,982 | -38,866 | 22, 358 | 28, 441 | 5026, 97.4 |
| Funded debt outstanding, amount Per mile of track | 992, 709,139 | $488,648,145$ 98,093 | 167, 314,210 | 77, 858,913 | 39,341,284 | 68,615,080 | 150, 981, 507 |
| Per mile of track....... Total capital liabilities... | 2, 308, 2882,099 | 1,166, 745, ${ }^{9868}$ | 403, 652,475 | [189,392, 2845 | 89, 1727,561 | 147, 288, 24.85 | 311,775, 212 |
| Investments in securities and nonrailway property | -152, 513,997 | ${ }^{1} 124,809,819$ | 4,556, 993 | 18,671,304 | 8, 3017 , 516 | 144, $2,186,934$ | 11,763, 431 |
| Net capital liabilities.. | 2,155, 768, 102 | 1, $041,9.12,047$ | 399, 095, 482 | 188, 721, 241 | 86, 125,987 | 144, 871,521 | 300, 011,824 |
| Per mile of track. | 96, 287 | 209, 162 | 113,026 | 68,197 | 38, 445 | 152,371 | 50,313 | steam railway companies.

This table shows that of the total capital liabilities outstanding, which amount to $\$ 2,308,282,099$, a tritte more than one-half has been issued by the railways in cities of more than 500,000 population, and an additional one-sixth by railways in urban centers of from 100,000 to 500,000 inhabitants. The capital liabilities of the fast, long interurban railways amount to $\$ 147,288,455$.
The proportions of the total capitalization represented by capital stock and funded debt do not greatly differ as among the four groups of urban centers, the bonds in each group being approximately three-fourths as great in amount as the stocks. On both classes of interurban railways the bonds are equal to about nine-tenths of the capital stock. In recent years street railway companies have become more and more disposed toward the issue of bonds. (See comparison with 1890, page 11.) Inter. urban railways, which are mostly of recent origin, reflect this tendency in their large proportion of bonds to stock.

The investments of companies in securities and property outside of the street railway plants themselves and lighting plants are most conspicuous in the largest cities. This is explained by the fact that in the process of combination among railways in these great centers the securities of certain companies have become in large amounts the property of other companies.

Capitalization of full-time electric surface railways without commercial lighting, classified according to pop-ulation.-Table 22 presents similar classified statistics of capitalization for those street railway companies which operate primarily electric surface railways, without commercial lighting, and which operated throughout the census jear. ${ }^{1}$

[^17]TABLE 2ヵ.-CAPITALIZATION OF FULL-TLIE ELECTRIC SURFACE RAILWAY COMPANES, WITHOUT COMLMERCIAL LIGHTING, OLASSIFIED ACCORDING TO POPULATION: 1002.

${ }^{1}$ Exclusive of reports for 7 eompanies, having 134.98 miles of track, which failed to furnish this information, and exclusive of be 97 miles of track leased from steam railmay companies.

The most significant fact brought to light by this table is that the capitalization of full-time electric surface railways without commercial lighting is very much greater in proportion to their trackage in large urban centers than in small ones. The average net capital liabilities of such street railways in centers of more than 500,000 population is no less than $\$ 182,775$ per. mile of track, or about five times as great as the net capitalization per mile of track of the steam railways of the United States. (See page 46.) For centers of 100,000 to 500,000 inhabitants the capitalization of railways of this class is $\$ 107,103$ per mile; for centers of 25,000 to 100,000 inhabitants it is $\$ 53,918$ per mile; and for those of less than 25,000 population, $\$ 33,754$. The average capitalization of fast, long interurban milways is $\$ 51,192$ per mile of track, and that of other interurban railways $8 \pm 7,758$.
These averages inclucle widely varying ratios of capitalization to trackage as among the different companies in each population group. Table 23 shows the number of companies in each group whose net capital liabilities fall within the limits specified.

Table 23.-Distribution of full-time electric surfacerailuaty companies, without commercial lighting, in the several urban and interurban groups, according to capitalization per mile of track: 1902. ${ }^{1}$

${ }^{3}$ Exclusive of reports for companies which failed to furnish this information.

This table inchudes only primarily electric surface railways, without commercial lighting, operating the entire year. Lessor companies are omitted except where, as in several important cases, their capitalization and trackage are combined with those of operating companies. While only 12 of the $\pm 8$ companies in urban centers of more than 500,000 inhabitants show a net capitalization exceeding $\$ 200,000$ per mile of track, these 12 companies have $2,246.17$ miles of track, or more than half of the total for all operating companies in the group. Six other companies in this group report more than $\$ 150,000$ per mile of track. In urban centers of 100,000 to 500,000 inhabitants only 3 companies report more than $\$ 150,000$ per mile of track. Half the companies in cities of this size have between $\$ 100,000$ and $\$ 150,000$ of net capital liabilities per mile of track, and these companies own much more than half of the total trackage of operating companies. In urban centers of 25,000 to 100,000 population, only 14 out of 69 companies have a net capitalization exceeding $\$ 75,000$ per mile of track. The largest group of companies in cities of this size comprises those reporting from $\$ 25,000$ to $\$ 50,000$ per mile. Of the 169 companies in the smallest urban centers, only 29 have more than $\$ 50,000$ of net capital liabilities per mile of track, and nearly half report less than $\$ 25,000$. More than half of the fast, long interurban railways fall within the group having from $\$ 25,000$ to $\$ 50,000$ of net capitalization per mile of track. Very few of the many "other" interurban companies report more than $\$ 75,000$ per mile of track, and 92 of them report less than $\$ 25,000$ per mile.

While there is thus no uniformity in the relation of capitalization to trackage in cities of a given group, the classified statistics of Table 23 show that the averages for the groups presented in Table 22 give a roughly correct idea of the capitalization of a large proportion of the trackage in the several population groups.

The enormous disproportion between the capitalization of street railways in urban centers of different population is attributable, at least in part, to differences
in cost of construction. It may be noted in the first instance that in cities of more than 500,000 population several important companies which operate predominantly electric surface railways operate also in part more expensive forms of trackage. Thus, such companies in Brooklyn and Boston have nearly 90 miles of elevated structure; while in Chicago and San Francisco they operate more than 90 miles of cable railway. In New York city there are about 180 miles of track with underground electric conduit. Each of these kinds of construction costs necessarily very much more than the overhead trolley construction. However, the total trackage of these three classes owned by primarily electric surface companies in cities of more than 500,000 population is only about one-thirteenth of their trackage. Even if a liberal allowance of additional capitalization be made for the more expensive systems, the securities remaining as strictly attributable to the overhead trolley surface railway trackage (including therewith 82.08 miles of horsepower railway in New York and Chicago) in cities of the first group would probably still be approximately $\$ 175,000$ per mile of single track.
Various causes have tended to make the cost of ordinary overhead trolley railways higher in centers of more than 500,000 population than elsewhere. The traffic is much heavier per mile of track than in smaller places, and the road must, therefore, be equipped with more cars; the expense for power houses and for car barns is much greater per unit of track than in cities where the traffic is less dense; the track, being subjected to more severe strain than elsewhere, is in general more expensively constructed, with deeper and stronger foundations and heavier rails; and the cost of paving is likewise greater.
Perhaps the most important factor tending to increase the amount of capital expended in street railway construction in the great centers of population is the fact that there, more than anywhere else, public demand has compelled speedy adoption of improvements in methods, resulting in extensive reconstruction and replacement. It was mostly in the larger cities that horse railways were developed and abandoned. It was chiefly there, too, that cable traction superseded horse traction, only to be itself soon displaced in most instances by electricity. Changes in methods of operation in these cities have had, in many cases, to be accomplished without the interruption of traffic, thus increasing the cost of reconstruction.

As the expense of constructing street railways has been greater in centers of more than 500,000 population than in those of any other class, so, doubtless, railways in centers of from 100,000 to 500,000 inbabitants have cost more than those in the centers of the next smaller size, and the latter in turn more than railways in the smallest urban centers. Whether these variations in cost are sufficient to explain altogether the
wide differences in the ratio of capitalization to trackage is a question that can not be fully discussed in this report. It may be observed, however, that the temptation to overcapitalize is stronger in the great cities, for the margin of earnings over operating expenses is greater in such cities than elsewhere. In smaller cities, or on interurban railways, the profits of the business are frequently scarcely enough to pay interest on the bare cost of construction. Under such circumstances the issue of securities beyond that cost would find its motive almost solely in the hope of future increase in earning capacity.

Capitalization, by states.-Statistics showing for each state the amount of (apital stock and funded deht authorized and issued, and the relation of the net capitalization of street and interurban railways to their trackage, will be found in Table 93. The capitalization per mile of track shows wide differences between states. Careful analysis will furnish a partial explanation of these differences. The ratio of capitalization to trackage would naturally be greatest in those states where the largest proportion of the trackage is situated in great cities. Moreover, in some states there is a much larger proportion of the expensire elevated, cable, and conduit trolley railway than in others.

Comparisons are often made between the capitalization of street railways in Massachusetts and in other states. In Massachusetts the issue of securities by street railway companies is closely regulated by law and by the State Railway Commission. ${ }^{1}$ The net amount of capital stock and funded debt of the street railways of that state, according to the present investigation, amounted to only $\$ 39,067$ per mile of track. Many of the Massachusetts companies have promissory notes outstanding in considerable sums, which have been issued to cover construction expenses. Eren if the total floating debt of the Massachusetts railway companies be added to their stock and bonds, however, the net capital liabilities amount to only $\$ 45,600$ per mile of track. This figure may be compared with $\$ 96,287$ per mile of track, the average of the United States for all classes of companies combined. The only states which show a capitalization per mile of track lower than Massachusetts are Arizona, Arkansas, Idaho, Maine, New Hampshire, New Mexico, Vermont, and Texas. In none of these states is there a large amount of street railway trackage, and in most of them there are no cities of considerable size. On the other hand, the average capitalization of street railways per mile of track in the state of New York is $\$ 177,532$; in Maryland, 8156,142 ; in Missouri, $\$ 152,206$; in New Jersey, $\$ 148,155$; in Illinois, $\$ 135,507$; and in Pennsylvania, $\$ 103,267$.
In connection with the low capitalization figures for Massachusetts railways, it should be noted that the railways of that state are in a considerable measure

[^18]interurban in character. Most of these interurban railway companies reported less than $\$ 20,000$ of capital per mile of track. Their trackage has been built, for the most part, on the public highways and at a comparatively low cost, a cost much less than that of the fast, long interurban lines more recently built, particularly in the middle Western states, and much less than that of railways in large cities.

In the case of every state where the street railways have an average net capitalization of more than $\$ 100,000$ per mile of track, a larger proportion of the trackage lies within the limits of great cities than is the case in Massachusetts. In Illinois and New York a large amount of elevated, cable, and conduit trollcy trackage is included in the average, wbile Massachusetts railways are, with the exception of 16 miles of elevated track in Boston and 25.43 miles operated on the third-rail system, purely of overhead electric trolley construction. It is bighly probable, however, that the street railways of Massachusetts are more conservatively capitalized than
those of most other states. The figures from which the average for that commonwealth is drawn include the excellent Boston system and other very satisfactory systems in the medium-sized cities of the state.

Capitalization of surface railway companies in urban centers of more than 100,000 inhabitants.-Table 24 shows the net capital liabilities of surface street railways in each urban center of more than 100,000 population, together with the relation between capitalization and length of track. The table includes all companies operating surface railways predominantly, whether by electric, cable, or animal power. The five strictly elevated railways have been excluded. As an aid to the interpretation of the relation between capital liabilities and trackage, the length of each class of trackage in each city is indicated. The statistics of Milwaukee, Wis., St. Joseph, Mo., and Toledo, Ohio, are not exactly comparable with those of other cities, since in these three cases the railway companies also operate lighting plants.

Table 24.-Gapitalization of surface Railway companies in individual urban centers of 100,000 POPULATION AND OVER: 1902.

| Nate of genter. | Population. | TRACE MHLEAGE. |  |  |  |  | Net capital liabilities. | Net capital liabilities per mile of track. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Total. | Electric. | Animal, | Cable, surface and inclined planes. | Steam, suriace. |  |  |
| Albany, N. ${ }^{\text {I }}$ | 216, 530 | 75.83 | 74.88 | 1.00 |  |  | 89,150,762 | \$120, 675 |
| Baltimore, Md | 510,288 | 365.12 | 365.12 |  |  |  | $66,455,000$ | 182, 009 |
| Boston, Mass | 927, 994 | 451.68 | 1451.68 |  |  |  | 43,972, 299 | 97, 20 \% |
| Buffalo, N. Y | 421,604 | 320. 48 | 820.48 |  |  |  | $225,920,923$ | 87,076 |
| Chicago, Ill. | 1,769, 951 | 925. 28 | 826.82 | 6.76 | 91.70 |  | 899,951, 396 | 109,587 |
| Cineimati, Ohio | - 429,137 | 2633.67 | 261.46 | 1.50 | 0.61 |  | 27,588, 430 | 104, 623 |
| Cleveland, Ohio | 406, 859 | 237, 01 | 237.04 |  |  |  | 26,916, 724 | 113,564 |
| Columbus, Ohio | 127, 022 | 106. 48 | 106. 48 |  |  |  | 11,605,000 | 109, 089 |
| Denver, Colo. | 138,859 | 149.77 | 149.77 |  |  |  | ${ }^{4} 10,837,000$ | 75,377 |
| Indianapolis, ind | 169,164 | 109.80 | 109.86 |  |  |  | 14, 749, 260 | 134,191 |
| Jersey City, N. J | 969, 735 | 468.64 | 462. 1.4 |  | 1.40 |  | 102,156,242 | 220,888 |
| Kansas Gity, Kans. | 237, 042 | 181. 24 | 148,24 |  | 33.00 |  | 21, 659,200 | 119,506 |
| Los Angeles, Cal. | 118,746 | 164.16 | 154,86 | .... | 4.85 | 4.45 | 12, 849,500 | 78, 274 |
| Iouisvilie, Ky .. | 204,781 | 147.18 | 147.18 |  |  |  | 12,438, 372 | 84,506 |
| Memphis, Tenn | 102,981 | 71.88 | 71.88 |  |  |  | 4,410,000 | 61, 362 |
| MiJwhukee, Wis | 301, 701 | 145.50 | 145.50 |  |  |  | 618,830,000 | 129, 4116 |
| Minneapolis, Minn | 378,923 | 251,02 | 251.02 |  |  |  | $28,898,000$ | 115, 122 |
| New Orleans, La | 287, 104 | 180.81 | 180.31 |  |  |  | 22, 157,000 | 122, 888 |
| New York, N. Y | 3, 501,107 | 1, 181,96 | -1,051.12 | 109.64 | 3.78 | 717.42 | 306, 768, 678 | 259,542 |
| Oakland Cal | 101,872 | 122.80 | 121.80 | 1.00 |  |  | 10,760,215 | - 87,624 |
| Omaha, Nebr | 155, 268 | 105. 95 | 105.95 |  |  |  | 9,500,237 | 89, 667 |
| Philadelphia, Pa | 1,293, 697 | 517.58 | 517.58 |  |  |  | 85,436,344 | 165,085 |
| Pittsburg, Pa | -040,380 | 469.47 | 464.25 |  | 6.22 |  | 86, 931,900 | 185, 170 |
| Providence, R . I | 268,946 | 187.05 | 137.05 |  |  |  | 9,025,000 | 65, 852 |
| Rochester, N. Y | 178, 383 | 95.86 | 95.86 |  |  |  | 9,584, 887 | 99, 988 |
| St. Josepli, Mo. | 102,979 | 35. 15 | 85.15 |  |  |  | 69, 100,000 | 258, 891 |
| St. Inouis, Mo....... | 814, 828 | 396.21 | 396.21 |  |  |  | 78,705,928 | 198,647 |
| San Francisco, Cal | 34, 614 | 276. 50 | 177.58 | 5. 65 | 80.35 | 12. 97 | 38, 982,225 | 140,985 |
| Scranton, Pa.. | 155, 65 | 76.68 | 76. 68 |  |  |  | 8,187, 410 | 106, 774 |
| Syracume, N. Y | 128, 776 | 68.16 | 68.16 |  |  |  | 8,351,083 | 122,522 |
| Toledo, Ohio...... | 185, 271 | 97.78 | 97.78 |  |  |  | 521,574, 504 | 220,613 |
| Washington, D. C. | 279,940 | 130.67 | 8139.67 |  |  |  | 26,036,750 | 186, 416 |

${ }^{1}$ Includes 16.02 miles of elevated track.
${ }^{2}$ Not including capitalization of 22.80 miles leased from a steam railway company.
SNot including capitalization of Denver, Lakewood, and Golden Railrond Company, having 6 miles of single track.
${ }^{5}$ This company has a lighting plant, the capitalization based on which is included.
Including 67.02 miles of elevated track and 178.89 miles of conduit trolley track.
7 Elevated traek.
8 Including 85.0 B miles of conduit trolley track.

The table shows a certain rough parallelism between population and the amount of net capital liabilities per mile of track, though there are several conspicuous exceptions. The heaviest net capitalization is found in Greater New York, where each mile of street railway is represented on the average by $\$ 259,544$ of securities. It will be observed that a considerable amount of the
trackage of the Brooklyn Rapid Transit Company, which is included in the table, is elevated, and that sone of the other New York companies have much undeiground trolley track. The net capitalization of the Interurban Street Railroad Company in New York, combined with that of the subsidiary companies which it directly operates (excluding the Third avenue lines
and several others which the Interurban controls in other ways), represents an average of $\$ 494,399$ per mile of track owned by these companies, the highest average reported for any important surface railway system. This system comprises 198.74 miles of track, of which 131.13 miles is operated by conduit trolley. Nearly all the rest of the trackage, however, is operated by animal power. The capitalization of this system may be contrasted with that of the railways of the city of Washington, two-thirds of whose trackage is of the underground conduit type, which are capitalized at $\$ 186,416$ per mile. It must be noted, however, that the lighter traffic of the Washington railways permits a smaller investment per mile in equipment than is required for the denser traffic of the Interurban railway; and again, that the Interurban company has converted to electric traction a larger amount of cable trackage than ever existed in Washington. Other causes, already mentioned, which tend to increase the cost of construction of street railways in the greatest cities, apply with special force to New York.

Several cities, however, in which only overhead trolley construction prevails, report a very high ratio of net capitalization to trackage. The railways in the great urban center in northern New Jersey are capitalized at $\$ 220,383$ per mile; those of St. Louis, at $\$ 198,647$; those of Pittsburg, at $\$ 185,170$; those of Baltimore, at $\$ 182,009$; and those of Philadelphia, at $\$ 165,085$. These figures contrast strikingly with the capitalization of the railways of Boston and the adjoining municipalities, which amounts to only $\$ 97,353$ per mile of track. The capitalization of the Boston lines is indeed less in proportion to the trackage than that of railways in most smaller cities of more than 100,000 population. This urban center is fifth in point of size in the United States, and its leading railway system is quite equal in its physical characteristics to that in any of the other cities just named; moreover, the system includes 16 miles of elevated track. It carries more passengers per mile of track than the railways in any of the other five centers

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mentioned except Philadelphia. The trackage is almost altogether located within strictly urban areas. There has perhaps, however, been less reconstruction and waste of capital in Boston than in some of the other leading cities, especially in New York.
Notwithstanding the fact that there is a considerable amount of costly cable trackage in Chicago, the ratio of the net capitalization of surface street railways in that city to their trackage is less than that of most cities of more than 200,000 population, amounting to $\$ 109,537$ per.mile of track. The most extensive surface system in Chicago, however, the Union Traction Company, has net capital liabilities, including that of lessor lines, of $\$ 268,577$ per mile. The comparatively low average for the city is partly accounted for by the fact that the Chicago City Railway Company, with 222.5 miles of track, has kept its capitalization at the relatively conservative figure of $\$ 18,000,000$, or $\$ 80,899$ per mile. Moreover, there are several Chicago companies which operate in the thinly settled parts of the city and its suburbs, where the cost of construction is much less than in the heart of the city.
The amount of net capital liabilities per mile of track in most of the cities of from 100,000 to 500,000 population is between $\$ 100,000$ and $\$ 150,000$. The only cities of this size which show a capitalization of less than. $\$ 100,000$ per mile are Buffalo, N. Y.; Denver, Colo.; Los Angeles and Oakland, Cal., the companies in all of which cities operate a large amount of interurban and suburban trackage; and also Louisville, Ky.; Omaha, Nebr. ; Memphis, Tenn.; Providence, R. I.; and Rochester, N. Y. The lowest ratio of net capitalization to trackage is reported for Memphis, but the railways of that city were in the hands of a receiver at the time of the census investigation and part of their securities had been wiped out of existence. The street railways of San Franciseo, Cal., which have about one-third of their trackage operated by cable, are capitalized at $\$ 140,985$ per mile of track.

## OHAPTER V.

## FINANCIAL OPERATIONS.

Of the 817 operating street and interurban railway companies 18 failed to furnish information regarding their financial transactions. These 18 companies operated 378.9 miles of track, about 1.7 per cent of the total mileage. The names of these companies are shown below, together with their mileage and the number of passengers carried by them.
Companies that failed to report data regarding fonennial transactions.

| hTate. | Name of company. | Miles of single track. | Fare passengers. |
| :---: | :---: | :---: | :---: |
| Totut |  | 378.90 | 14, 280, 136 |
| Arizona | Phoenix Railway Company $\qquad$ <br> Bouder Railway and Utility Compan | $12.00$ | $750,000$ |
| connecticut | New York, New Havers and Huriford Rail- | 8.68 | 204,900 |
| cronectieut.. | New York, New Haven mad Hartford Rail- | 25.89 | 1, 655,008 |
| Illimois.. | South Chicago City Railway Company .... | 3 s .42 | 4.532,047 |
| 11inois. | Galeshurg Eilectric Motor and Dower Company. | 17.00 | 1,750,000 |
| Indiana | Hammond, Whiting and East Chicago | 24.90 | 1,956, 616 |
| Калй: | Kansas City-Leavenworth Electric Rail. | 39.00 | (1) |
| Mussar huserts. | Weir York, New Haven and Hartiord Rat | 39.33 | , 089,810 |
|  | road Company, Nantasket Branch, |  |  |
| Newf Jersey... | West Jersey and Seashore Railroad Company. | 19.0 | 5, 206, 304 |
| Ohio. | Wellston and Jackson Belt Railway Com- | 10.50 | 928, 925 |
| Rhode Island.. | New York, New Haven and Hartford Rallroad Company, Providence, Warren | 31.50 | 4, 520, 89.4 |
| South Irakota | Rapid City Street Ratwoy Company | 2. |  |
| Virginia....... | South Side Railway and Development | 12.85 | 1,248,059 |
| Virginia....... | Oda Dominion Railway Comprny | 12.21 |  |
| Virginia | Richmond Traction Company | 18.75 | 6,795, 946 |
| Virginda....... | Richmond Passengerand Powercompany. | 25.21 | 9,517, 614 |
| Virginit | Virginia Passenger and Power Company -. | 37.00 | 1,184, 313 |

In the case of the four branches of the New York, New Haven and Hartford Railroad and the branch of the West Jersey and Seashore Railroad (Pennsylvania system) which are operated by electricity, as well as in the case of the Wellston and Jackson Belt Railway, which is controlled by the Hocking Valley Railroad Company, it was impossible to distinguish the financial operations from those of the controlling steam lines with any clearness. The five Virginia companies, three of which were taken orer by the Virginia Passenger and Power Company during the census
year, were unable to furnish data on account of recent changes in ownership.

In consiclering the financial statistics it is essential to distinguish between operating and lessor companies. A complete view of the results requires separate accounts for these classes of companies, together with combined accounts for the two classes jointly. Financial statistics for 158 of the 170 lessor companies were obtained directly from the lessor companies or from the operating companies controlling them, or from other sources. The statistics for a considerable number of the lessor companies were computed from the rentals reported as paid by the operating companies, and from information obtained from street railway journals and similar sources. These figures are in a ferv instances approximate only.

The inquiries in the census schedule regarding the financial transactions of operating companies followed closely the standard form of accounting prescribed by the Street Railway Accountants' Association of America. The majority of the railway companies, including nearly all the more important ones, now keep their accounts in accordance with these forms. In those eases in which companies did not follow the standard form, the agents of the Bureau of the Census, in conference with the officials of the respective companies, rearranged the items of receipts and expenditures and the balance sheet entries, as shown by the books of the companies, in such a way as to conform to the requirements of the schedule. The financial statistics in general represent, therefore, precise bookkeeping records and are in no sense estimates.

## I.

## GENERAL INCOME ACCOUNT.

Condensed income account for operating companies, classified according to power.-Table 25 gives a condensed income account for all operating street and interurban railway companies in the United States, and also for the several classes of such railways, as based upon power used.

Table 25.-CONDENSED INOOME ACCOUNT FOR OPERATING COMPANLES, CLASSIFIED ACCORDING TO POWER: 1902. ${ }^{1}$

|  | Total. | mifectric, surface. |  |  | Animal, | Stenm and electricelevated. | Cable, surface, and inclined planes. | Steam, surface |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{aligned} & \text { Without } \\ & \text { commercial } \\ & \text { lighting. } \end{aligned}$ | $\begin{gathered} \text { With com- } \\ \text { meroinl light- } \\ \text { ing. } \end{gathered}$ | Part time. |  |  |  |  |
| Number of companies | 799 | $\underline{606}$ | 112 | 57 | 52 |  | 14 | 3 |
| Gross income ..... | \$250, 504,627 | \$206,261, 288 | \$22, 418,065 | \$2,475, 365 | \$1,477,294 | \$16, 831, 892 | \$1,024, 873 | \$ 315.850 |
| Operating earnings | 247, 5538,999 | 204, 276,037 | 22,088,650 | 2, 477, 365 | 1,475,801 | 16,397,867 | 1,044, 323 | 15,860 |
| Operating expenses | $142,312,597$ $105,241,402$ |  | 12, $9,284,9815$ | 1, $1,0861,191$ | $1,077,736$ 898,105 | 8,151,926 | 7612,812 471,511 |  |
| Income from other sources | 2,950, 628 | 2,185, 251 | 3229,409 |  | 1,393 | 434, 025 | 550 |  |
| Gross income less operating expenses | 108, 192, 0330 | 88,024, 720 | 9,583,124 | 1,036, 191 | 399, 5 58 | 8,679,96ic | 472, 061 | 43,590 |
| Deductions from income, total...... | 77, 595, 053 | 65, 775, 778 | 6, 007, 847 | $5 \mathrm{C} 0,012$ | 362,018 | 4, 720, 135 | 162, 104 | 7,159 |
| Taxes. | 13,078, 899 | 10, 831,981 | -733,575 | 50, 739 | $\begin{array}{r}71,308 \\ \\ 727 \\ \hline 189\end{array}$ | 1,343,547 | 47,245 |  |
| Interest, total. ${ }^{\text {On }}$ (und | $38,085,911$ $35,223,28.4$ | 29,084, 650 | $4,849,800$ $4,619,145$ | 508,070 485,975 | 227,589 | -3,294,543 | 114,759 105,913 | 6, 6000 |
| On funded debt | $35,223,28.4$ $2,862,627$ | $26,669,877$ $2,414,673$ | - 4 , 6290,645 | 435,975 72,095 | 162, 642 | 3, 2727,116 | 105,918 8,840 | 6, 610 |
| Rental of leased lines. | 25,518,225 | 25,371,586 | 47,413 | 543 | 63, 101 | 35,592 |  |  |
| Miscellaneous deductions. | 912, 018 | 487,761 | 877,059 | 620 |  | 46,453 | 100 |  |
| Netincome | 30, 599, 977 | 22, 248,942 | 3,575,277 | 476, 179 | 37, 540 | 3, 959,831 | 309, 957 | -10,749 |
| Dividends. | 15,882, 110 | 12,193,247 | 818,091 | 46,500 429,679 | $\begin{array}{r}\text { 68, } \\ \text { 231, } \\ \\ \hline 837\end{array}$ | -2,594, 1,395 | 166,200 143,757 |  |
| Surplus | 14,714,867 | 10,055, 695 | 2,762, 180 | 429, 679 | ${ }^{2} 31,837$ | 1,385, 636 | 143,767 | ${ }^{2} 10,749$ |

${ }^{1}$ Exclusive of reports for 18 companies which fated to furnish this information.
${ }^{2}$ Deficit.

It will be understood by anyone acquainted with bookkeeping methods that an income account does not purport to show the actual cash receipts and disbursements during the year. It presents instead the receipts and expenditures properly assignable to the year's operations. Thus the items of taxes, interest, and rentals represent the amount of such obligations accrued during the year, whether wholly paid within that time or not. Similarly the item of dividends represents dividends declared during the year, no matter when paid. Money spent on capital account, moneys borrowed and repaid, and all bookkeeping duplications or transfers are omitted.

Operating earnings and gross income.-By the term "operating earnings" are designated all receipts of the companies from the actual operation of the railway property which they own, or of light and power plants connected therewith, but excluding income from sources other than railway property. The total operating earnings of the street and interurbain railways reporting to the Bureau of the Census in 1902 amounted to $\$ 247,553,999$. To this must be added, to show the gross income, the income from other sources, which consists chiefly of interest and dividends on securities held by the railvay companies, but which also represents, to some extent, interest on deposits of money, returns from investments in real estate not used for operating purposes, etc. A large proportion of the securities held by street and interurban railway companies are those of other such companies. The gross income of the operating street railways as a whole, therefore, includes a small amount of duplication, the earnings of certain companies becoming in part additions to the income of other companies. The gross income of all the railways, consisting of operating earnings plus income from other sources, amounted to $\$ 250,504,627$.

More than four-fitths of the aggregate operating earnings were those of full-time companies operating surface railways that were mainly eleetric and not operating commercial lighting plants. The operating earnings of electric railway companies having light and power plants were less than one-ninth as great as that of full-time electrio surface companies without such plants. The operating earnings of the five strictly elevated railways amounted to 6.6 per cent of the aggregate for the United States. The aggregate earnings of all other classes of street railwhys were comparatively small, and those of the three strictly steam railways insignificant.

Distribution of income. -The net earnings from operation of all street and interurban railways, calculated by deducting operating expenses from the gross earnings from operation, were $\$ 105,241,402$. The "gross income less operating expenses," as designated in Table 25 and later tables, is made up of the net earnings from operation plus the income from miscellaneous sources. ${ }^{1}$ It amounted to $\$ 108,192,030$ in 1902, the income from other sources constituting 2.7 per cent of this amount.

The distribution of the gross income of street and interturban railway companies among various objects differs materially among the different classes of railways distinguished in Table 25. These differences may be grasped more readily by the aid of Table 26, which shows, for each group of companies and for all companies combined, the percentages which the operating expenses and the various other items of disbursement bear to the gross income.

[^19]Table 26.-PERCENTAGE DISTRIBUTION OF GROSS INCOME OF OPERATING COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.


1 Less than one-tenth of 1 per cent.
It will be observed that, for all operating companies combined, operating expenses amount to 56.8 per cent of the gross income. The ratio of operating expenses to operating earnings is discussed elsewhere (pages 83 and 84). The total "deductions from income," or "fixed charges," as they are often called, amount to $\$ 77,595,053$. This sum, which is nearly three-fourths of the "gross income less operating expenses," is about 31 per cent of the gross income itself.
Taxes, licenses, and other payments to public authorities, taken together, constitute a larger proportion of gross and of net earnings than is generally supposed. These public charges in 1902 were equal to a little less than one-eighth of the gross income less operating expenses and to 5.2 per cent of the gross income. The amount going to taxes was relatively less in the case of electric railways furnishing commercial light and power than in the case of other classes of railways. This is chiefly due to the fact that companies of this type are, with a few exceptions, operating in cities and towns of moderate size where the rates of taxes are low. The taxes of the elevated railways are proportionately the highest, amounting to 8 per cent of their gross income.
The classification of taxes paid by operating companies, according to the returns of the companies, is as follows: Taxes on real and personal property, $\$ 5,835,542$, or 44.6 per cent of the total taxes; taxes on capital stock, $\$ 2,931,252$, or 22.4 per cent; taxes on earnings, $\$ 2,710,287$, or 20.8 per cent; miscellaneous taxes, licenses, and public payments, $\$ 1,592,818$, or 12.2 per cent. It may be remarked, however, that the names of the various classes of taxes in different states are not always uniform or consistent with accurate definitions. The statistics do not show to what extent the payments made by street railway companies represent a special return to the local government for franchise privileges granted. Beyond question, however, much the greater part of the payments to public authorities consists of ordinary taxes, levied upon the same basis as taxes on other forms of property or on corporations not enjoying special franchise privileges. ${ }^{1}$

[^20]The items of interest on bonds or funded debt and interest on notes and other floating debt amounted, as shown in Table 25, to $\$ 38,085,911$, or no less than 15.2 per cent of the gross income, and 35.2 per cent of the gross income less operating expenses. This sum is slightly larger than the amount which street railway companies actually paid on their obligations during the census year, as a considerable number of rail ways failed partly or wholly to pay the interest due. In some instances, indeed, companies still owed back interest for a number of years. The balance sheets of the operating and lessor companies combined showed the total amount of interest unpaid at the end of the fiscal year 1902 to be $\$ 14,497,670$; but, as appears from the schedules, part of this represented merely accrued interest-not yet due-of wholly solvent companies, and another part represented interest due on coupons not yet presented for payment. It appears probable, however, that the greater part of the aggregate back interest reported consisted of interest which the companies could not pay. The item of interest in the income account was conspicuously large for electric railway companies furnishing commercial lighting and for elevated railways.

The great importance of the method of lease as a means of combination among street railways may be judged from the fact that the rentals paid by operating companies to lessor companies amounted to $\$ 25,518,225$ in 1902, or nearly one-fourth of the gross income less operating expenses. The rental payments are almost wholly confined, however, to companies that operate electric surface railways and that do not furnish commercial lighting.

Sinking and depreciation funds.-A noteworthy feature of the income accounts of nearly all street railways is the absence of any provision for depreciation funds or for sinking funds to redeem bonds. The total amount of "miscellaneous deductions" from incomenot covered by the specified heads already mentionedwas only $\$ 912,018$, and only a fraction of this sum represented systematic.appropriations to depreciation or sinking funds. In this respect the American street railway companies form a striking contrast with those in most foreign countries and an even more striking contrast with foreign municipal undertakings. American
steam railways are adopting to an increasing extent the policy of providing at least sinking funds for their funded debt.

From the standpoint of the investors it is sometimes considered preferable not to provide depreciation and sinking funds in the case of a street railway company that possesses an unlimited franchise and that operates in a city with a large and steadily increasing population. The investors in such case know that the value of their franchise is steadily appreciating and that the appreciation tends to offset any depreciation in the physical properties. They feel assured that the bonds of the company as they fall due can be renewed with little difficulty and possibly at a lower rate of interest. It may therefore be deemed wise policy to provide the capital necessary for renewals and replacements by the issue of additional securities rather than by appropri- ${ }^{-1}$ ating part of the earnings for depreciation.

These considerations, however, apply with much less force in the case of many railways which are not so favorably situáted or are of less modern construction, as the present properties held by them may depreciate greatly in value. In some cases a large part of the investment has been made by the issue of bonds, and when these fall due they may more than equal the value of the depreciated plant. Under such circumstances sound finance would seem to demand sinking and depreciation funds. This is still more conspicuously true of those companies whose franchises are limited to a term of years, especially if there be no provision in the franchise for compensation to the present holders for the value of their tangible properties. Delegates to the American Street Railway Accountants' Association have frequently emphasized the desirability of sinking and depreciation funds.
It may be remarked, however, that the practice of many American street and interurban railway companies, of carrying a considerable fraction of their net earnings to surplus rather than distributing them in dividends, may in some measure take the place of the systematic setting aside of depreciation and sinking funds. The net surplus of the operating street and interurban railways for the census year was $\$ 14,714,867$, which was nearly as much as the dividends declared by such companies. In many cases permanent improvements and extensions are made out of such surplus earnings. Though, usually, if the earning capacity will justify it, such expenditures are later capitalized by the declaration of a stock dividend or by some similar device, so as to raise capitalization above the actual value of the property, yet, from the standpoint of the existing owners, the method of paying for permanent improvements out of surplus amounts practically to the assignment of a part of the current earnings in a way which offsets depreciation.
Net income and dividends.-By net income is meant the amount remaining after deducting from the "gross
income less operating expenses" the various fixed charges. The combined net income of all operating railway companies in 1902 was $\$ 30,596,977$. As appears from Table 37, the total net income of the 578 companies which reported a net income amounted to $\$ 34,352,684$, while the total net deficit of the $220 \mathrm{com}-$ panies which reported a deficit aggregated $\$ 3,755,707$. It is the difference between these sums, $\$ 30,596,977$, that is shown in Table 25 under the head of "net income."
It is scarcely necessary to point out that the net income thus calculated in no sense represents the profitableness of the street and interurban railway industry. The item of net earnings is much more accurately indicative of the true profits. To understand why this is so one need only recall that interest on honds is as truly a part of the return to street railway investors as dividends. Moreover, rentals paid to lessor companies, while they are designated as fixed charges by the operating companies, are likewise, strictly speaking, a return to street railway capital, since they become interest and dividends on the securities of the lessor companies. This point is the more obvious in those numerous cases where the operating and lessor companies are virtually owned by the same persons.
The amount of dividends paid by operating street railway companies in 1902- $\$ 15,882,110$-constituted only 6.3 per cent of their gross income and about oneseventh of the gross income less operating expenses. The proportion of dividends, exclusive of part-time railways, was least among full-time electric milway companies furnishing commercial lighting. It was much greater in the case of elevated and cable railways than among other classes. Full-time electric surface railways not furnishing commercial lighting, paid out in dividends 5.9 per cent of their gross income in 1902.

Income account for lessor companies.-Table 27 shows, for the United States as a whole, a condensed income account of the nonoperating lessor railway companies. Several of the operating companies, such as the Third Avenue Railroad Company and its affiliated lines in New York city, are leased to other operating companies at a rental fixed for the present at the amount of net income remaining after the payment of expenses and fixed charges. Such companies are included with the independent operating compunies, their accounts being in precisely the same form.
The income of nonoperating lessor companies consists almost wholly of the rentals received from operating companies. These rentals usually take the form of a fixed rate of interest on the bonds of the lessor company and a fixed rate of dividend (if any) on its stocks, though in some instances the rental is a lump sum. Many operating companies treat the funded debt of their lessor companies as though it were their own direct obligation, and in their income account, class the interest thereon with other interest rather than with
rentals. The Bureau of the Census has, however, uniformly segregated the interest on the debt of lessor companies, including it with rentals in the accounts of operating companies and treating it in the accounts of the lessor companies both as an income and as an expenditure. As a matter of fact, both interest on bonds and dividends on stocks of lessor companies are frequently, perhaps usually, paid directly to the security holders by the operating company.
Table 27.-Income accoum for nonoperating lessor compnnies: 1909. ${ }^{1}$

| Number of compuni | \$26, 138,899 |
| :---: | :---: |
| rirass income. | 26, 116, 484 |
| Rentals from operating c | -6, 22,015 |
| Income from other soure | 8,770,294 |
| Deductions from income | ${ }^{1}$ 287, 436 |
| Tuxes ........ | $8,355,677$ |
| Interest on funded des | , 20,882 |
| Maintenance of organiza | 115, 299 |
| Net jncome. | 17, $17.157,061$ |
| Dividends | 17,157, 202,544 |
| Surpulas. | 20, 21 |

1 Exchasive of 12 companies which failed to furnish this information,
The amount of rentals reported as received by lessor companies, $\$ 26,116,884$, does not correspond with the amount reported (see Table 25) as paid in lentals by operating companies, which was $\$ 2 \overline{5}, 518,925$. The discrepancy is due in part to imperfect information regarding lessor companies, and in part to differences in methods of accounting and in the periods covered by the reports.

The compensation paid to lessor companies for the use of their properties and franchises varies greatly. Sometimes the compensation is purely nominal, as, for instance, in a number of cases in which the lease method of control is a mere form, the securities of the lessor being, as a matter of fact, the property of the operating company. In many leases the sole compensation to the lessor company consists of the interest on its funded debt. It sometimes happens in such cases that the operating company owns part, or all, of the stocks of the lessor. The rate' of rental paid to stockholders varies from a fraction of 1 per cent to as high as 72 per cent on the paid-up capital stock in the case of one lessor company in Philadelphia where only a small portion of the stock was paid up. The amount of dividends of lessor companies in 1902 was $\$ 17,157,061$.

Ordinarily the taxes on the property of lessor companies are paid by the operating companies directly, but in a few instances, by special arrangement or on account of differences in bookkeeping methods, the taxes are reported as paid by the lessor companies.

Condensed income acoount for operating and lessor companies combined.-Table 28 presents a combined income account of all operating and lessor companies considered as one system, and shows the result of the financial opexations as they would stand if the same amount and kind of business had been done but if there were no lessor companies.

Table 28.-Condensed income acount for operating and lessor companies combined: 190․․

${ }^{1}$ Exclusive of reports for 30 companies which failed to furnish this information.
The only important differences between these figures and those for operating companies alone consist in the elimination of the item of rentals paid and in the distribution of the amount of rentals under the two heads of interest on funded debt and dividends. The distribution of the gross income of both operating and lessor companies among various objects is shown by percentages in Table 29.

Table 29.-Percentuge distribution of gress income for operating and lessor companies combined: 1902.

|  | $\begin{gathered} \text { Percent- } \\ \text { nge. } \end{gathered}$ |
| :---: | :---: |
| Gross income | 100.0 |
| Operating expenses. | 56.5 |
| 'Taxes....... | 5.3 |
| Interest, total. | 18.6 |
| On funded debt. | 17. ${ }^{1}$ |
| On other deht: | 1.2 |
| Misceltaneous deduc | 0.4 |
| Dividents. | 13.2 |
| Surplus. | 5.7 |

Regarding the operating and lessor street railways as one system, it is found that the amount of interest accrued on funded debt was $\$ 43,578,961$, which is 17.4 per cent of the gross income of all the companies, and a little more than two-fifths of the gross income less operating expenses. The net income and surplus shown in this table are not the same as would be obtained by simply adding these items for operating and lessor companies, respectively, for the reason, heretofore stated, that the income from rentals as reported by lessor companies does not precisely agree with the amount of rentals paid as reported by the operating companies. The dividends paid by operating companies and lessor companies combined amounted to 13.2 per cent of their gross income, or to 30 per cent of the income remaining after the deduction of operating expenses. The amount paid as interest on funded debt and as dividends combined, representing the total payments on the capital liabilities, is equal to 30.6 per cent of the gross income. Roughly speaking, about that proportion of each street railway fare represents the immediate return to capital invested.

Condensed income account for operating companies classified according to population.-Table 30 shows a
condensed income account for operating companies in urban centers, classified according to population, together
with the similar account for fast, long interurban and other interurban railways.

Tabla 30.-CONDENSED INOOME AOOOUNT FOR OPERATING OOMPANIES, OLASSLFIED ACOORDING TO POPULATION: 1902. ${ }^{1}$


| 500,000 and over. | $\begin{gathered} 100,000 \text { but } \\ \text { under } 500,000 . \end{gathered}$ | $\begin{gathered} 25,000 \text { but } \\ \text { under } 100,000 . \end{gathered}$ |
| :---: | :---: | :---: |
| 65 | 47 | 83 |
| \$123, 289, 2666 | \$51,063, 007 | \$22, 828, 007 |
| 120, 837, 007 | 51,008,983 | 22, 728,795 |
| 67,300,048 | 27, 308,769 | 13,480,577 |
| 53, 536,959 $2,452,259$ | 23, 700,214 | $\begin{array}{r} \mathbf{9}, 248,218 \\ 99.212 \end{array}$ |
| 55, 989,218 | 23,765, 138 | 9, 347,430 |
| 45,785, 422 | 12,819,488 | 5, 057,079 |
| 74,755, ${ }^{7}$ | $\begin{aligned} & 2,608,650 \\ & 8710,018 \\ & 8, \end{aligned}$ | 883,964 $3,761,836$ |
| 13, 683,195 | 8, 281,098 | 3, 492, 362 |
| 1,001, 726 | 431,850 | 269,474 |
| 23, 232,949 | 1, 152, 209 | 365, 240 |
| 1011,970 | 345, 881 | 106, 039 |
| $10,203,790$ $5,290,435$ | $10,935,650$ $6,344,101$ | ${ }^{4}, 290,3851$ |
| 4,913, 361 | 4,591,549 | 2, 80: 2,697 |


${ }^{1}$ Exclusive of reports for 18 companies which failed to furnish this information.

The following table shows the percentage which each item of disbursement bears to the gross income:

Table 31.-Percentage distribution of gross income of operating companies, classified according to population: 1902.

|  | Total. | Uhbas centers, population. |  |  |  | intertraban Rallwars. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{gathered} 500,000 \\ \text { and } \\ \text { oper. } \end{gathered}$ | $\left\lvert\, \begin{gathered} 100,000 \\ \text { but } \\ \text { under } \\ 500,000 . \end{gathered}\right.$ | $\begin{gathered} 25,000 \\ \text { but } \\ \text { under } \\ 100,000 . \end{gathered}$ | $\begin{aligned} & \text { Under } \\ & 25,000 . \end{aligned}$ | Fast, long. | Other. |
| Gross income. | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Operating expenses.... | 5 5 .5 | 54.6 | 53.6 | 59.0 | 67.4 | 69.8 | - 64.4 |
| Taxes . . . . . . . . . . . . | 5.2 | 6.3 | 6.1 | 3.6 | 2.8 | 2.4 | 4.2 |
| Interest, total........... | 15. 2 | 11.9 | 17.1 | 16.5 | 16.2 | 26.8 | 20.1 |
| On funded debt.... | 14.1 | 11.1 | 16.2 | 15.3 | 14.3 | $2 \overline{2} .1$ | 17.6 |
| On other detbt....... | 1.1 | 0.8 | 0.9 | 1.2 | 1.9 | 1.7 | 2.5 |
| Reintals of leased lines.- | 10.2 | 18.8 | 2, 2 | 1.6 | 0.2 | 0.5 | 2.2 |
| Miscellaneous demuetions | 0.4 | 0.1 | 0.7 | 0.5 | 0.3 | 1.1 | 0.7 |
| Dividends ............... | 6.3 | 4.3 | 12.4 | 6.5 | 2.5 | 2.9 | 16,9 |
| Surplus . . . . . . . . . . . . . | 5.9 | 4.0 | 9.0 | 12.3 | 10.6 | 6,5 | 1.5 |

As appears from Table 30 about 49 per cent of the total operating earnings of all street railways were received by the 65 companies in urban centers of more than 500,000 inhabitants. These companies, moreover, received more than four-fifths of the total amount of income from sources other than the operation of railway, light, and power plants. This unequal distribution of "income from other sources" is explained by the fact that the railway companies of the great cities, by virtue of the consolidations which have taken place, hold much larger amounts of the securities of other railway companies than are held by the companies in smaller urban centers. The operating earnings of the fast, long interurban railways amounted to $\$ 10,161,736$-about 4.1 per cent of the total for the country.

Table 31 shows that the manner in which the gross income of railway companies in the different popula-
tion groups is distributed varies considerably. The proportion of the gross income going to operating expenses is much less in the two groups of cities of more than 100,000 inhabitants than in the other groups. This is due to the economy of operation in large cities, as more fully shown later on. On the other hand, the deductions from income, including taxes, interest on bonds, rentals, and minor expenditures, constituted a greater proportion of the gross income of operating companies in the largest cities than elsewhere, a fact which is chiefly due to the great amount of rentals paid to lessor companies in such cities.

The amount paid for taxes and other public charges in urban centers of more than 500,000 inhabitants was 6.3 per cent of gross income of the operating companies in those centers, or 13.9 per cent of the gross income less operating expenses. The proportion going to taxes decreases in each of the successive urban groups, until in urban centers of less than 25,000 inhabitants it falls to only 2.8 per cent of gross income, taxes being, however, nearly 9 per cent of the income remaining after the deduction of operating expenses. Since street railways in small cities have a higher ratio of operating expenses to operating earnings than those in large cities, they can not properly be expected to pay as heavy taxes. An important reason for the increase in the ratio of taxes to net earnings with increasing population is that, as cities become larger, the functions of government expand, and the expenses of.government grow, ordinarily, not only faster than population, but faster than taxable property, so that the tax rate tends to increase. In a considerable number of the larger cities, moreover, the street railway companies are required to make special payments in addition to the taxes paid alike by railways and by ordinary forms of property and other classes of corporations. Such
special payments are seldom required in smaller towns. The proportion of gross income going to taxes is even lower for long, fast interurban railways than for street railways in the smallest urban centers. This is presumably in part due to the fact that the rate of taxation in the rural communities through which these interurban lines run is generally lower than in urban communities. The higher proportion of taxes shown for other interurban ralways would then be partly explicable by the greater extent to which their trackage lies within municipal limits. It is probable that the difference in the relative burden of taxation in the various classes of cities and on the two classes of interurban railways is attributable in some measure to differences in the efficiency and judgment of tax assessors. There can be little doubt, however, that the more profitable railways of the large cities can afford to pay as taxes a higher proportion of their gross earnings, and even of their net earnings, than the lailways in small towns and rural districts.
The most striking point in regard to the dednctions from income is the enormons amount of rentals paid by operating companies to lessor companies in urban centers of more than 500,000 inhabitants. Fully ninetenths of the rental payments of all companics are made by the companies in the seven largest urban centers. There has been more occasion and cause for combination and consolidation in the large cities, where formerly many street railways were in operation, than in smaller places. Rentals constitute 18.8 per cent of the gross income of operating railways in the first group of urban centers, while in none of the other groups do they exceed 2.2 per cent.

The amount paid for interest on funded debt constitutes a smaller proportion of gross income, and likewise
a smaller proportion of gross income less operating expenses, among operating companies in urban centers of the first group than elsewhere. This is due to the fact that in such cities a large part of the debt of the railways is that of the lessor companies rather than that of the operating companies. The interest which lessor companies pay is received from the operating companies in the form of rentals. The proportion of interest to income is much greater for fast interurban railways than for those of any other group.

The operating railways in cities of the first group have, proportionately, less net income and dividends than in any other group except that of "other" interurban railways. Here again dividends of operating companies in large cities are reduced, because a large part of the stocks based on the railway property are those of lessor companies, and the dividends which the latter pay are deducted from the income of operating companies in the form of rentals. In the largest cities the net income of operating companies amounts to only 8.3 per cent of their gross income, while in cities of from 100,000 to 500,000 people the net income is 21.4 per cent of the gross income. In the first group dividends constitute only 4.3 per cent of gross income, while in urban centers of the next rank dividends are 12.4 per cent. The ratio of dividends to gross income and to gross income less operating expenses is least in urban centers of less than 25,000 inhabitants.

Condensed income account for full-time electric surficoe railway companies, without commercial lighting, classified according to population.-Table 32 shows a condensed income account of full-time surface railway companies having primarily electric traction and not furnishing commercial lighting, classified according to population of urban centers served.

Table 32.-CONDENSED income AcCOUNT FOR FULL-Time Electric surface railway companies, withOUT COMMERCIAL LIGETING, CLASSIFIED ACCORDING TO POPULATION: 1902. ${ }^{1}$

${ }^{1}$ Exclusive of reports for 10 companies which failed to furnish this information.

The percentages which the various items of disbursements bear to the gross income are shown in the following table for the same class of railways as in Table 32. These statistics present a few rather important differences as regards three of the urban groups from those for all companies combined in the preceding tables.

Table 33.-Percentage aistribution of gross income of full-time electric surface railway companies, without commercial lighting, classified according to population. 1902.

|  | Total. | URBAN CENTERS, POPULATION. |  |  |  | INTERURBAN Radoways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{gathered} 500,000 \\ \text { and } \end{gathered}$ oyer. | $\begin{gathered} 100,000 \\ \text { but } \\ \text { nnder } \\ 500,000 . \end{gathered}$ | $\begin{gathered} 27,000 \\ \text { but } \\ \text { under } \\ 100,000, \end{gathered}$ | $\begin{aligned} & \text { Under } \\ & \mathbf{2 5 , 0 0 0 .} \end{aligned}$ | $\begin{aligned} & \text { Fast, } \\ & \text { long, } \end{aligned}$ | Other. |
| Gross income | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Operating expenses..... | 57.3 | 55.4 | 64.1 | 60.8 | 68.7 | 60.0 | 65.1 |
| Taxes ................... | 5.3 | 6.0 | 5.3 | 3.8 | 2.9 | 2.5 | 4.4 |
| Interest, total........... | 14.1 | 10.6 | 16.9 | 13.9 | 15.6 | 27.4 | 19, 1 |
| On funded debt..... | 12. 9 | 9.8 | 16.0 | 12.7 | 13.5 | 25.6 | 16.5 |
| On other debt....... | 1.2 | 0.8 | 0.9 | 1.2 | 2.1 | 1.8 | 2.6 |
| Rentals of leased lines.. | 12.3 | 22.0 | 2.5 | 2.4 | 0.4 | 0.7 | 2.4 |
| Miscellaneous deductions....................... | 0.2 | 0.1 | 0.1 | 0.7 | 0.3 | 0.5 | 0.7 |
| Dividends | 5.9 | 2,5 | 13.0 | 7.7 | 3.1 | 2.6 | 7.8 |
| Surplus.................. | 4.9 | 3.4 | 8.1 | 10.7 | 9.0 | 6.3 | 0.5 |

It will be noticed that these full-time electric surface railways in centers of 500,000 and over show somewhat smaller proportionate payments for taxes, in-
terest, and dividends than do street railways as a whole, and that on the other hand they show a very much larger proportionate payment for rentals. (Compare Tables 31 and 33.) These differences are largely due to the fact that the elevated railways, which are all within the largest urban centers and which are excluded from the tables now under consideration, make relatively large payments for taxes, interest, and dividends, but do not operate any lines under lease, and hence reported no rentals. The electric railways having commercial lighting plants are, for the most part, in the two classes of urban centers of less than 100,000 inhabitants. Companies with lighting plants show a larger proportion of interest and a smaller proportion of dividends than companies without lighting plants. This is one explanation of the fact that in the last two urban groups the electric railway companies not furnishing commercial lighting show a smaller proportion of interest and a larger proportion of dividends than appear when all classes of companies are taken together.

Combined income account for operating and lessar companies, classified according to population.-Table 34 shows the income account for all operating and lessor companies combined, classified according to the population groups, while Table 35 shows the percentages of the various items of disbursement.

Table 34.-CONDENSED INCOME ACCOUNT FOR OPERATING AND LESSOR COMPANIES COMBINED, CLASSIFIED ACCORDING TO POPULATION: 1902. ${ }^{1}$

|  | Total. | urban centers, population. |  |  |  | interubban rallivays, |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | 100,000 but under 500,000 . | $\begin{gathered} 25,000 \text { but } \\ \text { under } 100,000 . \end{gathered}$ | Under 25,000. | Fast, long. | Other, |
| Number of companies. | 957 | 138 | 56 | 99 | 314 | 60 | 290 |
| Gross income. | \$250, 526, 642 | \$123, 310, 971 | 851,004, 217 | 922, 828, 007 | \$12,005, 611 | \$10, 165, 768 | \$31, 152, 168 |
| Operating earnings. | 247, 553,999 | 120, 887, 007 | 51,008,983 | 22, 728, 7895 | 11,879, 827 | 10,161,786 | 30,938, 151 |
| Operating expenses ........ | 142, $10512,241,402$ | 67, 5300,048 536,959 | $27,308,769$ $23,700,214$ | $13,480,577$ $9,248,218$ | $8,088,172$ $8,791,155$ | $6,076,988$ $4,084,758$ | $20,058,048$ $10,880,103$ |
| Income from other sources. | 2, 972,648 | 2, 473, 964 | 555,234 | -99,212 | ${ }^{3} \mathbf{1 2 6 , 1 8 4}$ | 4, 4,082 | 10, 214, 017 |
| Gross income less operating e | 108, 214, 045 | 56, 010, 923 | 23, 755, 448 | 9, 847,430 | 3,917,339 | 4,088,785 | 11, 094, 120 |
| Deductions from income, tota | 60, 849, 231 | 30, 682, 915 | 11, 755, 926 | 4,803,329 | 2, 328,849 | 8,119, 565 | 8, 158, 627 |
| Taxes -.... | 18, 366, 385 | 8, 021,181 | 2, 211,881 | 8,84, 889 | 1 340,228 | - 248,5389 | 1,325,407 |
| Interest funded debut | 48, 4782,961 | ${ }_{21}^{22}, 460,962$ | $8,366,503$ | 3, $698,9.97$ | 1,782, 822 | 2, 598,488 | $6,609,088$ $5,821,299$ |
| On other debt. | 2,888,509 | 1, 004, 145 | 481,850 | 269, 729 | 221,120 | 168,810 | 787,849 |
| Miscellaneous deductions | 1, 220,426 | 196,657 | 345,692 | 110, 504 | 34, 673 | 108,768 | 24, 132 |
| Netincome. | i4 47, 364, 814 | 25, 327,978 | 11,999,522 | 4, 544,101 | 1, 588,490 | - 964,230 | 2, 935, 493 |
| Dividends | 15, 83, 039, 171 | 20,968, 959 | 7,344,007 | 1,650, 123 | 311, 575 | 315,224 | 2, 459,283 |
| Surplus. | 14, 325, 643 | 4,369, 019 | 4,655,515 | 2, 893,978 | 1,276, 915 | 654,006 | 476, 210 |

${ }^{1}$ Exclusive of reports for 30 companies which failed to furnish this information.

Table 35.-Percentage distribution of gross income for operating and iessar companies combined, classified according to population: 1902.

|  | Total. | Uhban centers, porulation. |  |  |  | INTERURBAN RALLWAY8. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{gathered} \text { 500,000 } \\ \text { thid } \\ \text { over, } \end{gathered}$ | $\begin{aligned} & 100,000 \\ & \text { but } \\ & \text { nuder } \\ & 500,000 . \end{aligned}$ | $\begin{gathered} 25,000 \\ \text { but } \\ \text { under } \\ 100,000 . \end{gathered}$ | Under 25,000 . | Fast, long. | Other. |
| Cross income | 100.0 | 100.0 | . 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Operatiog expense | Eti. 8 | i4. 6 | 53.5 | 59.1 | 67.4 | 59.8 | 64.4 |
| THxes........... | 5.3 | 6. 5 | 5.1 | 3.6 | 2.8 16.3 | 27.4 | 4.3 |
| Interest, total. ${ }^{\text {a }}$. | 18.6 | 18.2 | 17.2 | 16.9 | 16.3 14.4 | 27.2 30.6 | 18.2 |
| On funded debt. | 17. 4 | 17.1 | 16.4 0.8 | 15.7 | 14.4 1.9 | 0.0 .0 1.6 | 18.7 2.5 |
| On other deht.. | 1.2 | 0.8 | 0.8 | 1.2 | 1,9 |  | 2.5 |
| Misceliancous tions | 0.4 | 0.2 | 0.7 | 0.5 | 0.3 | 1.1 | 0.7 |
| Dividends. | 13.2 | 17.0 | 14.4 | 7.2 | 2.6 | 3.1 | 7.9 |
| Surplus | 5.7 | 3.5 | 9.1 | 12.7 | 10.6 | 6.4 | 1.5 |

The chief differences between this combined income account and the income account of operating companies alone lie in the items of rentals, interest, and dividends. Since lessor companies are found mostly in urban centers of the largest size, the combined income account for such centers differs materially from the income account of operating companies alone, while in the other groups little difference appears.
In urban centers of more than 500,000 iuhabitants the combined "deductions from iucome" or fixed charges-taxes, interest, and miscellaneous deductionsfor all railway companies considered as a single system are equal to 24.9 per cent of the gross income. This proportion is slightly larger than for any other urban group, but is smaller than for the two interurban groups. In the largest cities the proportion of dividends to the gross income is 17 per cent, exceeding somewhat the proportion in urban centers of the next size, and greatly exceeding the proportion in any of the other groups. All the other groups except the "other" interurban railways, however, carried a larger propor-
tion of their gross income to surplus than the companies in the largest cities. Interest and dividends combined constitute 35.2 per cent of the gross income in the first group, as compared with 31.6 per cent in the second group, 24.1 per cent in the third group, and only 18.9 per cent in urban centers of less than 25,000 inhabitants.

Condensed income accounts, 7 y states.-Table 36 shows by states the gross income of all operating companies, consisting of the operating earnings plus the income from other sources, and Table 37 presents a condensed income account for all operating street and interurban railway companies by states.
The various items of taxes and fixed charges are shown in detail for each state in Table 38.

Table 36.-Grass income of operating companies, by states and territories: 1902. ${ }^{1}$

| state or terMTORY. |  | Amount. | STATE OR TERRITOBY. | Numcom. panies | Amount. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| United States. | 799 | \$250, 504, 627 | Missouri. | 16 | \$10,734, 692 |
| Alabin | 9 | 1,497 | Nebraska. | 4 | 1, 148,991 |
| Arlansas | 7 | 371,560 | Sew Hamphire | 7 | 604,131 |
| Californi | 35 | 9, 967, 838 | New Jersey..... | 25 | 8,176,923 |
| Colorado | 7 | 2,227,766 | New York |  | 60,881, 780 |
| Commeticu | 21 | 4, 545,775 | North Carolina. |  | 442,467 |
| Delaware. | 3 | 500, 559 | Ohio..........es. | 62 | 16,599, 8 51. |
| Florith. | 6 | 529, 743 | Oregon.. | 6 | 1,042, 895 |
| Georgia | 10 | 2,375, 224 | Pentsrlyunia | 98 | 30, 357, 727 |
| Illinois. | 48 | 25,029, 2.57 | Khode Island... | 7 | 2,964, 260 |
| Indinna | 26 | 3,813,076 | Sruth Carolina. | 7 | 653,783 |
| Iowa. | 22 | 2,103, 834 | Temuessee. | 8 | 1,8fti, 835 |
| Kansas | 11 | 370,481 | Texas | 17 | 1, 547, 846 |
| Kentucky | 12 | 2,933, 800 | Ttuh | 3 | 586,611 |
| Louisiana | 8. | 2,910,24 | Yermont | 9 | 249,208 |
| Mrine | 19 | 1,571,562 | Virginia. | 16 | 1,667,029 |
| Mfaryland | 10 | 4,848,627 | Washington.... | 8 | 2,542,906 |
| Massachuse | 7.1 | 23, $\mathrm{t} 83,410$ | West Virginia.. | 17 | 1,102, 171 |
| Michigan. <br> Minnesota. | 24 | $\begin{aligned} & 6,521,173 \\ & 3,727,048 \end{aligned}$ | Wiseonsin ...... | 17 | 3, 923,884 |
| Mississippi | 5 | 208,654 | andterritories? | 11 | 3,021,063 |

[^21]Table 37.-CONDENSED INGOME ACCOUNI FOR OPERATLNG COMPANIES, BY STATES AND TERRITORIES: $1902 .{ }^{1}$


[^22]${ }^{2}$ Deflcit.
${ }^{3}$ Includes states and territories having less than 3 companies, in order that the operations of individual companies may not be diselosed. These companiesare distributed as follows: Arizona, 1; District of Columbia, 2 (8 reports); Idaho, 1; New Mexico, 1 .

Table 38.-ANalysis of deductions From income (Taxes and fixed charges) of operating companies, BY STATES AND TERRITORIES: 1902. ${ }^{1}$

| State or termitory. | Num-companies. | Aggregate. | taxes. |  |  |  |  | interest. |  |  |  | $\begin{gathered} \text { Rent of } \\ \text { leased lines } \\ \text { and ter- } \\ \text { minals. } \end{gathered}$ | $\begin{gathered} \text { Miscel- } \\ \text { lane- } \\ \text { ous. } \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Total. | Real and personal property | Capital stock. | Earnings. | Miscellaneous. | Total. | Funded debt. | Real <br> estate <br> mort- <br> gages. | Floating debt. |  |  |
| United States.. | 799 | 877, 595, 053 | 813, 078,899 | \$5, 835,542 | 82,931, 252 | \$2,719,287 | \$1,592,818 | \$88,085,911 | \$35, 223, 284 | - 993,078 | \$2,769,549 | \$25, 518, 225 | 8912,018 |
| Alabama. | 9 | 384,762 | 37,047 | 32, 940 |  | 669 | 8,438 | 347, 330 | 254, 658 |  | 92, 677 |  | 385 |
| Arkansas. | 7 | 68,071 | 7,213 | 6,229 |  | 895 | 89 | 60,858 | 50,850 |  | 10,008 |  |  |
| California | 85 | 2,112,959 | 495, 179 | 471,136 |  | 21,448 | 2; 695 | 1,617,550 | 1,579,043 |  | 38,507 |  | 230 |
| Colorado | 7 | 538, 005 | 78,204 | 78, 204 |  |  |  | 454, 479 | 441,645 |  | 12,834 | 3,262 |  |
| Connecticut. | 21 | 1, 128, 819 | 243,393 | 4,352 | 227,562 | 11,479 |  | 757,580 | 732,108 |  | 25, 472 | 108,046 | 19,300 |
| Delaware | 3 | 77,439 | 13,973 | 11,976 |  |  | 1,997 | 63,466 | 39,000 | 2,250 | 22, 216 |  |  |
| Florida | 6 | 74,779 | 12,439 | 11,714 |  |  | 725 | 62, 340 | 62, 220 |  | 120 |  |  |
| Georgia | 10 | 765, 207 | 110,846 | 108, 579 |  |  | 2,267 | 644,361 | 642,712 |  | 1,649 |  |  |
| Illinois. | 48 | 8,453,191 | 1,488, 359 | 740,989 | 558, 79.1 |  | 188,576 | 3,037, 830 | 2,786, 663 | 11, 530 | 239, 737 | 8,875,007 | 51,995 |
| Indiana. | 26 | 1,201,297 | 185, 014 | 151,609 |  |  | 33,405 | 98:1,301 | 952, 219 |  | 32,172 |  | 31,892 |
| Iowe | 22 | 429, 378 | 54,115 | 41,390 | 12,000 |  | 725 | 353, 118 | 344, 839 |  | 8,279 |  | 22, 140 |
| Kansas. | 11 | 64, 451 | 8,401 | 7,326 |  |  | 1,075 | 56,050 | 65,500 |  | 550 |  |  |
| Kentucky. | 12 | 777,483 | 177,755 | 52,843 | 194, 174 |  | 758 | 598,594 | 591,672 |  | 6,922 |  | 1,064 |
| Louisiana. | 8 | - 690,380 | 200,150 | 179, 549 |  | 20,607 |  | 483, 594 | 476,580 | 400 | 6,684 |  | 6, 630 |
| Maine.. | 19 | 337,050 | 29,704 | 16,748 | 50 | 12,622 | 384 | 301, 772 | 266, 969 | 667 | 84, 130 | 4,000 | 1,574 |
| Maryland. | 10 | 2, 355.715 | 402,223 | 82, 605 | 196 | 308,117 | 11,305 | 2,151, 517 | 2, 138, 492 |  | 18,025 | 1,975 |  |
| Massachusetts | 74 | 5,108,619 | 1,609,496 | 487, 893 | 854, 402 | 317, 055 | 146 | 1, 524, 248 | 1,071,242 | 712 | 452, 294 | 1,967,540 | 7,385 |
| Michigan | 24 | 1,788,797 | 228, 538 | 194, 559 |  | 30,823 | 3,156 | 1,547,772 | 1,501,111 |  | 46,661 |  | 12,487 |
| Minnesata | 5 | 1,027,121 | 131,128 | 128, 518 |  | 2,610 |  | 670,038 | 864,422 |  | 5,616 | 24,064 | 1,891 |
| Mississippi. | 5 | 88,684 | 4,601 | 4,176 |  |  | 325 | 34, 183 | 32,175 |  | 2,008 |  |  |
| Missouri | 16 | 4, 685,401 | 646,682 | 523, 127 |  | 22, 528 | 101, 027 | 1,756,840 | 1,489, 798 | 1,677 | 315, 365 | 2,230,164 | 1,715 |
| Montana. | 5 | 74, 683 | 13,975 | 11,075 | 200 | 1,532 | 1,168 | 60, 658 | 58,375 |  | 2,283 |  |  |
| Nebraska | 4 | 150, 297 | 28,252 | 28,252 |  |  |  | 122,045 | 119,750 |  | 2, 295 |  |  |
| New Hampshire | 7 | 83,786 | 7,822 | 6,151 | 1,671 |  |  | 47,390 | 39,550 |  | .7,840 | 28,574 |  |
| New Jersey .. | 25 | 8, 625, 740 | 481,912 | 221,200 | 1,616 | 159, 561 | 49,585 | 1,573,611 | 1,476, 383 | 10,114 | 86, 914 | 1, 586, 217 | 34, 200 |
| New York | 96 | 19, 552,955 | 3,428, 461 | 1,450,203 | 251,720 | 975,753 | 750,779 | 10,333, 127 | 0,528,743 | 30,746 | 773,638 | 5, 719, 589 | 71,778 |
| North Carolina | 7 | 98,993 | 10,791 | 10,791 |  |  |  | 87,219 | 80,310 |  | 6,909 |  | 983 |
| Ohio. | 62 | 4,137, 866 | 601, 142 | 313,815 | 1,569 | 233,441 | 52, 287 | 2, 457, 584 | 2,295,268 | 3,280 | 159,036 | 1,066,630 | 12,504 |
| Oregon. | 6 | 146,519 | 17,622 | 18,636 |  |  | 3,986 | 128, 897 | 128, 719 |  | 178 |  |  |
| Pennsylvania. | 98 | 12,868,280 | 1,576,476 | 102,673 | 896,619 | 250,620 | 396,564 | 2,056,166 | 1,870,540 | 18,804 | 166,822 | 8,902, 431 | 833, 218 |
| Rhode Island. | 7 | 351, 767 | 140,814 | 36,777 |  | 103, 998 | 44 | 210, 953 | 205, 360 |  | 5,593 |  |  |
| South Carolina. | 7 | 208,196 | 21,109 | 21, 109 |  |  |  | 180,392 | 161, 259 |  | 19,133 | 720 | 975 |
| Tennessee. | 8 | 595, 356 | 113,573 | 107,377 |  |  | 0,196 | 478,473 | 441, 222 |  | 37,251 |  | 3, 810 |
| Texas. | 17 | 199,483 | 36,919 | 36,525 |  |  | 394 | 162, 5644 | 152,912 |  | 9,652 |  |  |
| Utah | 3 | 172,424 | 16, 702 | 16,552 |  |  | 150 | 155, 013 | 140,000 |  | 15, 613 |  | 109 |
| Vermont. | 9 | 45, 089 | 4,427 | 644 | 673 | 3,075 | 35 | 40,662 | 36,721. |  | 3,941 |  |  |
| Virginia | 16 | 547,730 | 46,845 | 28, 989 |  | 808 | 17,048 | 490,484 | 467, 662 | 3,600 | 19,222 |  | 10,401 |
| Washington... | 8 | 463,101 | 78, 239 | 6i1,987 |  | 16,252 |  | 384,862 | 374, 163 |  | 10,699 |  |  |
| West Virginin........ | 8 | 265, 842 | 28, 030 | 27,483 |  | 547 |  | 287,812 | 230, 959 |  | 6,853 |  |  |
| Wisconsin.......... | 17 | 1,081, 160 | 150, 059 | 3,952 |  | 146, 107 |  | 646, 194 | 624,205 | 6,634 | 15,355 |  | 284, 907 |
| All other states and territories? | 11 | 685,777 | 161, 288 | 49,799 |  | 78, 815 | 32,639 | 523,494 | 467, 420 | 2,664 | 53,410 |  | 1,000 |
| Hawaii and Porto Rico................$~$ | 5 | 106,015 | 10,987 | 10,305 | 158 | 350 | 174 | 68,618 | 66,305 |  | 2,313 |  | 26,410 |

${ }_{2}$ Exclusive of renorts for 18 companies which failed to furnish this information.
are distributed as follows: Arizona, 1 ; District of Columbia, 2 ( 8 reports); Idaho, the operntions of individual companies may not be disclosed. These companies
are distributed as follows: Arizona, 1 ; District of Columbia, 2 ( 8 reports); Idaho, 1 ; New Mexico, 1 .

The income account of nonoperating lessor companies, by states is shown in Table 39, and the combined income
account for operating and lessor companies considered as one system, by states, in Table 40.

Table 39.-INCOME ACCOUNT FOR NONOPERATING LESSOR COMPANIES, BY STATES: 1902.1

${ }^{1}$ Exclusive of reports for 12 compantes which failed to furnish this information.
2 Deficit.
${ }^{3}$ Includes states having less than 3 companies, in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Colorado, 1; Maine, 1; Maryland. 2; Missouri, 1.

TABLE 40.-CONDENSED INCOME ACCOUNT FOR OPERATING AND LESSOR COMPANIES COMBINED, BY STATES: 1902. ${ }^{1}$

| STATE, | Number of com-panies. | Operating earnings. | Operating expenses. | Net carnings from operation. | Income from all other sources. | Gross income less operating expenses. | DEDCCTIONS FROM INCOME (TAXES AND FIXED CHARGES). |  |  |  |  |  | Netincome. | Divi- <br> dends. | Surplus. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  | Aggregate. | Taxes. | Interest. |  |  | $\begin{gathered} \text { Miscel- } \\ \text { lane- } \\ \text { ous. } \end{gathered}$ |  |  |  |
|  |  |  |  |  |  |  |  |  | Total. | On funded debt. | On other debt. |  |  |  |  |
| Connecticut. |  | 84, 284, 089 | \$2, 773, 608 | 81,510, 481 | \$71, 686 | \$1,582,167 | \$1, 097, 636 | \$2061, 445 | \$801, 284 | \$768, 608 | \$82, 676 | 434, 907 | 6484, 531 | \$275, 062 | \$209, 469 |
| Illinois . |  | 24, 164, 965 | 14, 103, 211 | 10,061,754 | 864, 292 | 10, 926, 046 | 5, 901, 691 | 1,488, 359 | 4,361, 387 | 4,110,070 | 251,267 | 51, 995 | 5, 024, 355 | 4,745, 965 | 278,390 |
| Massachusetts | 92 | 23, 617, 670 | 16, 403, 667 | 7,213,903 | 15,840 | 7,229,743 | 3, 847,046 | 1,610,341 | 2, 219, 926 | 1,753, 668 | 466, 257 | 16,779 | 3, 382, 697 | 3, 182, 455 | 200, 242 |
| New Hampshire. | 13 | 604, 131 | 478,849 | 125, 282 |  | 125,282 | - 92, 337 | 7.822 431 | 2 84,515 | 7b, 675 | 7,840 |  | 32,945 647,541 | 8,250 44,640 | 24,695 199,901 |
| New Jersey. | 29 | 8, 137, 477 | 4, 324, 112 | $3,818,365$ | 39,446 | 3,8i2, 811 | 3,205, 270 | 431, 912 | 2,733,971 | 2,636,948 | 97,028 | 39, 387 | 647, 541 | 447,640 | 199,901 |
| New York | 119 | 59, 315, 606 | 33, 677, 724 | 25, 637, 882 | $1,572,383$ | 27, 210, 205 | 15, 771, 167 | 3, 428, 461 | 12,241, 187 | 11, 436, 803 | 804, 384 | 101,519 | 11, 439, 098 | 6, 880, 864 | 4, 558, 234 |
| Ohio..... |  | 16, 587, 698 | 9, 182, 480 | 7,455, 213 | 12,158 | 7,467, 371 | 3, 126, 655 | 601, 142 | 2, 513,009 | 2,350, 698 | 162,316 | 12,504 | 4,340,716 | 2, 6033,554 | 1, 707, 162 |
| Pemnsylvania ... | 184 | 30, 319, 211 | $15,624,813$ | 14,694, 398 | 54, 322 | 14, 748, 720 | 5, 787,108 | 1, 844,880 | 3, 554, 185 | 3,388, 082 | 186,053 | 388,093 | 8,961, 612 | 8, 150, 880 | 810,732 |
| All other states ${ }^{\text {a }}$ | 57 | 19, 359,641 | 10,812,560 | 8,547,081 | 73,006 | (8,620,087 | 7, 479, 926 | 1,157,008 | 6,819,189 | 5,941,435 | 377, 704 | 3,779 | $1,140,161$ | 1,336,123 | ${ }^{3} 195,962$ |


${ }_{2}$ Includes states laving less than 8 lessor companies, in order that the operations of individual compnnies may not be disclosed. The companies are distributed as follows: Colorado, 1; Maine, 1; Maryland, 2; Missuri, 1 ,
a Deflett.

Wide differences appear among the states in the proportions which the various items of the income account bear to one another.

From Table 37 it will be seen that the operating earnings of the companies in the state of New York$\$ 59,315,606$-constitute no less than 24 per cent of the total for the United States, which amounts to $\$ 247,553,999$. The operating earnings of the companies in Pennsylvania are somewhat more than one-half as great as those of the New York companies. Illinois is third, with about one-tenth of the street railway earnings of the country, while Massachusetts, which shows a remarkable development of interurban traffic, follows close after Illinois. Of the total net earnings from operation- $\$ 105,241,402-$ New York companies show $\$ 25,637,882$, or 24.4 per cent. The fact that the street railway companies of New York and Illinois together
have more than five-sixths of the "income from other sources" than operation is explained by the large extent to which companies in Chicago and New York city hold the securities of other companies.

Taxes in the several states.-The statistics for states showing the proportion which the contributions of street railway companies to the public treasury bear to their gross income and to their income less operating expenses throw some, though on the whole but little, light upon the policy prevailing under state laws and local ordinances concerning the taxation of this business and the requirement of compensation for special privileges. Quite as important a cause of the wide variations that appear among the states in this respect is found in the differences in the expense of government and in the general rate and methods of taxation in the communities where the railways are located. The pro-
portion of taxes to gross income, and even to gross income less operating expenses, is in general lowest in those states where the greatest proportion of railways are in small towns; notably in various states of the West and South, which are lacking in large urban communities. In a number of these states the taxes paid were less than 2.5 per cent of the gross income of the companies.
Table 41 shows the ratio of taxes to gross income, and to income less operating expenses, in the more important states. It will be seen that Michigan, Ohio, and Iudiana are the only states in the table in which the taxes were less than 5 per cent of the gross income. The lower ratio of taxes in these states is probably due in part to the large proportion of interurban railways, the taxation upon which is as yet less heavy than that upon street railways in cities.
Table 41.-Percentage of taves to income, for street cond interurbare railuays, in selected stales: 1902.

| state. | PEBCENTAGE OF <br> TAXES TO- |  |
| :---: | :---: | :---: |
|  | Gross income. | Gross income less operating expenses. |
|  | 5.0 | 10.8 |
| Conmectieut..... | 6.0 | 16.5 |
| IMinois....... | 5.9 | 13.6 |
| Indiana ..... | 4.9 | 11.6 |
| Kentuckty. | 6.1 | 12.9 |
| Lomisinna. | 8.3 | 15.4 |
| Maryland ........ | 8.2 6.8 | 152. 3 |
| Massachusetts richigan | 6.8 3.5 | 8.0 |
| Miehigari | 6.0 | 13.9 |
| New Jersey. | 6.3 | 11.2 |
| New York. | 5. 6 | 12.6 |
| Ohio....... | 3.6 | 8.1 |
| Peansylvania | 6.1 | 12.5 |
| Tennessee.... | 6.1 | 14,4 |

Payments to public anthorities are heavier in Maryland than in any other state, being 8.2 per cent of gross income and 15.6 per cent of gross income less operating expenses. This fact is due to the policy of the city of Baltimore in requiring a large franchise payment annually from her railways. Louisiana and Massachusetts come next with taxes amounting to nearly 7 per cent of gross income. The high proportion in Massachusetts is not attributable to the requirement of special franchise payments to local governments, but rather to the methods of assessing corporate property in general in that commonwealth, and to the commutation of the ordinary requirements regarding maintenance and care of the street surface into cash payments to the local authorities.

In Chapter IX will be found a digest of information regarding the special payments for franchise privileges required from street railways in various cities and towns.

Rentals of learsed lines, by states.-The widest difference appears among the states as regards the amount of rental paid for leased lines. In only 12 states are
there any lessor companies. The rentals paid in 3 states alone, Pennsylvania, Illinois, and New York, amount to about three-fourths of the total rentals for the United States. The rentals paid by operating companies in Pennsylvania amount to no less than $\$ 8,902,431$, or 29 per cent of the gross income of the companies. The rentals paid in Pennsylvania are equal to nearly three times the amount paid by all the operating companies of that state as interest and dividends on their own securities. In Philadelphia almost all the railway trackage has come under the control of a single operating company, which itself owns no track, but which holds and operates the system under a complicated series of leases and subleases. Five-sixths of the entire net perating earnings of this company go to pay the rentals on the bonds and stocks of its 38 lessor companies. A similar condition of affairs exists in Pittsburg. A large proportion of the surface railway trackage of New York city is likewise controlled under lease, and the rentals paid by operating companies in the state as a whole are equal to nearly one-tenth of their gross income. In Illinois rentals are equal to 15 per cent of the gross income of the railway companies. The Union Traction Company of Chicago, the most important company in that city, holds its trackage altogether under lease. The most important railway system of St. Louis is likewise leased by one company to another, and the rental of leased lines in Missouri is equal to more than one-fifth of the gross income of the street railway companies of the state.

Detailed comment on the figures of interest, net income, dividends, and surplus in the several states would be superfluous. Attention may, however, be called again to the fact that profits in the street railway business do not by any means necessarily depend upon a high proportionate net income. Thus the street railway business in a state in which the proportion of net income is relatively small may yet be highly profitable business, even as disclosed in the income account. Payments to capital in the form of interest and rentals, which are deducted when computing net income, are quite as real a return as those which take the form of dividends. The combined income account for operating and lessor companies, Table 40 , gives a very differ-ent view of the profitableness of streetrailway operation in some of the states from that which appears in the income account of operating railways alone.

## II.

## ANALYSIS OF OPERATING EARNINGS.

Operating earnings af companies, classified according to power:--Table 42 shows, for all companies and for the various groups distinguished according to the character of power used, the amount of operating earnings from the different sources.

Table 42.-OPERATING EARNINGS OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902. ${ }^{1}$

${ }^{1}$ Exelusive of reports for 18 companies which falled to furnish this information.
Table 43 shows the percentage which each item bears to the total earnings of the group.
Table 43.-PERCENTAGE Distribution, By sources, of operating earnings of companies, classified ACCORDING TO POWER: 1902.

|  | Total. | elegtric, surface, |  |  | Animal. | Steam andelectricelented elevated | Cable, sur inclined planes. | Steam, surface. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Withont commercial lighting. | With commercial lighting. | Part time. |  |  |  |  |
| Operating earnings | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 160.0 | 106.0 | 160.0 |
| From passengers, ..... | ${ }_{0}^{94.4}$ | ${ }^{97.0} 0$ | 68.3 0.2 | ${ }^{91.7}$ | (1) 98.2 | 97.0 | 42.3 | 49.1 |
| From freylt ......... | 0.4 | 0.4 | 0.8 | 0.9 |  |  | 8.5 | 4.6. |
| From express................................................................... | 0.2 <br> 0.2 <br> 1 | 0.2 | 0.1 | 0.1 |  | 0.1 | ${ }^{\text {(1) }} 0.1$ | 0.9 6.9 |
| From sale of eleatric current for light and power ..................................... | 3.1 1.6 | 0.6 1.5 | $\stackrel{29.2}{1.3}$ | 2.5 1.5 |  |  |  |  |
|  |  |  |  | 1.0 | 1.0 | 2.3 | 4 | 6.5 |

${ }^{1}$ Less than one-tenth of 1 per cent.

It will be seen that including the small amount from chartered cars 94.5 per cent of the earnings of all companies were derived from passenger traffic. Of the other sources of earnings the sale of electric current for light and power was the most important. Of the receipts from this last source 83.7 per cent were earned by that group of electric railways which operate fairly distinct and important light and power plants in addition to their railway business. They derived 29.2 per cent of their operating earnings from the sale of light and power. It is scarcely possible to draw a sharp distinction between companies which operate commercial lighting plants and those which do not. The small sales of current reported by companies which are not regarded by the Bureau of the Census as operating separate light and power plants are, in considerable measure, made to other railway companies or to electric light companies, which take the current directly at the dynamo and distribute it.
Railway companies differ to some extent in regard to the distinction which they make between freight and express business, and the amounts of these items, therefore, can not be considered as based upon exact definitions. Elevated railways reported only a small amount of income from mail service and none from freight and express. The freight earnings of the group of cable railways are confined to the inclined plane roads, which derive about one-sixth of their revenue from this source.

The item of miscellaneous earnings covers receipts from a considerable variety of sources. In the case of some companies it includes a certain amount of revenue which, strictly speaking, should be treated as miscellaneous income rather than as earnings, since it is derived from sources not directly connected with the railway or with the accompanying light and power business, but which was not distinguished in the returns from earnings proper. The most important source of miscellaneous earnings was street car advertising, and, particularly in the case of elevated railways, adrertising in stations. This revenue belongs properly enough to earnings. Some companies derive a small amount of earnings from parks and other pleasure resorts which they operate. In the majority of instances, however, these establishments are run at a loss, so far as their direct operations are concerned, the company making its profit from the increase in traffic. The sums received by certain railway companics for permitting the cars of other companies to run orer their tracks are likewise properly included under the head of miscellaneous earnings.

Operating earnings of companies, classified acoording to population.-Tables 44 and 45 show the amount and percentage distribution of the various items of operating earnings of all street and interurban railway companies, classified according to the population of the urban centers served, with the further distinction of the two classes of interurban railways.

TABLE 44.-OPGRATING EARNINGS, BY SOUROES, OF COMPANIES, OLASSIEIED ACCORDING TO POPULATION: I902. ${ }^{1}$

|  | Total. | urban centers, population. |  |  |  | interubban rallways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | 100,000 but under 500,000 . | 25,000 but under 100,000. | Under 25,000. | Fast, long. | Other. |
| Number of companies. | - $24.47,558,{ }^{799}$ | \$120,837, ${ }^{60}$ | \$51, 008, 983 | 822,728,795 | \$11, $879,{ }^{312}$ | \$10, 161,736 | \$80, 938,73818 |
| Operating earnings. | -233,821, 548 | 118, 195,786 | 49,014,651 | 19, 928,711 | 9, 241, 431 | 8,994,849 | $28,446,12.20$ 93,425 |
| From chartered cars | 303, 608 $1,038,097$ | 70, 838 | 141,574 | 158, 499 | 81, 323 | 300, 685 | 321,680 |
| From freight ...... | 1, 132,080 | 217,777 | 76,081 | 23, 251 | 18, 885 | 29,126 | 67, 510 |
| From mill.. | 401, 672 | 53, 193 | 7,191 | 4,946 | 12,023 | 171, 111 | 15s,208 |
| From express electric cirrent for inght and power... | 7,703, 774 | 425,923 $1,889,004$ | $1,011,031$ 693,150 | $2,236,787$ 352,945 | $2,259,694$ 254,282 | 397,217 230,761 | $1,372,920$ 488,278 |
| From miscellaneous sources... | 3,808,420 | 1,889,004 |  |  |  |  |  |

1 Exclusive of reports for 18 companies which failed to furnish this information.
TABLE 45.-PERCENTAGE DISTRIBUTION, BY SOUROES, OF OPERATING EARNINGS OF COMPANIES, OLABSIFITD ACCORDING TO POPULATION: 1902.

${ }^{1}$ Less than one-tenth of 1 per cent.
The corresponding statistics for full-time electric surface railways not furnishing commercial lighting are presented in Tables 46 and 47.
TAble 46.-OPERATING EARNINGS, BY SOURCES, OF FULL-TIME ELECTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATLON: 1902. ${ }^{1}$

|  | Total. | urban centers, population. |  |  |  | interurban ramways, |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | $\begin{gathered} 100,000 \text { but } \\ \text { under } 500,000.0 \end{gathered}$ | $\begin{gathered} 2 \overline{0}, 000 \text { but } \\ \text { under } 100,000 . \end{gathered}$ | Under $25,000$. | Fast, long. | Other. |
| Number of companies. | ${ }^{52040}$ | (10) $896.17{ }^{47}$ | -45 ${ }^{38}$ | S15, ${ }^{656} 86$ | ¢6, $\begin{array}{r}165 \\ \hline 869\end{array}$ | \$7, 640,640 | 826, 215.5800 |
| Oparating earnings. | \$20., 076,037 $\mathbf{1 9 7}, 989,040$ | $\$ 102,896,131$ $100,708,508$ | \$ $\$$ | \$15,366, ${ }^{14,801,254}$ | $\$ 6,377,469$ $6,034,681$ | $\$ 7,640,642$ $6,908,044$ |  |
| From chartered cars | -26i, 588 | 70,986 | - 57,210 | 13, 466 | 7.671 | 34, 044 | 78,311 |
| From freight | 780,444 | 10,904 | 128,234 | 88,72 | 36, 192 | 241,082 | 275, 800 |
| From mail.. | 390, 256 | 199, 829 | 72, 981 | 17,841 | 14,172 | 25,303 | 60,180 |
| From express.................................... | 1,196,025 | 52,369 425,925 | 7,191 148,374 | 3,584 151,407 | 10,006 138,156 | 160,604 17,178 | 143,188 814,000 |
| From miscellaneous sources ................................ |  | 1,427,610 | 630,858 | 281, 171 | 136, 691 | 194,392 | 410,628 |

${ }^{1}$ Exclusive of reports for 16 companies which failed to furnish this informarion.
TABLE 47.-PERCENTAGE DISTRIBUTION, BY SOURCES, OT OPERATING EARNINGS OF FULLTIME ELECTRIG SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFLED ACCORDING TO POPUJATION: 1902.

| - | Total. | urban centers, population. |  |  |  | interurban batlways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500, ${ }_{\text {and }}$ | $\begin{gathered} 100,000 \\ \text { but under } \\ 500,000 \text {. } \end{gathered}$ | $\begin{gathered} 25,000 \\ \text { but, under } \\ 100,000 . \end{gathered}$ | $\begin{aligned} & \text { Under } \\ & 25,000 \text {. } \end{aligned}$ | Fast, long. | Other. |
| Operating earnings. | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| From phassengers ...... | 97.0 | 37.9 | 97.7 | 96.4 | 94.6 | 91.2 | 95. 0.18 |
| From freight, mail, nind express | O. 0.8 | 0.1 | 0.1 | 0.7 | 0.1 1.0 | 0.4 5.6 | 1.8 |
| From sale of electric current for lightand power | 0.6 | 0.4 | 0.8 | 1.0 | 2.2 | 0.2 | 1.2 |
| From miscellaneots sources ..................... | 1.5 | 1.4 | 1.4 | 1,8 | 2.1 | 2.6 | 1,0 |

The proportion which passenger earnings bear to the total earnings depends primarily on the amount of income from light and power, and it is therefore quite different, in some of the population groups, when electric surface companies without lighting plants are considered alone, from that which appears for all classes of companies combined, including those selling light and power in a commercial way. For all companies the proportion of passenger earnings to total earnings is greatest in the centers of more than 500,000 population, and, decreasing with population, becomes smallest in those of less than 25,000 inhabitants.
The receipts from chartered cars in all classes of urban centers are exceedingly small. The item of earnings from chartered cars is of somewhat greater significance on interurban railways, constituting fourtenths of 1 per cent of the total earnings of fast, long interurban railways and three-tenths of 1 per cent of the earnings of other interurban lines. It is not uncommon for pleasure parties to avail themselves of the convenience and comfort of chartered interurban cars for long journeys into the country or for visits to neighboring towns and cities.
The earnings of urban street railways from freight, mail, and express service are insignificant as compared with their passenger earnings. The distinction between freight and express traffic as made by street and electric railways is not a very precise one, and these two items in the tables should therefore be considered jointly. The earnings from these two sources are relatively greater in small cities than in the larger cities. The freight and express business of the interurban railways of both classes is much more important than that of urban railways. The total revenue of fast, long interurban railways from freight, mail, and express traffic amounted to $\$ 500,922$, or 4.9 per cent of the gross earnings of all interurban companies of this class.
There are striking differences among the various urban groups in regard to the proportion of earnings derived from the sale of electric light and power. If companies of all classes, including those furnishing commercial lighting, be considered together, it will be found that whereas only two-fifths of 1 per cent of the earnings of companies in urban centers of more than 500,000 inhabitants were derived from light and power, the corresponding proportion in cities under 25,000 inhahitants was 19 per cent. For reasons elsewhere suggested (page 13) it is much more common to find railway business combined with light and power business in small and medium-sized cities than in large ones. Several interurban railway companies of both classes also operated lighting plants and derived a considerable amount of earnings from them.

When attention is confined to those electric surface railway companies which are not regarded by the Bureau of the Census as doing a commercial lighting business, it appears that the earnings from the incidental sale of electric current were also greater among companies in urban centers of less than 100,000 inhabitants than among companies in the larger cities.

The various popalation groups do not show a wide divergence as regards the proportion which the earnings of railway companies from miscellaneous sources bear to the total earnings. On the face of the returns the proportion of receipts from such sources was distinctly greater in urban centers of less than 25,000 inhabitants than in the larger centers. This is probably attributable, at least in part, to the failure of companies in these towns to distinguish strictly between miscellaneous earnings, which are properly assignable to street railway operation, and miscellaneous income, which is derived from property entirely distinct from the street railway business. The miscellaneous receipts are made up of such a wide variety of items that it is impossible, in the absence of the exact figures for each item, to derive any significant comparisons from the totals for groups. One would, perhaps, expect the receipts from advertising to be comparatively larger in great cities than in those of smaller population, and this opinion seems to be confirmed by such incomplets data regarding the earnings from advertising as appear in the original schedules.

Operating earnings, by states.-Table 48 presents the sources of operating earnings, by states and territories.

The proportions of the earnings from different sources in a given state depend in considerable measure upon the size of the cities in which its street railway companies operate and upon the presence or absence of interurban railways. Thus the earnings from freight, mail, and express service combined are relatively much larger in Ohio and Michigan than elsewhere, because the interurban railways in those states have developed this class of traffic to a considerable degree. The companies of Maryland derived a greater proportion of their revenue from carrying mail than the companies of any other state, although this item was also considerable in Illinois, Missouri, and Massachusetts. Receipts from the sale of electric current for light and power constituted a larger proportion of total earnings in sereral of the Southern and Western states, where the total business of the companies is comparatively small, than in the leading Northern states. A considerable income was, however, derived from the sale of light and power by the street and interurban railways of Connecticut, Ohio, Illinois, Iowa, and Wisconsin.

Table 48.-ANALYSIS OF GROSS EARNINGS FROM OPERATION, BY STATES AND TERRITORIES: 1902. ${ }^{1}$

| state or territory, | $\begin{gathered} \text { Number } \\ \text { of } \\ \text { comp. } \\ \text { panles. } \end{gathered}$ | Total. | FROM- |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Passengers. | Chartered cars. | Freight. | 'Mail. | Express. | Sale of electric current for light or power. | Miscellaneous. |
| United States. | 799 | \$247, 553,999 | \$233, 821,548 | \$303,608 | \$1,038,097 | \$432,080 | \$401,672 | \%7,703, 574 | \$3,853,420 |
| Alabama. | 9 | 1,497,351 | 1,135,266 | 2,211 | 34,494 | 1,415 | 1,862 | 318, 660 | 3,948 |
| Arkansas. | 7 | 371,560 | 322,805 | 114 | 20 |  |  | 45, 630 | 2,985 |
| California. | 35 | 9,967,288 | 9, 464, 723 | 3,637 | 47,625 | 20, 116 | 3,576 | 279, 216 | 148,305 |
| Colorado. | 7 | 2,227,286 | 2, 091, 824 | 8,106 |  | 2,000 |  | 111, 104 | 14, 252 |
| Connectient. | 21 | 4,284,089 | 3,829,094 | 12,435 | 16,652 | 6,807 | 16,660 | 348,297 | 54, 204 |
| Delaware | 3 | 500,412 | 476,539 | 494 | 2,270 |  |  | 5,112 | 15, 997 |
| Florida | 6 | 529,743 | 411,533 | 667 | 2,486 | 515 | ...... | 110,363 | 4, 179 |
| Genrgia | 10 | 2,375,224 | 1,594,982 | 4,972 | 9,772 | 440 | 150 | 727,847 | 37,001 |
| Illinois. | 48 | 24, 164,965 | 23,270, 828 | 12,615 | 23,165 | 42,596 | 10,148 | 519, 958 | 285, 655 |
| Indiana. | 20 | 3,813,076 | 3,532,579 | 6,858 | 18,781 | 1,977 | 17,893 | 144, 823 | 90, 665 |
| Iowa. | 22 | 2,384,421 | 1, 059, 965 | 954 | 17,548 | 5, 299 | 9,132 | 296, 780 | 94,793 |
| Kansas. | 11 | 370,481 | 343,197 | 200 |  | 566 |  | 23,007 | 3,511 |
| Kentucky | 12 | 2,932, 001 | 2,780,487 | 1,407 | 2,500 | 2,168 | 4,142 | 138,387 | 8,840 |
| Louisiana | 8 | 2,910,244 | 2,835, 262 | 4,457 | ....... | 1,682 |  | 37,753 | 31,090 |
| Maine. | 19 | 1,542,508 | 1,311,198 | 201 | 80,880 | 6,179 | 9,409 | 102, 318 | 32, 773 |
| Maryland. | 10 | 4, 898,6207 | 4,748,425 | 520 | 15,343 | 33,372 | 11,169 | 10,843 | 78, 975 |
| Massachusetts | 7 | 23,617,570 | 22,807, 316 | 43,182 | 12,876 | 48,454 | 4,140 | 250,109 | 451, 498 |
| Michigan | 24 | 6, 191,691 | 6,014, 842 | 20,313 | 47,904 | 11,143 | 138, 20.4 | 195, 428 | 51,897 |
| Minnesota | 5 | 3, 727,648 | 3,650, 483 | 4,138 |  | 4,385 |  | 49,680 | 19,012 |
| Mississippi. | 5 | 258, 854 | 154,597 | 113 |  |  |  | 103,236 | 708 |
| Missouri. | 16 | 10,691,220 | 10,422, 236 | 5,652 | 7,379 | 41, 071 | 4,392 | 172,036 | 38, 159 |
| Montana. | 5 | 492,023 | 382,452 |  | 50,544 | 365 | 34 | 43,284 | 15,364 |
| Nebraska | 4 | 1,148,994 | 1,107,494 | 1,044 |  | 2,698 |  | 35,073 | 2, 688 |
| New Hampshire | 7 | \{04,181 | 579,548 |  | 1,182 | 4, 050 | 120 | 10,625 | 8,608 |
| New Jersey | 25 | 8,137,477 | 7,989,544 | 21,585 | 5,364 | 4, 822 | 96 | - 15,459 | 100,607 |
| New York. | 96 | 59, 315, 606 | 57, 347, 930 | 63,418 | 197,324 | 65, 077 | 6.4,213 | 471, 509 | 1,116,135 |
| North Carolina. | 7 | 487,259 | 247, 812 | 75 | 8,367 |  | 1,500 | 168,657 | 15, 888 |
| Ohio. | ¢2 | 161, 587,093 | 15,293,976 | 37, 450 | 211,842 | 35,171 | 57,679 | 602, 619 | 349,016 |
| Oregon... | 6 | 1,042,895 | 969,231 | 507 | 17,287 | 2,90t | 163 | 38,622 | 19,281 |
| Pennsylvania. | 98 | 30, 319, 211 | 29,537,284 | 24, 407 | 35,563 | 61,377 | 28, 477 | 188,602 | 493,501 |
| Rhode Island | 7 | 2, 96-1,200 | 2,874,255 | 1,963 | 48,835 | 1,769 | 536 | 25,687 | 16,215 |
| South Carolina. | 7 | 597, 577 | 401, 553 | 61 | 16,579 | 1,504 |  | 171, 662 | 6, 818 |
| Tennessee. | 8 | 1,866, 835 | 1,759,680 | 68 | 1,289 | 4,830 |  | 86, 901 | 1.t, 111 |
| Texas. | 17 | 1,547,846 | 1,501, 188 | 2,250 | 8,000 | 555 | 719 | 20,859 | 19,275 |
| Utah | 3 | 561,328 | 547,875 | 1,197 |  | 800 |  | 1,571. | 9;885 |
| Vermont | 9 | 249,228 | 210,013 |  | 23,351 | 2,201 | 1,768 |  | 5,895 |
| Virginia | 16 | 1,553,478 | 1,108,732 | 2,030 | 12,791 | 1,617 | 368 | 387, 031 | 45, 908 |
| Washington. | 8 | 2,542,906 | 1,813, $166^{\circ}$ | 3,233 | 63, 501 | 1,883 |  | 641, 800 | 19,333 |
| West Virginia. | 8 | 1,102,171 | 958,805 | 100 | 6, 160 | 755 |  | 126, 117 | 10,234 |
| Wisconsin. | 17 | 3,902,059 | 3,155, 168 | 11,489 |  | 765 | 582 | 690, 284 | 43,771 |
| All other states and territories'. | 11 | 3,021,063 | 2,876,433 | 9,429 | 967 | 8,796 |  | 62,485 | 72,958 |
| Hawaii and Porto Rico.. | 5 | 515,913 | 485, 258 | 301 | 25 |  |  | 26, 454 | 3, 575 |

1 Exclusive of reports for 18 companies which railed to furnish this information.
are distributed as follows: Arizona, 1; District of Columbia, $2(8$ reperts); Idato , the operntions of individual companies may not be diselosed. These companies
III.

## anatisis of operating expenses.

Detailed unalysis, by states.-Table 49 presents for the United States and for each state an analysis of the operating expenses of street railways under six main divisions and thirty-nine subdivisions. The classification of expenses is that adopted by the American Street Railway Accountants' Association. In the appendix to this report will be found a detailed list of the different items of expenditure which, according to the rules of that association, are to be included in each of the divi-
sions and subdivisions. This classification applies less satisfactorily to animal power, elevated, and steam railways than to electric and cable railways, and less satisfactorily to electric railways having commercial lighting plants than to those without them. Nevertheless, electric railway companies without commercial lighting plants do such a large proportion of the total business for all classes of companies that the totals of the table, which include all operating companies, may be regarded as showing in a fairly accurate manner the distribution of expenses of this class of companies.

Table 49.-ANALYSIS OF OPERATING

${ }^{1}$ Exclusive of reports for 18 companies which failed to furnish this iniormation.
Includes states and territories having less than 3 companies, in order that the operations of individual companies may not be diselosed, These companfes are distributed as follows: Arizona, 1 ; District of Columbia, 2 ( 5 reports); Idaho, 1 ; New Mexico, 1 .

EXPENSES, BY STATES AND TERRITORIES: 1902. ${ }^{1}$

| maintenance-continued. |  |  | transportation. |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Equipment-Continued. |  |  | Operation of power plant. |  |  |  |  |  |  | Operation of cars. |  |  |  |
| Electric, cable, ete. equipment of cars. | Miscellaneous. | Miscellaneous shop expenses. | Total. | Wages. | Fuel. | Water. | Lubricants and waste. | Miscellaneoussupplies and expenses. | Hired power. | Total. | Superintendenice of transportation. | Wages of conductors. |  |
| $85,325,125$ | \$668,875 | \$842, 711 | 123,062, 328 | \$4, 599,487 | \$12, 827, 322 | \$034,026 | \$500, 967 | \$629,008 | \$8,871, 318 | 862, 454,679 | 82,598,835 | 84,070,221 | 1 |
| 86,762 | 3,436 | 3,288 | 114, 063 | 23,074 | 67, 684 | 4,140 | 3,233 | 1,479 | 14, 453 | 300,598 | 20, 273 | 105,877 | 2 |
| 5,290 | 105 | 450 | 55, 129 | 15, 3.7 | 26,814 | 2,183 | 2,075 | 162 | 8,548 | 87,830 | 2,551 | 21,963 | 3 |
| 157,048 | 21,461 | 15,196 | 878, 716 | 186, 522 | 428, 453 | 4,388 | 14, 152 | 20,451 | 224,750 | 2, 762, 29.9 | 73, 246 | 1,181,880 | 4 |
| 39,552 | 1,875 | 5, 004 | 240, 298 | 73,144 | 136,386 | 3,509 | 3,820 | 1,925 | 21,514 | 531, 518 | 16,052 | 224,802 | 5 |
| 114,766 | 5,754 | 21,152 | 438,707 | 102,549 | 260, 027 | 8,000 | 9,855 | 8,211 | 20,005 | 1,114,410 | 30, 914 | 442,579 | 6 |
| 13,910 | 1,319 | 4,480 | 84, 804 | 15,384 | 01, 600 | 1,527 | 3, 297 | 310 | 2,686 | 134, 871 | 1,650 | 60, $0 \times 50$ | 7 |
| 7,80: | 200 | 602 | (65, 281 | 14,798 | 47,652 | 175 | 1,505 | 1,151 |  | 102, 453 | 6,266 | 50, 299 | 8 |
| 40,386 | 2,805 | 9,877 | 170,885 | 41,571 | 113,619 | 8, 086 | 7,628 | 3,784 | 2,147 | 400,180 | 9,451 | 158,480 | 9 |
| 388, 439 | 59,430 | 103,605 | 2,353,311 | 476,336 | 1,306,304 | 49,239 | 37,869 | 80,584 | 402,979 | $5,825,5022$ | 89, 704 | 2,444, 620 | 10 |
| 115, 675 | 2,234 | 24,482 | 368,879 | 106,523 | 228,900 | 3,312 | 12, 100 | 7,441 | 10,603 | 817,307 | 27,146 | 352,116 | 11 |
| 47,020 | 8,581 | 13,361 | 293,226 | 74,084 | 187,345 | 4,432 | 8,362 | 5,430 | 13,567 | 513,227 | 13,192 | 177,609 | 12 |
| 3,022 | 585 | 962 | 44, 452 | 16,790 | 24, 986 | 591 | 1,569 | 516 |  | 102,482 | 5,080 | 27,020 | 13 |
| 32,570 | 1,492 | 7,047 | 184,764 | 46, 165 | 100,244 | 4,902 | 6,760 | 13,547 | 13,146 | 653, 671 | 58,187 | 99, 04.4 | 14 |
| 66,198 | 3,414 | 10,008 | 205, 083 | 76, 026 | 172, 626 | 511 | 20,607 | 33, 313 | 2,000 | 881,936 | 10,610 | 346, 139 | 15 |
| 56,429 | 1. 900 | 8,554 | 200,581 | 52, 744 | 84,798 | 27,501 | 4, 347 | 6,278 | 24,883 | 377,203 | 18,099 | 141,941 | 16 |
| 132, 124 | 78 | 1,815 | 461, 108 | 89,296 | 268, 550 | 9,847 | 5,303 | 2,203 | 85,909 | 1,017,517 | 25, 448 | 443,201 | 17 |
| 672, 20.1 | 28,057 | 17,698 | 2,573,845 | 469,865 | 1,522,155 | 68,347 | 47,979 | 43,435 | 427,064 | 7, 44, 107 | 640,791 | 2, 600,047 | 18 |
| 168,807 | 18,027 | 21,901 | 660,257 | 175,669 | 398, 744 | 1,527 | 20, 472 | 14, 073 | 54,722 | 1,576,781 |  | 592, 66 | 19 |
| 1.25, 793 | 1,850 | 2,401 | 263, 689 | 48,538 | 69,702 | 2,023 | 2,541 | 7,005 | 133,790 | 784,491 | 21,488 | 299,127 | 90 |
| 3,111 | 661 | 189 | 611,945 | 14, 073 | 39,643 | 2,441 | 2,659 | 1,511 | 1,618 | 40,765 | 1,305 | 15,24 | : 21 |
| 240,660 | 10,763 | 58,695 | 970, 9997 | 942,381 | 643,115 | 47,332 | 26,959 | 7,560 | 3,650 | 2, 713,951 | 30,849 | 1,109,345 | 22 |
| 11,349 | 710 | 1,196 | 58,988 | 12,053 | 19,282 | 1,363 | 797 | 1,098 | 24,390 | 140, 188 | 600 | 57,842 | 3 |
| 24, 104 | 115 |  | 122, 058 | 29,539 | 86, 290 | 3,690 | 2,533 |  |  | 264, 688 | 1,885 | 119,273 | 24 |
| 18,572 | 1,308 | 6,250 | 134, 413 | 21, 144 | 38,348 | 1,349 | 1, 611 | 1,584 | 70,377 | 162, 911 | 7, 349 | 67,679 | 25 |
| 238, 141 | 19,468 | 28,466 | 758,759 | 112,188 | 301, 284 | 17,312 | 14,309 | -17, 218 | 291,448 | 1,907,598 | 76,302 | 743, 342 | 26 |
| 1,147,418 | 381,005 | 306, 612 | 5,266, 237 | (659, 683 | 3,012, 882 | 259, 145 | 85,333 | 263, 583 | 985,711 | 15,420,303 | $7{ }^{7} 11.132$ | 5,528, 638 | : 7 |
| 7,089 | 701 | 500 | 78, 996 | 10,959 | 48,399 | 1,588 | 2, 964 | 700 | 8,386 | 79,180 | 4,288 | 29, 685 | 28 |
| 29.4, 688 | 19,491 | 68,260 | 1, 016, 321 | 418, 639 | 963, 623 | 33,839 | 46,376 | 31,468 | 127,381 | 4,211,137 | 113,153 | 1,663,807 | 29 |
| 30,400 | 1, d13 | 53 | 108, 877 | 29,980 | 25, 022 | 12 | 3,430 | 1,242 | 49,191 | 293,011 | 9,405 | 126,473 | 30 |
| 707, 628 | 39,670 | 38,200 | 2, 056,849 | 579, 052 | 1,060,602 | 29,197 | 60,888 | 16,872 | 310, 288 | 7,207,220 | 281, 810 | 3,071, 314 | 31 |
| 58,220 | 4,655 | 18,943 | 206, 212 | 48,397 | 170, 287 | 15,203 | 4,165 | 6,021 | 52,189 | 792,790 | 31,513 | 304,091 | 32 |
| 7,851 | 6, 6.40 | 488 | 55,630 | 7,619 | 32,019 | 280 | 1,027 | 429 | 14.262 | 135, 242 | 16,906 | 37,931 | 23 |
| 38,133 | 1,229 | 10,893 | 163,842 | 21,769 | 72,189 | 3,315 | 4,081 | 1,878 | 60,620 | 409,102 | 25,700 | 164, 145 | 34 |
| 35,788 | 1,459 | 5,117 | 177,486 | 30, 359 | 68, 843 | 1,133 | 3,375 | 3,450 | 75,276 | 376,369 | 16,338 | 129,006 | 35 |
| 23, 467 | 708 | 467 | 59,881 | 2,679 | 5,407 | 188 | 402 | 44 | 51, 161 | 162,998 | 7.100 | 65,506 | 36 |
| 9,912 | 1,579 | 728 | 41,449 | 3,989 | 10,005 |  | 711 | 219 | 26,525 | 90,641 | 5,210 | 33,683 | 37 |
| 32,971 | 1,250 | 1,687 | 243,088 | 40,806 | 144,727 | 6,721 | 7,180 | 3,478 | 31, 176 | 319,064 | 17,734 | 114, ${ }^{2}$ | 3 |
|  |  | 3,889 | 274, 662 | 48,888 | 141,864 | 3,374 | 3,589 | 9,491 | 67,956 | 515,418 | 9,980 | chat, 103 | 39 |
| 16,783 | 2,279 | 1,478 | 97,029 | 36,655 | 47,276 | 2,572 | 3, 055 | 1,439 | 6,032 | 278,868 | 6,582 | 110,890 | 40 |
| 46, 120 | 8,894 | 2,610 | 300,989 | 72,092 | 261,880 | 2,527 | 7,290 | 14, 884 | 32,316 | 716,787 | 34, 856 | 269,268 | 41 |
| 78,018 | 1,448 | 17,096 | 284, 746 | 42, 228 | 143,250 | 2,205 | 4,809 | 3,545 | 88,709 | 747, 278 | 21,947 | 286, 237 | 42 |
| 9,385 | 1,586 | 1,386 | 55, 327 | 10,617 | 37,829 | 1,013 | 1,097 | 571 | 4, 200 | 110,797 | 3,989 | 35,238 | 43 |

Table 49:-ANALYSIS OF OPERATING

|  | state or territury. | transportation-continued. |  |  |  |  |  |  | miscele infeous. |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Operation of cars-Continued. |  |  |  |  |  |  |  |  |  |
|  |  | Wages of motormen. | Wages of othercar service employees | Wages of car house employees. | Car service supplies. |  | Cleaning and sunding track. | $\begin{gathered} \text { Removal of } \\ \text { snow andl } \\ \text { ice. } \end{gathered}$ | Total. | Salarles of general offcers. | Salartes of clerks. |
| 1 | United States. | 821,602, 872 | \$2, 595, 652 | 83,214, 605 | 31,905,155 | \$1, 994, 599 | \$730, 981 | \$750, 959 | \$25, 812, 009 | \$2, 908, 123 | \$2,237,723 |
| 2 | Alabama | 112,689 | 7,439 | 32,738 | 8,268 | 8,203 | 5,071 |  | 124, 105 | 24,701 | 8,922 |
| 3 | Arkansas. | 44,175 | 1,188 | 14,687 | 1,700 | 982 | 639 | 8 | 38,555 | 9,090 | 5,502 |
| 4 | California | 1,187,715 | 103, 147 | 81,333 | 66,925 | 30,820 | 36,585 | 601 | 609, 016 | 105,628 | 94, 917 |
| 5 | Colorado | 231,261 | 3,888 | 16,624 | 12,332 | 15,079 | 9,672 | 1,798 | 208, 680 | 38,813 | 30, 180 |
| 6 | Connectient. | 442, 425 | 32,096 | 57,614 | 10,067 | 29,186 | 28,604 | 34,925 | 410,887 | 127, 90.4 | 44,372 |
| 7 | Delaware......................... | 60,080 | 4,934 | 3,473 | 1,450 | 882 | 861 | 1,431 | 94, 178 | 6,400 | 5,181 |
| 8 | Florida | 37,851 | 1,656 | 11,081 | 2,418 | 1,332 | 2,430 |  | 62, 139 | 18,308 | 11,752 |
| 9 | Georgia. | 170,243 | 17,304 | 24,102 | 5,320 | 8,549 | 6,671 |  | 218, 135 | 46,222 | 22,677 |
| 10 | minois. | 2,094,870 | 302,081 | 353, 302 | 147,441 | 263,683 | 102,580 | 27, 271 | 2,819,250 | 237, 095 | 104,765 |
| 11 | Indiana .......................... | 364, 174 | 9,725 | 56,123 | 21,357 | 18,884 | 13,572 | 4,210 | 408, 474 | 98,060 | 40, 18.1 |
| 12 | Iowa............................ | 230,912 | 16,505 | 45,349 | 12,502 | 9,673 | 3,284 | 4,681 | 259,80.4 | 47,738 | 21,740 |
| 13 | Kansas | 53,381 | 2,843 | 4,413 | 5,324 | 1,686 | 2,062 | 678 | 60, 058 | 16,500 | 3,630 |
| 14 | Kentucky | 288, 499 | 28, 914 | 23, 244 | 72,591 | 74,510 | 7,352 | 1,290 | 318, 510 | 41, 832 | 15,914 |
| 15 | Luaidiana | 351,266 | 18,886 | 63,990 | 9,569 | 20,017 | 11, 459 |  | 221,128 | 53, 607 | - 23, 927 |
| 16 | Maine. | 142, 185 | 10,593 | 16,968 | 4,463 | 27,594 | 2,290 | 13,460 | 107,793 | 22, 098 | 20,896 |
| 17 | Maryland ....................... | 416, 104 | 17,980 | 32,000 | 31,231 | 13,845 | 3,679 | 8,669 | 122,437 | 40, 000 | 61, 65.4 |
| 18 | Massachusetts ................... | 2,711,885 | 372, 823 | 419,198 | 55,799 | 289,900 | 95,241 | 197, 523 | 2, 483,327 | 266, 085 | 248, 165 |
| 19 | Michigan. | 631,592 | 68,553 | 117,433 | 41,790 | 45,196 | 10,418 | - 13,151 | 657,609 | 125, 835 | 78, 290 |
| 20 | Minnesota. | 294,234 | 29,231 | 75,107 | 26,870 | 21,401 | 12,915 | 4,118 | 327,060 | 48,234 | 36,996 |
| 21 | Miskissipri. | 17,351 |  | 3,727 | 1,185 | 768 | 1,120 |  | 40,302 | 12, 050 | 4,640 |
| 22 | Missouri | 1,100,274 | 61,838 | 183, 694 | 60,425 | 71,066 | 13,461 | 2,909 | 1,170,639 | 136, 140 | 85,021 |
| 23 | Montana | 51,886 | 150 | 5,980 | 15,456 | 2,263 | 5,342 | 669 | 76,788 | 11,150 | 7,175 |
| 24 | Nebraska. | 119,695 | 11,597 | 5, 134 | 4,955 | 168 | 527 | 1,402 ${ }^{\prime}$ | 83, 372 | 17,007 | 7,728 |
| 25 | New Hampshire. | 67,630 | 3,645 | 7,197 | 2,736 | 963 | 180 | 5,382 | 95, 209 | 9,088 | 4, 078 |
| 26 | New Jerser ........................ | 733,769 | 108,906 | 95,787 | 69,409 | 48,562 | 12,760 | 10,762 | 804, 65 LI | 107,030 | 64, 8.24 |
| 27 | New York | 5,796,023 | 1,001,318 | 619,944 | 873,777 | 556,546 | 72, 320 | 250, 285 | 0, 032, 892 | 428,451 | [80, 651 |
| 28 | North Carolina. | 29,762 | 6,619 | 3,023 | 4,396 | 600 | 1,004 | 400 | 57,135 | 14,276 | 7, 129 |
| 29 | Ohio. | 1,761,552 | 136, 863 | 281, 003 | 82,773 | 87,762 | 71, 911 | 12, 713 | 1, 558,649 | 260,607 | 150,200 |
| 30 | Oregon | 126,626 | 7,456 | 9,383 | 6,991 | 1,695 | 4,0.45 | 987 | 87, 688 | 20,789 | 14, 14,10 |
| 31 | Pernsslvania ................... | 3,080,059 | 76,240 | 200,284 | 145, 278 | 97,860 | 103, 546 | 120, 614 |  |  |  |
| 32 | Rhode Istand. | 300,305 | 21,438 | 68,672 | 22,770 | 11,450 | 16,027 | 120,618 18,518 | 2, 306, 309 | 223,289 25,777 | 20,163 15,350 |
| 33 | south Carolina | 38,277 | 4,956 | 11,154 | 2,722 | 20,903 | 2,365 | 10, 28 | $\begin{array}{r}\text { 306, } \\ 68,410 \\ \hline\end{array}$ | 20,767 | 15,166 4,609 |
| 34 | Tennessee. | 176,851 | 6, 223 | 11,954 | 13,340 | 6,288 | 2, 4604 4 | 1.87 | 68,410 237,784 | 17,260 32,075 | 4,669 14,673 |
| 35 | Texas ........................... | 182,270 | 10,047 | 18,744 | 6,604 |  |  |  |  |  |  |
| 36 | Vtah. | 75,059 |  | 5,705 | 2,129 | $\begin{array}{r}\text { 4, } \\ 4 \\ \hline\end{array}$ | 7,249 1,907 | 38 802 | 218,290 | 56, 623 | 15, 014 |
| 37 | Vermont | 31,109 | 5,0.19 | 6,106 | 1,812 |  |  | 802 | 38,204 | 9,900 | 2, 440 |
| 3 | Virginia | 114,320 | 16,749 | 15,594 | 15,184 | 2,108 22,739 |  | 2,284 | 22,201 | 6,046 | 1,967 |
|  |  |  |  |  |  | 22, 80 | 1,900 | 810 | 204, 051 | 42,152 | 15, 070 |
| 39 | Washington...................... | 222,087 | 10,368 | 24,308 | 3,484 |  |  |  |  |  |  |
| 40 | West Virginia .................... | 118,573 | 4,037 | 7,034 | 3,404 4,011 | 15,849 23,790 | 2,429 | 4,800 | 311,290 | 60,775 | 85,095 |
| 41 | Wisconsin | 310,462 | 4,437 | - 4.174. | 11,600 | 23,790 <br> 7892 | 2,422 | 1,520 | 106,707 | 26,284 | 18, 178 |
| 42 | All other states and territories... | 2290,185 | $4,4,7$ 47,928 | 45,474 45,365 | 11,600 10,756 | 27,492 33,300 | 10,517 10,765 | 2, 681 | 307,023 | 68, 591. | 25,847 |
|  |  |  |  |  | 10,700 | 33,300 | 10,765 | 795 | 281, 910 | E52,247 | 37,250 |
| 43 | Hrwaii and Porto Rico.. | 58,257 | 1,420 | 3,887 | 2,079 | 826 | 4,819 |  | 95,866 | 8,059 | 14, 098 |

EXPENSES, BY STATES AND TERRITORIES: 1902-Continued.

| 1 mrscrianneous-continued. |  |  |  |  |  |  |  |  |  |  |  | Wages, supplies, and expenses incidental to electrieseryice not elsewhere included. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Printing and stationery. | Miscellaneous office expenses. | Storeroom expenses. | Stable expenses. | Advertising and attractions. | Miscellaneous general expenses. | Damages. | Legal ex-pensesinconnection with damages. | Other legal expenses. | Rent of lend and buildings. | Rent of track and termínals. | Insurance. |  |  |
| \$496, 381 | \$666, 997 | \$229,237 | \$1,430,000 | \$1,122, 816 | \$2, 061, 821 | \$7, 529, 946 | \$1, 865, 599 | \$1, 017,854 | \$608, 344 | 81, 471,293 | \$2,080, 875 | \$2, 188, 753 | 1 |
| 3,896 | 4,850 | 3,040 | 6,832 | 11,078 | 10,966 | 31, 054 | 6,260 | 1,100 | 3,473 | 355 | 7,572 | 158, 650 | 2 |
| 620 | 510 | 617 | 3,838 | 669 | 5,636 | 2,976 | 387 | 593 | 202 |  | 3,006 | 1,555 | 3 |
| 12,053 | 25,143 | 21,763 | 32,956 | 35,547 | 26,578 | 180,769 | 52,707 | 14,045 | 2,100 | 3,299 | 51,481 |  | 4 |
| 3,682 | 5,394 | 5,645 | 3,419 | 32,969 | 20,952 | 36,340 | 8, 557 | 5,102 | 5,240 |  | 12,388 | 4, 270 | 5 |
| 7,615 | 10,139 | 2,922 | 9,235 | 47,336 | 28,454 | 46,850 | 8,989 | 30,327 | 4,002 | 5,283 | 46,453 | 182,344 | 6 |
| 1,616 | 1,137 | 150 | 888 | 12,412 | 3,868 | 16,772 | 3,700 | 253 | 99 | 34,035 | 7,672 |  | 7 |
| 1,350 | 1,867 | 684 | 1,012 | 8,025 | 8,499 | 3,514 | 1,680 | 1,682 |  |  | 3,670 | 62,524 | 8 |
| 6,128 | 2,751 | 1,957 | 3,597 | 28, 297 | 9,548 | 62, 080 | 5,660 | 7,356 | 4,567 | 3,495 | 13,820 | 284, 698 | 9 |
| 28,933 | 45,934 | 23,435 | 95,424 | 28,645 | 226,542 | 913,117 | 275,468 | 173,202 | 55, 228 | 463, 528 | 87,043 | 52, 768 | 10 |
| 8,913 | 11,184 | 9,624 | 7,716 | 31, 887 | 51,018 | 50, 839 | 13,283 | 14,962 | 8,668 | 31,606 | 20,585 | 99,404 | 11 |
| 7,765 | 4,952 | 3,081 | 5,750 | 40,183 | 35,388 | 38,498 | 8,821 | 9,495 | 6, 925 | 6,005 | 20,469 | 78,372 | 12 |
| 1,593 | 340 |  | 4,511 | 3,454 | 2,490 | 7,340 | 5,269 | 590 | 858 | 100 | 3,288 | 6,279 | 13 |
| 8,888 | 9,041 | 20,036 | 4,088 | 14, 344 | 84, 324 | 60,759 | 9,691 | 18,507 | 3, 355 | 6,600 | 18,181 | 27,771 | 14 |
| 4,467 | 5,627 | 8,846 | 13,882 | 13,109 | 26,096 | 38, 270 | 200 | 13,137 | 931 | 820 | 25,309 | 3,797 | 15 |
| 4,642 | 4,015 |  | 4,776 | 45,180 | 32,128 | 25, 629 | 1,376 | 880 | 8, 662 | 5,596 | 21,065 | 49,228 | 10 |
| 11,096 | 8,006 | 110 | 14,694 | 2,216 | 45,401 | 164, 913 | 11,344 | 5,499 | 451 | 200 | 55,9:14 | 6,907 | 17 |
| 111,795 | 71,325 | 10,882 | 34, 459 | 92, 324 | 203,360 | 664, 662 | 195, 160 | 63, 609 | 139, 111 | 366,935 | 474,699 | 42,763 | 18 |
| 21, 597 | 29,188 | 6,258 | 3, 828 | 56, 52. | 92,871 | 121,088 | 10,738 | 27, 590 | 16,920 | 17,663 | 41, 857 | 11, 764 | 19 |
| 6, 429 | 4,971 | 10,188 | 4,644 | 6,195 | 56,710 | 106,669 | 18,227 | 8,760 | 4,265 |  | 20,682 | 29,797 | 20 |
| 1,187 | 2,014 |  | 1,181 | 2,567 | 3,461 | 12, 509 | 2,615 | 1,447 | 2,023 |  | 2,759 | S, 600 | 21 |
| 16,517 | 12,829 | 14,786 | 24, 704 | 50,227 | 97,304 | 568,369 | 51,415 | 37,218 | 5,454 | 7,617 | 72,038 | 26,379 | 22 |
| 413 | 1,286 | 25 | 120 | 89, 150 | 6,707 | 3,456 | 100 | 2,500 | 2,442 |  | 2,214 | 21,740 | 23 |
| 4,587 | 461 |  | 1,205 |  | 9,109 | 30,040 | 2,500 | 2,400 |  |  | 8,335 |  | 24 |
| 4,456 | 6,92s | 128 | 3,637 | 16,288 | 8,527 | 12,113 | 2,588 | 419 | 7,665 | 36 | 18,448 | 2,487 | 25 |
| 88,385 | 19,379 | 12,650 | 22,585 | 15,660 | 23, 378 | 318,119 | 45, 352 | 39,849 | 1.2, 958 | 30,488 | 58,988 | 11, 479 | 26 |
| 54, 275 | 137,944 | 37,015 | 1, 008, 873 | 111, 378 | 825, 300 | 2,173,259 | 881, 019 | 232,655 | 120,749 | 205, 035 | 426,388 | 181,692 | 27 |
| 1,7.42 | 2,935 | 560 | 510 | 13,133 | 2,809 | 5,059 | 949 | 2,472 | 400 | 687 | 4, 180 | 49,721 | 28 |
| 36, 343 | ${ }^{\circ} 36,743$ | 15,785 | 24, 334 | 68, 975 | 201, 350 | 340,695 | 102,110 | 65,468 | 50, 946 | 02,899 | 108,104 | 100,801 | 29 |
| 4,089 | Б, 023 |  | 2,888 | 2,810 | 5, 571 | 10,381 | 3,840 | 5,201 | 1,810 | 5,078 | 5,759 | 8, 027 | 30 |
| 48,738 | 146,883 | 3,274 | 41, 238 | 191,976 | 248,862 | 894, 338 | 115,915 | 128,745 | 23, 555 | 156,225 | 264,404 | 2,359 | 31 |
| 122 | 4,867 |  | 532 | 788 | 12,200 | 165, 357 | 450 | 21, 313 | 32, 955 | ........... | 26,597 | .............. | 32 |
| 632 | 2,584 | 1,718 | 1,872 | 11,122 | 9,228 | 12,478 | 1,020 | 399 | 642 |  | 4,852 | 79, 977 | 33 |
| 4,716 | 3,180 | 1,788 | 6,681 | 4,010 | 18,840 | [8,203 | 10,165 | 12,421 | 60, 501 |  | 10,672 | 45,478 | $34^{\circ}$ |
| 5,541 | 5, 770 | 1,585 | 8,724 | 14, 927 | 12,452 | 62,481 | 13,260 | 7,248 | 3,350 | 1,111 | 9,304 |  | 35 |
| 2,689 | 1,455 |  | 1,680 | 981 | 3,326 | 7,454 | 3,121 | 1,000 |  |  | 4,208 |  | 36 |
| 533 | 440 |  | 2,704 | 3,629 | 3,275 | 387 | 100 | 445 | 740 |  | 1,923 |  | 87 |
| 4,717 | 7,363 | 2,948 | 525 | 24,531 | 17,577 | 28,676 | 4,380 | 17,004 | 5,672 | 16,647 | 22,083 | 49, 89.4 | 38 |
| 1,859 | 9,352 | 3,275 | 268 | 32,957 | 25, 665 | 89,989 | 15, 062 | 18,410 | 5,815 | 1,389 | 21,479 | 152,396 | 39 |
| 930 | 1,62s |  | 450 | 1,715 | 14, 482 | 28,004 | 1,060 | 6, 294 | 1,342 |  | 11,350 | 72, 643 | 40 |
| 5,758 | 5,735 | 5,158 | 9,132 | 6,359 | 19,330 | 99,605 | 9,933 | 14,826 | 2,338 | ........... | 49, 411 | 277, 641 | 41 |
| 5,233 | 5,873 | 4, 854 | 8,713 | 9,904 | 22,334 | 82,979 | 5,127 | 18,455 | 1,924 | 7,666 | 19,845 |  | 42 |
| 1,861 | 344 | 903 | 54, 142 | 3,018 | 3,225 | 1,570 | 1,453 | 1, 988 | 624 |  | 3,186 | 20,384 | 43 |

Table 50 shows, for all companies, the percentage which each subdivision of operating expenses bears to the total operating expenses.

Tabrs 50.-Percentage distribution of operatiang expenses of operating companies: 1908.

| itma of exprssk. |  | itmam of expensin |  |
| :---: | :---: | :---: | :---: |
| Aggregate | 100.0 | Car serrice supplies. | 1.3 |
| Maintenance of ways and Track and roadway...... Eleetric, cable, ete., innes.Buildings and fixIures bunagsana mxire | $\begin{aligned} & 8.5 \\ & 0.7 \\ & 0.1 \\ & 0.7 \end{aligned}$ | ciee expenses …äuin Removal of siow anid |  |
|  |  |  | 0.5 |
|  |  |  | 1 |
| Manintenance of equipment, toal , |  |  |  |
|  |  |  | - $\begin{aligned} & 2.1 \\ & 1.6\end{aligned}$ |
| $\underset{\text { Cars }}{\text { Clectic, }}$ calije, ete, |  |  |  |
| equip ent oc itrs. | 3.70.5 |  | , |
| Misteelinueous ehtop ex- |  |  |  |
| Operation of of power piant. | 0.6 |  | 0.8 |
|  | 9.0 |  expenses. | 1.4 |
| $\underset{\substack{\text { Pute } \\ \text { Water: }}}{ }$ |  |  |  |
|  | 0.6 |  | ${ }_{0}^{1.3}$ |
| and expenses. | 2.7 |  |  |
| Hired power itit | , 3.7 | Rentoit rack andermi- |  |
| portation | $\begin{gathered} 1.8 \\ 10.9 \\ 10.9 \end{gathered}$ | Wages, suppioies and exper:service notial tee oleectin in adea |  |
| Wages of conductors. |  |  |  |
| Wices of other car serv- | 1.8 |  | 1,6 |
| Whages of car house | 2.8 |  |  |

It will be seen that almost exactly one-fifth of the total operating expenses were devoted to the maintenance of ways and equipment, while the opeation of the power plant, of which cost of fuel is the most important item, required one-sixth of the total expenditure. A considerable number of street railways hire their electric current, either from other street railways, or, more often, from electric light companies, while, in a few instances, steam power is similarly hired. The aggregate expenditure for hired power in 1902 was about one-sixth of the expenditure of all companies for power. By far the most important class of expenditures is that designated as for "operation of cars," which amounted to 43.9 per cent of the total. The wages of conductors and motormen constituted more than onethird of the entire cost of street railway operation. The item "superintendence of transportation" can not,
in the case of some railways, be accurately separated from the item "salaries of general officers and clerks," but these instances are not of sufficient importance to affect materially the totals for the country.

A considerable part of the expenditure under the head "advertising and attractions" consists of the cost of maintaining parks and other places of amusement. The revenue derived by street railway companies from such enterprises has been deducted and the item, therefore, represents only net expenditure. The most important of the miscellaneous expenses is that for damages, mostly in personal-iajury cases. No less than $\$ 7,529,946$ was paid by street railway companies for danages in 1902, while the legal expenses comected with claims and suits for damages raised the total expense to $\$ 9,395,545$, which was one-fifteenth of the total operating expenses of all street railway companies. The companies very generally complain that the public and the courts treat them unfairly in the matter of claims and suits for danages. They allege that there is too general a readiness to blame the railways for injuries which are due wholly or largely to the carelessness of the injured person, and that juries are prone to assess damages at an unreasonable figure.
The item " wages, supplies, and expenses incident to electric service" was not reported in a uniform manner by all companies. It is intended to represent the expense peculiar to the production and distribution of electric current for light and power, as distinguished from expenses of the railway business proper. Some companies which sell light and power undertake to distinguish that part of their fuel and other power plant expenses, which is attributable to the lighting and power service, from that which is properly attributable to the railway operation. Other companies do not make such a segregation, but place under the last subdivision in the account only such expenses as are connected strictly with the distribution of current for light and power, excluding those due to its generation.

Operating expenses of companies, classified according to power.-Tables 51 and 52 present for the groups of railway companies, classified according to power used, the amount and percentage, respectively, of operating expenses falling under the six main divisions. In considering these statistics, it should be remembered that the ratio of operating expenses to operating earnings differs materially in the various groups of railways.

Table 51.-OPERATING EXPENSES OF COMPANIES, CLASSIFTED ACCORDING TO POWER: 1902.1

${ }^{1}$ Exclusive of reports for 18 companies which failed to furnish this information.
Table 52.-PERCENTAGE DISTRIBUTION OF OPERATING EXPENSES OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902.

${ }^{1}$ Less than one-tenth of 1 pur cent.

Animal power railways show the lowest proportion of expenditure for maintenance of ways and structures. This is due in part to the relatively simple construction and equipment of such lines and the low degree of wear and tear on them; in part, perhaps, to the disposition to let such properties, which are becoming anachronisms, run down rather than to maintain them.

The expense for the operation of power plant is naturally greater among electric railways which have commercial lighting plants than among those which do not, since the cost of producing current constitutes a greater proportion of the total operating expense in the lighting business than in the railway business. The large proportion of the expenditure of elevated railroads for operation of "power plant" is partly explained by the fact that the Manhattan Elevated Railway was largely operated by steampower during the census year, the fuel consumption of the locomotives being far greater proportionately than that of powerhouse engines. The company has since changed its motive power, and the report of the company for the year following that of the census inquiry shows a remarkable decrease in operating expenses per car mile
and in the ratio of expenses to earnings. Animal power railways present no item for power plant expenses, the stable expenses being included under the "miscellaneous" group, which is thus made relatively very much greater for such railways than for other classes.

The statistics of the three ordinary cable railways in San Francisco present a decidedly different distribution of expenses from that of the inclined planes which are combined with them in the foregoing tables. For the ordinary cable railways the proportions of the various classes of expense to the total operating expenses were: Maintenance of ways and structures, 11.25 per cent; maintenance of equipment, 11.15 per cent; operation of power plant, 13.13 per cent; operation of cars, 54.94 per cent; and miscellaneous expenses, 9.53 per cent.

Operating expenses of companies, alassified acconding to population.-Tables 53 and 54 show the amount and percentage of the six main classes of operating expenses for all railway companies in the various urban and interurban groups. Similar statistics for full-time electric surface railway companies not furnishing commercial lighting are presented in Tables 55 and 56.

Table 53.-OPERATING EXPENSES OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902, ${ }^{1}$

${ }^{1}$ Exclusive of reports for 18 companies which failed to furnish this information.
Table 54.-PERCENTAGE DISTRIBUTION OF OPERATING EXPENSES OF GOMPANIES, GLASSIFIED ACCORDING TO .POPULATION: 1902.

|  | Total. | Urban centery, mopulation. - |  |  |  | interurban railways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | $\left\lvert\, \begin{gathered} 100,000 \text { but } \\ \text { under } 500,000 . \end{gathered}\right.$ | $\begin{gathered} 25,000 \text { but } \\ \text { under } 100,000 . \end{gathered}$ | Under 25,000. | Fast, long. | Other. |
| Operating expenses, total. | 100.0 | 100, 0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
|  | 8.5 11.7 | 7.6 12.8 | re. 10.6 | 10.1 | 8.8 9.9 | 8.9 12.4 | 11.3 |
| Operation of power plant ........................................ | 16.2 | 14.3 | 14.2 | 16.2 | 24.5 | 22.0 | 20.2 |
| Operation of cars.. | 43.9 | 46.2 | 47.9 | 40.9 | 33.9 | 34.0 | 89.6 |
| Miscellaneous..... | 18.2 | 19.1 | 17.1 | 17.4 | 16.0 | 20.5 | 17.1 |
| Wages, supplies, and expenses incidental to electric service, not elsewhere included. | 1.5 |  | 1.0 | 5.1 | 6.9 | 2.2 | 2.6 |

Table 55.-OPERATING EXPENSES OF FULL-TIME ELEGTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902. ${ }^{1}$

|  | Total, | urban centers, population. |  |  |  | intertrban railways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | $\begin{gathered} 100,000 \text { but } \\ \text { under } 500,000 . \end{gathered}$ | $\left\|\begin{array}{c} 25,000 \text { but } \\ \text { under } 100,000 . \end{array}\right\|$ | Under 25,000. | Fast, long. | Other. |
| Number of companies | ${ }^{556}$ | 47 | ${ }^{38}$ | ${ }^{666}$ | 165 | 40 | 200 |
| Operating expenses, total .............. | \$118,236,568 | \$58, 089, 686 | \$24, 684, 272 | \$9,366, 539 | \$4, 388,688 | \$4, 579,621 | \$17, 127, 912 |
| Maintenance of ways and structures | 10, 290, 505 | 4, 506, 096 | 2, 306, 248 | 1,016,903 | 487,370 | 422,570 | 1,601, 318 |
| Maintenance of equyment | $14,443,364$ $18,199,604$ | 7,686, 7018 | 2, ${ }^{2}$ 3,487, 41811 | 1, $1,519,183$ | 476,085 996,542 |  | $2,004,775$ $3,526,020$ |
| Operation of cars. | 53, 398, 930 | 26, 936,798 | 11, 963, 891 | 4,153,625 | 1,798,273 | 1, 556 , 444 | $6,989,899$ |
| Miscellaneous expenses | 21,816, 383 | 11,294, 706 | 4,307,888 | 1,657,442 | 680,388 | 957, 891 | 2,948,118 |
| Wages, supplies, and expenditures ineidental to electric service, not elsewhere included | 57,782 |  |  |  |  |  | 57,782 |

1 Exclusive of reports for 16 companies which failed to furnish this information.
Table 56.-PERGENTAGE DISTRIBUTION OF OPERATING EXPENSES OF FULL-TIME ELECTRIC SURFAGE RAILWAY COMPANIES, WITHOUT COMMERCIAL LIGHTING, OLASSIFIED ACCORDING TO POPULATION: 1902.

|  | Total. | URBAN CENTERS, population. |  |  |  | interurban railways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 600,000 and over. | $\begin{gathered} 100,000 \text { but } \\ \text { under } 500,000 \text {. } \end{gathered}$ | $\begin{gathered} 25,000 \text { but } \\ \text { under } 100,000 . \end{gathered}$ | Under 20,000. | Fast, long. | other. |
| Operating expenses, total....................................... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Maintenance of ways and structures ........................... | 8.7 | 7.8 | 9.3 | 10.9 | 10.0 | 9.2 | 9.4 |
| Maintenance of equipment................................... | 12.2 | 13.2 | 10.7 | 10.9 | 10.8 | 18.3 | 11.7 |
| Operation of power plant. | 10.4. | 13.2 46.4 | 14.0 48.5 | 16.2 44.3 | 422.7 | 22.6 <br> 34.0 | 20.6 40.8 |
| Miscellaneous...... | 18.5 | 19.4 | 17.5 | 17.7 | 15.5 | 20.9 | 17.2 |
| Wages, supplies, and expenditures incldental to electric service, not elsewhere included | (1) |  |  |  |  |  | 0.3 |

[^23]Tables 55 and 56 , applying to a more homogeneous class of railways, are more significant than Tables 53 and 54 , and the following discussion is accordingly confined to them. These tables reveal considerable differences among the population groups in the distribution of operating expenses. The expense of maintaining ways and structures is relatively least in urban centers of more than 500,000 inhabitants, as might be expected from the small proportion of trackage in such centers to the total amount of traffic. For the same reason, on the other hand, the largest cities, in which, presumably, cars see more and harder service than in small towns, show a greater proportion of expenditure for maintenance of equipment than appears in any other group except the fast, long interurban railways, on which, by reason of the high speed maintained, cars are subjected to severe wear and tear.
In the case of full-time electric surface railways without lighting plants there is a progressive increase in the proportion of expenses for the operation of power plant as we descend the scale of population of urban centers served. Other things being equal, the greater the density of traffic and the larger the scale on which the power plant is constructed, the lower will be the cost of power per unit of traffic. The fact that the proportion of expenses for power plant in the case of all classes of companies combined, is higher in the urban centers of the first group than in those of the second is due to the presence of elevated railways in the largest cities. That the expense for the operation of cars, which consists chiefly of wages, is a smaller proportion of the total in urban centers of less than 100,000 inhabitants than in larger urban centers is due chiefly to the lower rates of wages paid in the smaller towns. The higher proportion of miscellaneous expenses in urban centers of more than 500,000 inhabitants as compared with the other urban groups is chiefly attributable to the heavier damnge expenses in such cities.
Operating expenses of $1^{\prime \prime}$ selected companies in the largest cities.--Since peculiar interest attaches to the operations of street railways in large cities, Table 57 has been prepared, which shows by percentages the distribution of operating expenses in detail for a group of 17 selected companies, situated in 10 of the largest urban centers in the United States. The companies included in the table are as follows: Boston Elevated Railway Company; Cleveland Electric Railway Company; Cleveland City Railway Company; Interurban Street Railway Company and Third Avenue Railroad Company, of New York; Brooklyn Rapid Transit Company; United Railways and Electric Company, of Baltimore; St. Louis Transit Company; Union Traction Company, of Phila-
delphia; Chicago City Railway Company; Chicago Union Traction Company; International Railway Company and Crosstown Street Railway Company, of Buffalo; Cincinnati Traction Company; Luited Railroads of San Francisco; Jersey City, Hoboken and Paterson Street Railway Company; and North Jersey Street Railway Company, of Jersey City, Newark, and ricinity. The aggregate operating expenses of these 17 companies were $\$ 56,809,980$, or about two-fifths of the total for the United States.

Table 57.-Percentage distribution of operating expenses for $\quad$ ir selected electric surface railuay companies in the largest cities: 1902.


A comparison of the distribution of expenses for these companies with that for all companies reveals a number of points of difference which are significant.

## IV.

## analysis of interest and difidends.

Detailed analysis for all companies.-Table 93 shows for each street railway company the rate and amount of dividends declared during the census year upon its common or preferred stock or both, and the rate of interest on its funded debt. The table also shows the total dividends by states. The amount of interest accrued is shown by states in Tables 38 and 39. The data for the United States are summarized in Table 58 , both operating and lessor companies being included.

Table 58.-Tverest and dividends of operating and lessor compronies combined: 1902. ${ }^{1}$

| Number of companies. | 957 |
| :---: | :---: |
| Funded debt, total em | \$492, 709,139 |
| Interestaccrued on funded d | 843, 578, 961 |
| Ratio of interest to funded debt, percentage |  |
| Preferred stock, amount. | \$127, 030, 179 |
| Number of companies having preferred stock ........... | 85 |
| Number of companies declaring dividends on preferred stock. | 40 |
| Dividends declared on preferred stock. | 84, 301,284 |
| Ratio of dividends to total preferred stock |  |
| Amount of preferred stock on which dividends were de | 883, 869,055 |
| Ratio of dividend-bearing preferred stock to |  |
| Ratio of dividends to dividend-bearing preferred stock |  |
| centage........... | 1 |
| Commonstock, | \$1,187,642,781 |
| Number of companies declaring dividends on common stock |  |
| Dividends declared on common stuck | 828,737,887 |
| Ratio of dividends to total common stock, percenta |  |
| Amount of common stock on which dividends were declared. | 8560, 326, 121 |
| Ratio of dividend-bearing common stock to total common | dia |
| Ratio of dividends to dividend-bearing common stock, |  |
| centage. | 1 |
| Both classes of stock, amo | 81, $815,572,960$ |
| Total number of companies declaring dividends | 81 |
| Total dividends declared ........... | \$33, 039, 171 |
| Ratio of total dividends to total capital stock, percenta |  |
| Total amount of stock on which dividends were declared | \$644, 195, 170 |
| Ratio of dividend-bearing stock to total capital stock, per- | 9, 8 |
|  |  |
| centage | 5.1 |

1 Exclusive of 30 companies which failed to furnish this information and which iswaed $\$ 17,325,000$ bonds, $\$ 4,000,000$ yreferred stock, and $\$ 18,987,745$ common stock.
${ }_{2}$ The amount of funded debt, interest on which was charged to the income account, is not reported, but is equal to nearly the total amount.

The amount of interest accrued on funded debt and charged to the income account during the census year was $\$ 43,578,961$, which was equal to a rate of 4.5 per cent on the outstanding funded debt. An examination of the rates of interest for individual companies, stated in Table 93, shows that by far the most common rate is 5 per cent. Many of the more recent bond issues, however, and especially those of the largest companies, have been placed at 4.5 per cent, or even at 4 per cent. A large number of companies still have bonds bearing 6 per cent interest, and a few 7 per cent, most of these bonds having been issued at a comparatively early period. The average ratio of interest accrued to the total funded debt, as shown in Table 58, is slightly lower than it would have been had not a few companies in bankruptcy failed to charge interest in the income account, and had not several other companies, very recently completed, charged interest for the census year to the cost of construction rather than to income. As shown elsewhere, however, the amount of interest accrued on funded debt somewhat exceeds the amount actually paid. (See page 56.)

For all street and interurban railways the ratio of total dividends declared to total capital stock is decidedly low-only 2.6 per cent in 1902. Less than one-third of the companies declared any dividends whatever duringthe census year, and these paid dividends on a little less than one-half of the total outstanding stocks. Even of companies having preferred stock, less than half were able to pay dividends at all, and they paid on about two-thirds of the total amount of such stock for all companies. In judging the significance of these figures, however, the possibility that the companies as a whole may be overcapitalized must be borne in mind.
The dividends of operating street and interurban railway companies represent a smaller percentage of their capitalization than the dividends of lessor companies. The dividends declared by operating companies, which amounted to $\$ 15,882,110$ in 1902 , were equal to 2.1 per cent of the total stock of such companies ( $\$ 761,705,8 \pm 2$ ) and to 4.6 per cent of their stock that paid dividends ( $\$ 348,796,456$ ). For lessor companies the dividends average 3.2 per cent of the total capital stock ( $\$ 530,929,373$ ) and 5.8 per cent of the dividendbearing stock ( $\$ 295,398,8 i 2$ ). This difference between operating and lessor companies is due to the fact that a considerable part of the most profitable railway trackage, lying in large cities, is held under lease, and that the rentals, which constitute the dividends of the lessor companies, are usually, and maturally enough, fixed so as to absorb nearly the full earning capacity of the leased system at the time when it is taken over by the operating company. When, therefore, as often happens, the operating company has little or no property except what it leases, the additional securities which it may issue must rest chiefly on the anticipation of future increase in earnings, and as a large proportion of the street railway leases have been effected very recently, comparatively little net profit is left at present in such cases for the operating companies.

Interest and dividends of companies, classizied according to population.-Table 59 shows in condensed form the interest accrued and dividends declared by street and interurban railway companies in the various urban and interurban groups. The statistics are for both operating and lessor companies considered as one system.

TABLE 59.-INTEREST AND DIVIDENDS OF OPERATING AND LESSOR COMPANIES, CIAASSIFIED ACCORDING TO POPULATION: 1902. ${ }^{1}$

|  | Total. | urban centers, popllation. |  |  |  | interurban | Railways. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{aligned} & 500,000 \text { and } \\ & \text { over. } \end{aligned}$ | $\begin{aligned} & 100,000 \text { but } \\ & \text { under } 500,000 . \end{aligned}$ | 25,000 but under 100,000 | Under 25,000. | Fast, long. | Other. |
| Number of companies. | 957 | 138 | 56 | 99 | 314 | 60 | 290 |
| Interest accrued......... ${ }_{\text {Ratio }}$ of interest to funded debt, | - $43,578,961$ | \$21,460,962 | \$8, 366, 503 | \$3, 598,997 | \$1,732, 829 | \$2, 598,438 | \$5, 821,284 |
| Number of companies having preferred stock | $\stackrel{4}{45}$ |  |  |  | 4.5 |  | 4. 3 |
| Number of companies declaring dividends on preferred stock.. | 40 | 7 | 7 | 9 | 16 | 11 | 21 |
| Number of enmpanies declaring dividends on common stotk. | 258 | 80 | 27 | 37 | 37 | 8 | 69 |
| Total number of companies deelaring dividends . . . . . . . . . . . . . | 286 |  | 31 | 45 | 40 | 14 | 74 |
| Total dividends deelared..................... | \$33,039, 171 | \$20, 958, 959 | \$7, 344, 007 | \$1,650, 123 | \$311,575 | \$315,224 | \$2, 459, 288 |
| Ratio of dividends to chpital stock, percentage....... | \$644, 195, 2.6 | \$370, 768, 3110 | \$168, $513,3.1$ | \$1, $835,137.510$ |  | $\begin{array}{r}\text { \% } \\ \hline 9.401,975 \\ 0.4 \\ \hline\end{array}$ | 2, $853,842,531$ |
| Ratio of dividend bearing stock to total stock, percentag | \$644, 195, 17.6. | \$870, 768,710 54.9 | \$168, 513, 24.4 | $\$ 35,137,910$ 32.6 | $86,636,410$ 13.4 | \$9,401,975 12.0 | $\$ 53,842,531$ 86.9 |
| Ratio of dividends to divideld-bearing stock, percentage | 5.1 | ธ. 7 | 4.4 | 4.7 | 4.8 | 3.4 | 4.6 |

${ }^{1}$ Exclusive of reports for 30 companies which failed to furnish this information.

The rate of interest is highest in urban centers of from 100,000 to 500,000 population, and does not differ materially among the other three urban groups. The fact that the average rate of interest on funded debt of interurban railways of both classes is lower than on urban railways is due in part to the modern origin of interurban companies, most of them having been organized since the fall in the prevailing rate of interest on securities generally. But it is also due in part to the fact that several new companies in this group charged interest during the census year to cost of construction and equipment.

As might be expected, street railways in cities of more than 100,000 population declared dividends on a much larger proportion of their stock, and showed a higher ratio of dividends to total capital stock, than those in smaller cities or than interurban lines. The average ratio of dividends to total capital stock was 3.1 per cent in each of the first two groups; but as a larger proportion of stock declared dividends in urban centers of the second group than in those of the first, the average rate of dividends on stock that bore dividends was lower in the second group of cities.

In none of the other four groups did the ratio of dividends to total capital stock rise even to 2 per cent, and in none of them, except the "other" interurban group, did more than one-third of the capital stock bear dividends. The ratio of dividends to the capital stock that bore dividends was lowest in the case of the fast, long interurban lines, and highest in the case of companies in urban centers of the first group. The differenees in these ratios may not, and probably do not, correctly represent the differences in actual profitableness of the several classes of railways, since the street railway companies in smaller towns and the interurban railways are probably somewhat more conservatively capitalized than those in the largest urban centers. In the case of many of the newer companies the absence of dividends is due to their policy of putting surplus earnings into improvements and extensions. It is true, however, beyond question, that in the smaller towns and rural districts a large number of railways have been established which must look to the future for any possible dividends on their stock.
Dividends of leading individual companies.-An examination of the statistics of dividends for individual comprnies in Table 93 reveals the widest differences even among railways operating under roughly similar conditions of traffic. These differences are partly due to the variations in the absolute earning capacity of the companies, but they are also partly due to other factors, such as the varying proportion of total capital represented by funded debt, the varying proportion of the income of operating companies going as rental to lessor companies, and the varying proportion between capitalization and actual cash investment. Many companies in the large cities, and even some of the most impor-
tant ones, declare no dividends, but usually an explitnation of that fact may be found in some of the circumstances just mentioned. Thus the Cuited Railways and Electric Company of Baltimore, Md.. which paid no dividends in 1902, has a funded debt of three and one-third times the amount of its stock. The Brooklyn Rapid Transit Company, of New York, which paid no dividends, not only has a funded debt considerably greater than its stock, but, in addition, paid 10 per cent from its earnings on $\$ 12,000,000$ of the stock of a lessor company, a fact which is significant because, as previously suggested, the capitalization of an operating company which holds most of its trackage under lease is often based chiefly on expectation of future earnings. Indeed in several instances-e. g., the Interurban Street Railway Company of New York, and the Pittsburg Railways Company, of Pittsburg, Pa.-the operating companies have a very small amount of capital stock as compared with the lessor companies which they control. Among other important companies which declared no dividends in 1902 may be mentioned the Third Avenue Railroad Company, of New York, which has a funded debt nearly three times as great as its stock; the Chicago Union Traction Company, of Chicago, Ill, and the Union Traction Company, of Philadelphia, Pa., both of which have exceedingly heary rental payments; and the leading operating companies in St. Louis, Mo., Milwaukee. Wis., and Indianapolis, Ind., which also have heary fixed charges.

Of the $\$ 15,882,110$ of dividends declared by all operating companies, $\$ 11,667,226$, or 73.5 per cent, was paid by 22 large companies, each of which declared dividends of $\$ 200,000$ or more. The rates of diridends of these 22 companies were as follows: The United Railroads of San Francisco, Cal., declared 2.25 per cent on its one class of stock. The Capital Traction Company, of Washington, D. C., the South Side Elerated Railway Company, of Chicago, Ill., the Detroit United Railways Company, of Detroit, Mich., the Louisrille Railway Company, of Louisville, Ky., the Twin City Rapid Transit Company, of St. Paul and Minneapolis, Minn., the Manhattan Railway Company, of New York citr, the Omaha Street Railway Company, of Omaha, Nebr., and the Cleveland Electric Railway Company, of Cleveland, Ohio, each' declared dividends of 4 per cent on its common stock. 'Of these companies, the Twin City Rapid Transit Company and the Louisville Railway Company also reported preferred stock, the former declaring a dividend of 7 per cent and the latter 5 per cent on such stock. The Wilkesbarre and Wyoming Valley Railway Company, of Wilkesbarre, Pa., declared 4.25 per cent, and the International Railway Company, of Buffalo, N. Y., 4.8 per cent on the single class of stock issued. The rate of dividends was 5 per cent in the case of the Old Colony Railway Company, of eastern Massachusetts, the Metropolitan Street Railway Company, of Kansas City, Mo., the United Traction Company, of Albany
and Troy, N. Y., and the Cleveland City Railway Company, of Cleveland, Ohio, none of which reported preferred stock. The Boston and Northern Street Railway Company, of eastern Massachusetts, and the Boston Elevated Railway Company, of Boston, each declared 6 per cent; the Union Street Railway Company, of Providence, R. 1., 8 per cent; the Chicago City Railway Company, of Chicago, 9 per cent; and the Coney Island and Brooklyn Railroad Company, 16 per cent, all of these companies having a single class of stock only. The Metropolitan West Side Elevated Railway Company, of Chicago, declared 3 per cent, and the Milwaukee Electric Railway and Light Company, of Milwaukee, 6 per cent on their preferred stock, but paid nothing on their common stock.

Dividends, by states.-An examination of the statistics in Table 93 will show wide differences in the ratio of dividends to capital stock among the states. One of the conspicuous features of the table is the relatively high average rate paid by Massachusetts companies, as compared with those in other leading states. The dividends on common stock in Massachusetts averaged 5 per cent for operating and lessor companies together, and while only 27 out of 75 operating companies declared dividends, these comprised most of the large companies. The one company in this state which had preferred stock, a lessor company, declared an 8 per cent dividend. In New York state, on the other hand, only 9 of the 96 operating companies declared dividends on common stock, and the average rate on the common stocks of operating and lessor companies combined was only 2.5 per cent. The amount of preferred stock in the state was small and the average rate of dividends on such stock very low. In Pennsylvania only 18 of
the 98 operating companies declared dividends on their common stock; and the average rate of dividends for operating and lessor companies was 3.8 per cent on common stock and 4.8 per cent on preferred stock, which was about one-tenth as much in amount as the common. In nine states and territorics, most important among which are Indiana and Tennessee, no companies declared dividends on common stock. The only states in which the average rate of dividends on common stock exceeded 2 per cent are Colorado, District of Columbia, Florida, Illinois, Kentucky, Massachusetts, Minnesota, Nebraska, New York, Ohio, Pennsylvania, and Rhode Island.

## V.

## GGNERAL RESULTS OF OPERATION.

In many respects the most interesting information relating to the street railway industry is that which shows the relation of traffic, receipts, and expenditures. Statistics of this character may be regarded as presenting the general results of street railway operation.

General results of operation of companies, classified according to power.-Table 60 presents, for all street railways of the United States and for groups of companies classified according to the power used, the percentage which operating expenses bear to operating earnings, or "operating ratio;" the amount of operating earnings per mile of track and per car mile, respectively; the total operating expenses per car mile, together with the expenses per car mile for power plant and for operation of cars; the amount of operating expenses per fare passenger; the amount of passenger earnings per fare passenger; and the net earnings per mile of track.

Table 60.-GENERAL RESULTS OF OPERATION, ALL COMPANIES, GLASSIFIED ACCORDING TO POWER: 1902. ${ }^{1}$

|  | Total. | FLECTRIC, SURFACR. |  |  | Animal | Steam and electric elevated. | Cable, surface, and inclined planes. | Stenm, surface. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Withont commer- cial light- ing. | With commer. cial lighting. | Part time only. |  |  |  |  |
| Number of companies . . . . . . . . . | 799 | 556 | 112 | 57 | 52 | 5 | 14 | 3 |
| Ratio of operating expenses to earnings, percentage | 57.49 | 57.94 | 58, 11 | 58.14 | 73.02 | 49.71 | 53.97 | 122.65 |
| Operating earnings per mile of track constructed | \$11,152 | \$11,045 | 88,978 | \$2,978 | 89,454 | \$71,889 | \$80,987 | \$1,314 |
| Operating earnings per car mile............................................. | 0.2187 | 0.2168 | 0.2597 | 0.1901 | 0.2603 | 0.1960 | 0.9258 | 0.1464 |
| Operating expenses per car mile, total.......................................... | 0.1257 | 0.1256 | 0.1509 | 0.1105 | 0.1901 | 0.0975 | 0.1758 | 0.1795 |
| Power piant....... | 0.0204 | 0.0193 | 0.0293 | 0.0250 |  | 0.0232 | 0.0846 | 0.0224 |
| Operation of cars................... | 0.0552 | 0.0567 | 0.0478 | 0.0410 | 0.0764 | 0.0448 | 0.0845 | 0. 0552 |
| Operating expenses per fare passenger. | 0.0301 | 0.0294 | 0.0420 | 0.0381 | 0.0821 | 0.0259 | 0.0285 | 0.1144 |
| Passenger earnings per fare passenger. | 0.0494 | 0.0498 | 0.0498 | 0.0621 | 0.0432 | 0.0508 | 0.0488 | 0.0458 |
| Net earnings per mile of track.................................................. | 4,741 | 4,646 | 3, 761 | 1,247 | 2,550 | 36,151 | 14,241 | - 2998 |

${ }^{1}$ Exclusive of reports for 18 companies which failed to furnish this information.
${ }^{2}$ Deffit.

Attention should be called at the outset to the fact that several of the items in this table for electric railway companies operating commercial lighting plants can not properly be compared with similar items in the other columns, since the total operating expenses and earnings, including those for the lighting business, enter into the computation. A fairly correct idea of the earnings of such companies from the railway busi-
ness alone may be obtained from the income account by omitting therefrom the income from the sale of current for light and power, although the resulting figures are not quite comparable with those of electric railway companies which do not operate commercial lighting plants, since they also derive a small incidental revenue from the sale of current. With the deduction indicated, companies with commercial lighting plants had
operating earnings of $\$ 6,358$ per mile of track and 18.39 cents per car mile. Instead, therefore, of having earnings greater per car mile than companies without commercial lighting plants, as the crude figures might imply, they really had railway earnings considerably less per car mile, as might be expected in view of the fact that most of these companies are in the smaller towns. For purposes of rough calculation and comparison it may be assumed that the operating expenses of companies having lighting plants are divided between the railway business and the lighting business in the same proportion in which the earnings are divided. On this assumption the "railway" operating expenses of such companies wonld be 10.69 cents per car mile and 2.97 cents per passenger. The expense per car mile "would thus appear somewhat less than for companies without lighting plants, and such a showing may be accounted for, at least in part, by the fact that the companies with lighting plants, operating in the small towns, have smaller cars and pay lower wages than do companies of the other group. Their operating expenses per passenger, on the other hand, are apparently somewhat greater for the companies with lighting plants.

There is, of course, no one standard by which to judge the success of railway operations. Street railway men themselves, in considering the question, are perhaps most likely to base their conclusions on the percentage which operating expenses bear to operating earningsthe operating ratio, as. it is called. Generally speaking, a low ratio of expenses to earnings is regarded as an indication of good management. This, however, is not always the case. It is quite conceivable that a company would be able to earn a higher return on its investment by increasing the amount of its traffic, through a lessening of fares or otherwise, even though the percentage of operating expenses to earnings should be slightly raised as a result. Again, a low ratio of operating expenses to earnings may mean merely that the fares are higher or the service less satisfactory than elsewhere, rather than that the company is peculiarly economical in its operating methods. Conversely, where fares are low the ratio of operating expenses to earnings may be high, while the cost of operation per aar mile or per passenger is exceptionally low. Given cars of similar size and character and given similar general conditions of operation, the truest test of the success of railway operations is in the amount of expenses per car mile operated and per passenger carried. Finally, it may be noted that a low ratio of operating expenses to operating earnings is often made possible only by heavy capital investment. Indeed, it is sometimes the case that costly improvements, which materially lessen the expenses of transportation, are not strictly profitable from the standpoint of the investor.

As appears from Table 60, the operating expenses of
all street and interurban railway companies in the census year 1902 amounted to 57.5 per cent of their operating earnings. The gross earnings, including those from sale of current and other sources, were equal to $\$ 11,152$ per mile of track, and to 21.87 cents per mile run by cars of all classes. The passenger earnings per passenger car mile, not shown in the table, averaged 21.14 cents. The average fare, obtained by dividing the passenger earnings by the number of fare passengers, was $4.9 \pm$ cents, and the total operating expenses per fare passenger-which slightly exceed the expenses properly chargeable to passenger traffic-were 3.01 cents. The average net earnings per mile of track for all companies were $\$ 4,741$. The ratio of operating expenses to operating earnings is much lower on the street and electric railways of the country as a whole than on the steam railways, which spent 64.7 per cent of their earnings for operation in the year ending June 30,1902 , and in the previous year 64.9 per cent. ${ }^{1}$ It is possible that the comparison thus made is not altogether a just one, since 41.4 per cent of their expenses was incurred by steam railways in 1902 for the maintenance of ways and structures, while street and interurban railway companies assigned to maintenance of ways and structures only 8.5 per cent of their operating expenses. ${ }^{2}$ Beyond question it costa relatively less to maintain a street railway than a steam railway, since the former has much less track to keep up in proportion to the amount of its earnings. Moreover, the speed of electric cars is less than that of steam trains, and the wear and tear, as well as the injury to property from accident, is therefore less on electric than on steam railways. Again, the roadbed and equipment of most of the electric railways are comparatively new, and they may therefore require less repair and renewal at present than will be necessary later on. ${ }^{3}$
However this may be, it is probable that, with all possible allowances for the difference in conditions and policy with respect to expenditures for maintenance, the proportion of operating expenses to earnings would still be found lower on street and electric railways than on steam railways. Such a difference might be attributable to relatively higher charges for transportation on the electric lines. On the other hand, it is to be remembered that a relatively low operating ratio might be secured at the expense of a relatively heavy capital investment. Now the amount of capital liabilities is decidedly greater in proportion to the operating earmings in the case of street railways than in the case of steam railways. In the absence, however, of definite knowledge as to the actual cash investment in either class of railways, it is impossible to

[^24]decide to what extent the lower ratio of operating expenses to earnings on electric lines may actually be due to the hearier investment of capital.
For the purpose of further considering the ratio of expenses to earnings for the different classes of railways, the averages shown in Table 60 have been supplemented by the following table, showing the number of companies which have operating ratios falling within specitied limits. In studying this table the differences in the importance of the individual companies should be borne in mind.

Table 61.-Distribution of ruiluay companies at the several groups, clasxitied according to puatr, with respect to their operuing ralio: $1+0 . \div 1$

${ }^{1}$ Exclusive of reports for 18 companies which iailed to furnish this information.
Electric surface railways without commercial lighting plants, the most important class, show an average operating ratio of 57.9 per cent. It is seen in Table 61 that 43 of the 556 companies of this class devote less than ${ }^{5} \dot{j} \rho$ per cent of their earnings to operating expenses, while on the other hand 80 such companies devote more than 90 per cent of their earnings to expenses. The largest group is that of companies that have an operating ratio of between 60 and 70 per cent, but they operate much less track than companies with a ratio of from 50 to 60 per cent.

That a considerable degree of economy is secured by combining light and power plants with railways in towns of smaller population may probably be deduced from the fact that the average operating ratio for companies having commercial lighting plants--58.1 per cent-was practieally the same as that for electric companies without such plants, in spite of the fact that the former are for the most part situated in towns of moderate size where the railway traffic is comparatively small. The operating ratio for companies with lighting plants is indeed considerably lower than that for those without such plants in cities of corresponding size, for it will be noted that much more than balf of the business of companies of this group is done in places of less than 100,000 inhabitants; and, as appears in Table 63, the operating ratio for full-time companies without lighting plants in towns of less than 25,000
inhabitants is 68.8 per cent, and in urban centers of from 25,000 to 100,000 inhabitants 61 per cent.
The lowest operating ratio, 49.7 per cent, was that of elevated railways. As only one of the five companies had an operating ratio below 50 per cent, while three reported ratios between 50 and 60 per cent, and the fifth reported a ratio between 60 and 70 per cent, the great inequality in the relative importance of the companies is quite evident.
The explanation of the low average operating ratio for elevated railways is to be found in the fact that the operating earnings per passenger were slightly higher than for electric surface railways without lighting plants, while the operating expenses per car mile were ahout 20 per cent lower. It is, however, impossible to draw from these statistics any satisfactory conclusion regard-" ing the conditions of operation on elevated railways at the present time, because a large part of the traflic of the most important company during the census year was handled by steam power, while since that time steam has been replaced by electricity. The fact that in 1902 the power plant expenses of elevated railways were 2.3 cents per car mile, as compared with only 1.9 cents for electric surface railways without lighting plants, was undoubtedly due chiefly to the higher cost of stenm traction, though it was probably also due in some measure to the larger cars and higher speed on clevated railways. On the other hand, large cars and high speed tend to reduce the expenses of running cars, particularly the important item of wages of motormen, or eugineers, and gatemen. The practice of rumning cars in trains also reduces wages of motormen or engincers per car mile, and this saving is not wholly ofliset by the expenses of maintaining ticket sellers and ticket "choppers" at the stations.
Some idea of the financial advantage of electric traction on elevated railways as compared with steam traction may be gained from a comparison of the annual reports of the Manhattan Elevated Railway Company for the two years ending September 30, 1901 and 1903, respectively. In 1901, when steam was used almost exclusively, the operating ratio was 55.4 per cent; in 1903, when electric power was almost the sole means of traction, the ratio was only 42.9 per cent. The operating expense of this company per passenger was 2.72 cents in 1901 and only 2.12 cents in 1903. The operation of 6 -car trains instead of 5 -car trains, which was made possible by electricity, contributed materially to this reduction in operating expenses.

Cable and inclined plane railways likewise show a conspicuously low operating ratio. Five of the 14 companies reported a ratio below 50 per cent, and 8 reported a ratio below 60 per cent. The 3 ordinary cable railways show an average operating ratio of 54.7 per cent. The fact that these ordinary cable railways are all in a large city and have very dense traffic makes their results more favorable than would be the case if the conditions
under which they operate were similar to those of the average electric railway. Under similar conditions of traffic electric traction is cheaper than cable traction in the matter of current expenses, to say nothing of the fact that the capital investment per mile in an overhead trolley electric railway is much less than in a cable system. In 1890, when the number of cable railways was considerably greater than at the present time, the operating expenses of such companies, as they were reported for the Eleventh Census, were 65.7 per cent of their operating earnings. The high earnings and high expenses per car mile for the inclined planes are explained by their short tracks, dense traffic, and relatively large capital investment per mile of track.
Animal power railways, as might be expected, present a much less favorable operating ratio, 73.0 per cent, than most other classes shown. Of the 52 companies of this class, 21 report operating expenses exceeding 90 per cent of operating earnings. On the other hand, 10 companies show operating ratios under 60 per cent. The explanation of the high average ratio is found partly in the fact that the average carnings per passenger are lower for animal power tailways than for those of any other class, but the explanation lies chiefly in the heavy expense of operation, which amounts to no less than 19 cents per car mile. While the group of animal power railways includes a large number of companies in small towns, where the traffic is very light, the greatei part of the earnings and expenses fall to the four companies in New York city, which have very dense traffic; and the averages for the group as a whole are therefore largely determined by the figures for these four companies. When itis remembered that the horse cars are much smaller than the electric cars, the enormons reduction in expenses which has resulted from the introduction of electricity may be appreciated by comparing the operating expenses per car mile for animal power roads with those for electric railways without lighting plants, 12.56 cents.
Effect of change to electric traction on cost of opera-tion.-Interesting conclusions might be drawn from the detailed statistics of leading railway systems, showing the reduction in operating expenses which followed the introduction of electric power. Comparable figures are, however, very difficult to obtain because of changes in the ownership of railways and because of the extension of the old lines. Consolidation of formerly independent lines very often accompanied the change of power, and where this has been the case it is not,only hard to obtain comparable statistics, but it is also impossible to distinguish economies due to change of power from those due to consolidation.
The "electrification" of the street railway lines of Philadelphia took place about 1894, much the greater part of the trackage before that time having been operated by animal power. In 1893 the operating expenses of all the lines of the city; $\$ 5,322,734$, were
68.1 per cent of the operating earnings. In 1895 the ratio fell to 59.7 per cent; in 1896 to 52.5 per cent; and in 1898 to $41^{\prime}$ per cent. In the last-named year the expenses were only $\$ 4,608,163$, or more than 10 per cent less than in 1893, while earning's had increased one-third. Combination also contributed to the economy in Philadelphia. ${ }^{1}$
Another example of the economy of electric traction may be taken from the West End Street Railway Company of Boston, now controlled by the Boston Elevated Railway Company. In the year ending September 30, 1889, this company was just beginning to install electric traction. Its earnings were $\$ 5,204,512$; its operating expenses, exclusive of taxes and rentals, $\$ 4,098,533$, the operating ratio being 78.7 per cent. The conversion to electric traction bad largely been accomplished by the end of $189 t$, nearly three-fourths of the track being then operated exclusively by electricity. For that year the operating earnings were $\$ 6,823,879$; the expenses $\$ 4,805,605$; the operating ratio 70.4 per cent. The marked increase in traffic indicated by the figures of earaings was in considerable measure attributable to improvement in the service, as there had been comparatively little addition to the trackage of the company. ${ }^{2}$
The Third Avenue Railroad Company of New York had precisely the same length of track (directly operated) ten years ago that it has to-day. In the year ending June 30,1892 , its main line was operated by animal power, although it had two shorter branches with cable traction. In that year the earnings were $\$ 1,741,072$; the operating expenses $\$ 1,184,804$; the operating ratio 68 per cent. The traffic was very dense, and there were probably fewer long-distance passengers in 1902. Under cable traction, which was introduced in 1894, the expenses were materially reduced in proportion to the traffic. Apparently a still further reduction has been accomplished by the recent change to electricity. It is impossible to speak with certainty, because the financial difficulties of the Third Avenue Railroad and its transfer to the Metropolitan Street Railway Company hare made satisfactory comparison of the cost of operation in recent years impracticable. According to the report of the company for the year ending June 30, 1901, the operating expenses for a greatly increased traffic were less than in 1892, and the operating ratio was only 49.6 per cent. In 1902 there were heavy expenditures for maintenance and for damages, but the operating ratio rose only to 61.3 per cent, which was still decidedly lower than the ratio under horse traction. ${ }^{3}$

General results of operation of companies classified according to population. - The results of the operations

[^25]of street railways classified according to population of urban centers served, and of the two classes of interurban railways, are summarized in Table 62, which includes the same items as were presented in the corresponding table for companies classified according to
power. More instructive is Table 63, which presents similar data for full-time electric surface railways without commercial lighting plants. The following discussion is based chiefly upon the data presented in Table 62.

Table 62.-GENERAL RESULTS OF OPERATION OF COMPANIES, CLASSIFIED ACCORDING TO POPULATION: 1902. ${ }^{1}$

${ }^{1}$ Exclusive of reports for 18 companies which failed to furnish this information.
Table 63.-GENERAL RESULTS OF OPERATION OF FULL-TIME ELEGTRIC SURFACE RAILWAY COMPANIES, WITHOUT COMMERCLAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902. ${ }^{1}$

|  | Total. | urban centers, population. |  |  |  | interurban railm ways. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | $\begin{gathered} 100,000 \\ \text { but, under } \\ 500,000 . \end{gathered}$ | $\begin{gathered} 25,000 \\ \text { but, nuder } \\ 100,000 \text {. } \end{gathered}$ | $\begin{aligned} & \text { Under } \\ & 26,000 \text {. } \end{aligned}$ | Fast, long. | Other. |
| Number of companies... | 556 | 47 | 38 | 66 | 165 | 40 | 200 |
| Ratio of operating expenses to earnings, percentage | \$11.045 | 56.45 $\$ 21.982$ | \$14.021 | 60.99 | 68,81 84.872 | 69,94 | ${ }^{65.83}$ |
| Operating earnings per car mile ................ | 0.2168 | ${ }^{0.212876}$ | \$0.2064 | 0.1865 | -1,1662 | ${ }_{0} 0.215$ | 0.2008 |
| Operating expenses per car mile, total. | 0.1256 | 0.1342 | 0.1118 | 0.1138 | 0.1144 | 0.1267 | 0.1312 |
| Power plant...... | 0.0193 | 0.0177 | 0.0157 | 0.0185 | 0.0260 | 0.0286 | 0.0270 |
| Operation of cars.............. | 0.0567 | 0. 0622 | 0.0542 | 0.0504 | 0.0469 | 0.0431 | 0.0535 |
| Operating expenses per fare passenger | 0.0294 0.0498 | 0.0276 0.0479 | 0.0274 | 0.0307 0.0485 | 0.0351 | 0.0555 <br> 0.0845 | 0.0942 0.0498 |
| Net earnings per mile of track ......... | 4,646 | 9,572 | 6,429 | 2,866 | 1,519 | 1,415 | 1, 824 |

${ }^{1}$ Exclusive of reports for 16 companies which failed to furnish this information.

The great advantage which the street railways in the large cities have over those in smaller towns is conspicuous in the above tables. The amount of earnings per mile of track for electric surface lines having no lighting plants, which in urbon centers of more than 500,000 inhabitants is $\$ 21,982$, decreases steadily with decreasing population of the centers served, an average of only $\$ 4,872$ per mile of track being shown for companies in centers of less than 25,000 inhabitants. The amount of net earnings per mile of track decreases even more sharply, being $\$ 9,572$ for electric railways without lighting plants in urban centers of the first group and only $\$ 1,519$ in centers of smallest population.

The differences among the groups in the ratio of operating expenses to operating earnings are also marked. In urban centers of more than 500,000 inhabitants railways of all classes combined spent for operation only 55.7 per cent of their operating earnings, and the electric surface railways not furnishing commercial lighting in such centers show a ratio of expenses to earnings only slightly higher. In urban centers of from

100,000 to 500,000 inhabitants the operating ratio is even lower than in the largest cities. On the other hand, in places of from 25,000 to 100,000 inhabitants the operating expenses amounted to 59.3 per cent of operating earnings for all companies combined, and to 60.99 per cent for electric surface companies without commercial lighting plants. In centers of less than 25,000 inhabitants the corresponding operating ratios are 68.1 per cent and 68.8 per cent, respectively. The fast, long interurban railways present quite favorable operating results. The other group of interurban railways on the other hand, including many railways that closely resemble the railways in the smallest towns, spent 64.8 per cent of their earnings for operation.

The differences among the various population groups as regards the ratio of operating expenses to earnings are further indicated in Tables 64 and 65 , which show for all railways, and for electric surface railways without commercial lighting plants, respectively, the number of companies falling within stated limits of operating ratios.

Table 64．－Distribution of railway companies in the several urban and interurban groups，according to their operating ratios：1908．${ }^{1}$


1 Exclusive of reports for 18 companies which failed to furnish thisinformation．
Table 65．－Distribution of full－time electric surface railway compa－ nics，without commercial lighting，in the several urban and interurban groups，according to their operating ratios：1902．${ }^{1}$

${ }^{1}$ Exclusive of reports for 16 companies which failed to furnish thisinformation．
It will be observed from Table 65 that in urban centers of more than 500,000 inhabitants only 5 out of the 47 electric surface railways without commercial lighting plants had operating ratios under 50 per cent．Four of these 5 companies，however，operate great railway sys－ tems，and the 5 companies together control an aggregate trackage of $1,289.02$ miles，which is 27.5 per cent of the total of $4,680.96$ miles reported for all electric surface railways in centers of this size．Of the 9 companies in urban centers of more than 500,000 inhabitants that show an operating ratio of from 50 to 60 per cent， 3 have more than 300 miles of track each，and 2 others operate large systems．The total trackage of the 14 companies that show operating ratios under 60 per cent is $2,641.45$ miles，or 56.4 per cent of the total trackage for centers having more than 500,000 inhabitants．On the other hand，most of the 22 electric railway compa－ nies in the largest centers that show an operating ratio over 70 per cent are small concerns in the outskirts and
suburbs．The average operating ratio for the group thus represents pretty closely the conditions for the more important street railway systems of the great centers．

In urban centers of from 100,000 to 500,000 inhabit－ ants 21 of the 38 electric surface railway companies not furnishing commercial lighting reported operating ex－ penses between 50 and 60 per cent of earnings，and 6 companies，with 630.17 miles of track out of a total of $3,251.54$ miles for the group，reported a ratio under 50 per cent．Only 5 companies in centers of this size had an operating ratio of 70 per cent or higher．This ap－ parently more favorable distribution of companies in centers of the second rank，as compared with the largest centers，is largely explained by the fact that consolida－ tion has gone so far in the second group that very few small railways，such as exist in some of the centers of the first group，now remain in operation．

In centers of from 25,000 to 100,000 inhabitants only a small proportion of the electric railway companies have an operating ratio of less than 50 per cent，while the largest group is that of companies whose expenses are between 60 and 70 per cent of their operating earnings．

Still less favorable were the conditions shown for the smallest centers，where only one－fifth of the electric railway companies reported an operating ratio under 60 per cent．The largest single group in such centers was that of companies with from 60 to 70 per cent；but more than half of the whole number of companies reported a ratio of 70 per cent or higher，and 30 out of the 165 companies spent more than 90 per cent of their earnings for operation．

The distribution of fast，long interurban railway com－ panies without commercial lighting plants shows a rather wide variation in the proportion of expenses to earnings．Twenty－three of the 40 companies have an operating ratio between 50 and 70 per cent．Of the other interurban railways，almost exactly one－half had an operating ratio of 70 per cent or higher，though the largest single group of companies reported from 60 to 70 per cent．

Relation of operating ratio to density of traffic．－ Table 66 classifies full－time electric surface railway companies without commercial lighting according to the number of fare passengers per mile of track and the ratio of operating expenses to operating receipts． The fast，long interurba⿱口⿰口口亏 railways are omitted from the table because the number of fare passengers on such railways can not properly be compared with those on other classes of electric railways．The table，how－ ever，includes those interurban railways that have been classed under the head of＂other＂in this report．

Table 66.-Disiribution of full-time electric surface railways, without commercial lighting, according to number of fare passengers carried per mile of lrack operated and according to operating ratio: $1902 .{ }^{1}$

| NUMBER OF FARE PASSENGERSCARRIED PER MILE OF TRACK OPERATED. | numbel of companies reporting operating ratio. |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Total. | Under 50 per cent. | b0 per cent butun- der 60 per cent. | 60 per cent butunder 70 per cent. | 70 per cent but under 80 per cent. | 80 per but under 90 per cent. | 90 per cent and oref. |
| Total | 514 | 35 | 109 | 147 | 84 | 62 | 7 |
| Under 25,000. | 54 | 5 | 3 | 7 | 12 | 6 | 21 |
| 25,000 but under 00,000 .. | 72 | 2 | 8 | 14 | 10 | 14 | 94 |
| 50,000 but under 100,000. | 177 | 0 | 30 | 63 | 32 | 33 | 23 |
| 100,000 but under $200,000$. | 145 | 9 | 45) | 62 | 23 | 8 | 8 |
| 200,000 but under 300,0000 | 34 | 5 | 11 | 11 | 6 |  | I |
| 300,000 but under 400,000. | 15 | 4 | 7 | 4 |  |  |  |
| 400,000 and over .......... | 17 | 4 | 5 | 6 | 1 | 1 |  |

In judging these statistics the fact that companies differ materially in importance must be borne in mind. The table shows clearly that an increase in the density of traffic per mile of track is usually accompanied by a reduction of the ratio of operating expenses to earnings. This is due chiefly to the fact that heary traffic per mile of track is usually accompanied by heavy traffic and earnings per car mile. Proceeding from the group showing the least number of passengers per mile of track to the group showing the greatestnumber, the number of companies having low operating ratios increases. Nearly two-fifths of the $5 t$ companies reporting less than 25,000 passengers per mile of track showed a ratio of expenses to earnings of 90 per cent or higher, while only 5 had an operating ratio of less than 50 per cent. On the other hand, among the 15 companies reporting between 300,000 and 400,000 passengers per mile of track, there is none with an operating ratio exceeding 70 per cent, and only 4 have a ratio of 60 per cent or more. Similarly, of the 17 companies haring more than 400,000 passengers per mile of track, 4 had an operating ratio of less than 50 per cent and 9 a ratio of less than 60 per cent, while only 2 showed a ratio of 70 per cent or higher.

Table 67 classifies full-time electric surface railways without commercial lighting plants, other than fast, long interurban lines, according to the number of passengers per car mile and the ratio of operating expenses to operating earnings.

The close comection between a high number of passengers per car mile and a low operating ratio appears clearly from this table. Of the 198 companies reporting less than 3 passengers per car mile, 88 show an operating ratio of 80 per cent or more, and only 30 had a ratio less than 60 per cent. On the other hand, of the 92 companies with from 4 to 5 passengers per car mile, only 8 present an operating ratio of 80 per cent or higher, and 35 reported a ratio under 60 per
cent. Of the 60 companies with 5 or more passengers per car mile, only 16 had an operating ratio of 70 per cent or more, while more than one-half show a ratio under 60 per cent, and one-sixth of them show a ratio less than 50 per cent.
Table 67.-Distribution of full-time electric surface railways, without commercial lighting, according to number of fure passengers carried per car mile and according to operating ratio: 1902. ${ }^{1}$

${ }^{1}$ Exclusive of reports for 2 railways carrving freight only; for 16 which failed to furnish this information, and for 40 fast, long interurbans.

Causes affecting the operating ratio.-The causes which contribute to keep the operating ratio of street railways in large cities lower than in the smaller towns may be clearly discerned by a consideration of the other items in Tables 62 and 63. The difference is not due to higher fares in the great cities. It appears that the average fare collected per passenger ou electric surface railways without lighting plants does not differ very materially as among the four urban groups, ranging from 4.79 cents to 4.94 cents. It is, however, largely the fact that the average passenger earnings per passenger are highest in urban centers of the second group, which makes the operating ratio for the companies of this group slightly lower than for those in the largest centers.

It is also clear that the low ratio of operating expenses in the first two groups of urban centers is not due to the low cost of operating cars. In fact, the average cost of operation per car mile for railways without lighting plants, 13.42 cents, is about oneseventh higher in centers of more than 500,000 inhabitants than in any of the other classes of urban centers; while the other three groups of urban centers differ very little among themselves in the amount of operating expenses per car mile. It is probable that the cars in the great cities average somewhat larger than those elsewhere, but they can scarcely exceed in size the cars in centers of from 100,000 to 500,000 inhabitants by as great a proportion as the expenses per car mile exceed those in the second group of centers.

One reason, perhaps the chief reason, why it costs more to operate cars in the largest cities than elsewhere
is found in the higher rates of wages. It is possible, too, that on account of the obstructions to traffic the average rate of speed of surface cars is less in large cities than elsewhere, so that a larger amount of wages must be paid to conductors and motormen for covering a given distance, even if time wages were not higher. The expense of "operating cars," which consists chiefly of the wages of conductors and motormen, amounts to 6.2 cents per car mile on electric surface railways without lighting plants in the largest centers as against 4.7 cents in centers of the smallest size. One might reasonably expect, however, that the large scale on which the street railway business is conducted in great cities would result in material economies with regard to the power plant; and as a matter of fact, as shown by Table 63, the power plant expenses per car mile in the greatest centers, though they slightly exceed those in centers of the second group, are less than in centers of from 25,000 to 100,000 inhabitants, and decidedly less than in the smallest centers.

Other causes having been excluded, the reason why the operating ratio is lower in the largest cities than elsewhere is necessarily found to lie in the great density of traffic per car mile. It will be recalled that the average number of passengers carried per car mile on electric surface railways without commercial lighting plants, in centers of more than 500,000 inhabitants, was 4.92 in 1902, while in the smallest centers it was only 3.26. The table at present under consideration shows that the operating earnings of electric surface companies without lighting plants amount to 23.76 cents per car mile in centers of more than 500,000 inhabitants, as compared with 20.64 cents in centers of the second group, and with only 16.62 cents in places of less. than 25,000 inhabitants. Notwithstanding the fact that in all probability the rides taken by passengers in the greatest cities average longer than elsewhere, the cars in such cities are so much larger and so much better filled that they earn more for each mile traveled than in any of the other urban groups. The passengers who stand are those who make the greatest profit for the railway company.

The figures which show the average operating expenses per fare passenger on electric surface railways without lighting plants indicate the effects of these differences
in the density of traffic and in the amount of earnings per car mile. They range from 2.76 cents for the largest centers to 3.51 cents for the smallest. A fraction of the operating expenses represents the cost of other branches of service besides passenger traffic, but in the case of electric surface companies without lighting plants this fraction is so small as to be negligible.
The fact that the operating expenses of fast, long interurban railways, despite the decidedly larger size of their cars, are not materially greater per car mile than in those of the last three urban groups is attributable partly to the high rate of speed maintained, which reduces the outlay for conductors and motormen. The power plant expenses of such railways, on the other hand, as might be expected, are heavier per car mile than for any class of urban railways. The comparatively unfavorable operating results of other interurban lines are shown primarily in their high operating expenses per car mile. These companies also have low earnings per mile of track; but against this must be set the fact that the cost of construction and equipment per mile for many of these railways is much less than in the case of the railways in large cities. The finances of fast, long interurban railways are discussed in greater detail in Part I, Chapter VII.

## VI.

## BALANCE SHEET.

Detailed analysis for all companies.-Table 68 presents for the United States and for each state a summary of the balance sheets of both operating and lessor street railway companies. Besides the 18 companies mentioned on page 54, as reporting no financial statistics, it was found impossible to obtain balance sheets for the Deuver, Laikewood and Golden Railroad Company, which has 6 miles of track, and for one lessor company, the Pittsburg and Charleroi Street Railway Company, which has 4.6 miles of track. Moreover, the data for the balance sheets of a number of other lessor companies had to be drawn from the reports of the controlling operating companies, from 干arious financial reports and other sources, it being impossible to obtain returns directly from the companies, as some of them have virtually ceased to keep financial accounts.

Table 68.-BaLaNCE SHEET FOR OPERATING

|  | state or tehritory. | $\begin{aligned} & \text { Num- } \\ & \text { ber of } \\ & \text { com- } \\ & \text { panies. } \end{aligned}$ | ASSETS. |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Total. | Cost of construction and equipment.? | Other permanent investments. " | Cash on hand. | Bills and accounts receivable. | Supplies. | Sundries. | Profit and loss deficit for companies reporting deficit. | Net deflcit for states showing deficit. |
| 1 | United States... | 967 | \$2, 545, 132,305 | \$2,167,634,077 | \$152, 518, 997 | \$28, 021, 853 | \$22, 448,700 | 810,610, 928 | \$152, 617,703 | \$11,285, 047 | \$1, 123, 330 |
| 2 | Alabama | 9 | 15, 451, 927 | 18,990,633 | 949, 116 | 78,370 | 94, 304 | 38,101 | 278, 765 | 13,638 |  |
| 3 | Arkansas | 7 | 2, 501, 330 | 2,207,346 | 40,486 | 27, 268 | 6,106 | 11, 149 | 208,975 | ............. |  |
| 4 | Californa | 35 | 82, 602, 550 | 74, 624, 168 | 1,805,168 | 1,186, 782 | 515,963 | 832, 641 | 3, 632,077 | 5,751 |  |
| 5 | Colorado | 7 | 16, 820, 646 | 16,174,785 | 210,062 | 149, 687 | 39,298 | 115, 097 | 121,850 | 9,967 |  |
| 6 | Connecticut. | 25 | 45,645,893 | 42,482, 731 | 2, 121, 580 | 300, 733 | 72,907 | 191,509 | 371,430 | 104, 993 |  |
| 7 | Delaware. | 3 | 5,289,910 | 5, 104,476 |  | 71,386 | 40,860 | 47,361 | 7,977 | 17,850 |  |
| 8 | Florida | 6 | 3,822,637 | 3, 710,728 |  | 47,861 | 32, 994 | 23,453 | 7,001 |  |  |
| 9 | Georgia. | 10 | 27, 056, 898 | 26, 157,678 | 134, 800 | 196,538 | 212, 437 | 142,571 | 212,894 |  |  |
| 10 | Illinois | 56 | 284,953,125 | 225, 507, 387 | 40, 237, 103 | 1,819,913 | 1, 123, 128 | 899, 638 | 12, 432,930 | 2,933,026 | 826, 030 |
| 11. | Indiana | 26 | 43,454,495 | 39, 420, 184 | 10,485 | 371, 275 | 107, 448 | 170,915 | 3,241,044 | 133, 194 |  |
| 12 | Iowa | 22 | 19,977, 660 | 18,035,123 | 47,704 | 243,518 | 226,522 | 80,498 | 1, 214, 397 | 129,898 |  |
| 13 | Kansas | 11 | 3,318, 649 | 3, 089, 321 |  | 14,622 | 2,942 | 14,379 | 190,206 | 7,179 | 6,655 |
| 14 | Kentueky | 12 | 25, 239, 780 | 22,850,276 | 40,928 | 333; 415 | 43,307 | 139,698 | 1,810,241 | 21, 921 |  |
| 15 | Louisirna | 8 | 24, 084, 087 | 14,282, 507 |  | 243, 853 | 97, 891 | 103,969 | 9,329,908 | 25,959 |  |
| 16 | Maine. | 20 | 12, 476, 227 | 11, 176, 556 | 559,960 | 86,503 | 69, 716 | 65,567 | 209,555 | 318,370 |  |
| 17 | Maryland .............. | 12 | 69, 710, 668 | 68, 711, 891 | 30,000 | 187,137 | 22,735 | 131,666 | 622, 807 | 104, 432 |  |
| 18 | Massnchusetts | 92 | 121, 627,650 | 109, 782, 044 | 212,011 | 3,302, 901 | 1,387, 588 | 1,451,677 | 5,085,058 | 406,371 |  |
| 19 | Michigen. | 24 | 66,227,886 | 55, 582, 232 | 2,068,542 | 330,675 | 531, 320 | 174, 632 | 7,416,002 | 124, 483 |  |
| 20 | Minnesota | 5 | 40, 016, 285 | 39,273, 860 |  | 477,985 | 4,862 | 101,286 | 147, 242 | 11,100 |  |
| 21 | Mississippi.. | 5 | 1,444, 119 | 1,268, 084 | 114,196 | 11, 196 | 5,928 | 2,390 | 40, 540 | 1,785 |  |
| 22 | Missouri | 17 | 149,060,520 | 117,628,659 | 24,379,270 | 1,053,495 | 299, 330 | 445, 988 | 4,743,535 | 510,243 |  |
| 23 | Montana | 5 | 3,748,096 | 3, 228,532 | ............. | 46,521 | 37,782 | 22,589 | 347,107 | 65, 565 |  |
| 24 | Nebraska | 4 | 8,807,086 | \$, 599, 242 |  | 100,961 | 9,175 | 19,209 | 76,654 | 1,845 |  |
| 25 | New Hampshire. | 13 | 4,485, 194 | 4,118,457 |  | 177,579 | 108, 629 | 6,636 | 20,163 | 8,780 |  |
| 20 | New Jersey .............. | 29 | 132, 029, 283 | 126, 589, 270 | 880, 908 | 439,114 | 278,001 | 338,461 | 2,549, 375 | 954, 154 | 134, 148 |
| 27 | New York | 119 | 643, 014, 844 | 521,912,957 | 86,751,267 | 11,859, 612 | 8,815,728 | 2,116,1654 | 58, 140, 377 | 3,388, 249 |  |
| 28 | North Carolina | 7 | 4, 430, 976 | 2,408,661 | 639,690 | 24,076 | 89,318 | 36,408 | 1, 198,720 | 34, 103 | 16,814 |
| 29 | Ohio. | 66 | 181, 414,088 | 169, 058, 687 | 1,147,336 | 1,705,688 | 2, 320,577 | 664, 896 | 6,291,586 | 225, 868 |  |
| 30 | Oregon.. | 6 | 6, 568, 798 | 6, 235, 570 |  | 89,601 | 8,680 | 89,341 | 118,864 | 21,737 |  |
| 31 | Pennsylvania | 195 | 314, 258, 454 | 216, 118,011 | 31,568,967 | 1,307,980 | 3, 454,482 | 1,061,225 | 29,899,316 | 848,523 |  |
| 32 | Rhode Island. | 7 | 24,488, 395 | 28,871,751 |  | 38,443 | 147, 373 | 160,607 | 1,589 | 268, 632 |  |
| 33 | South Carolina | 7 | 6,689,525 | 4, 523, 752 | 1,780,000 | 8,244 | 58, 631 | 45,693 | 316,961 | 6,244 |  |
| 84 | Tennessee. | 8 | 18,142,307 | 16, 931,576 | 582, 015 | 64,557 | 491, 801 | 62,046 | 9,187 | 1,122 |  |
| 55 | Texas | 17 | 16,465,080 | 15,755,440 | 140,000 | 231, 886 | 31, 141 | 65,784 | 240,029 | 800 |  |
| 36 | Utah | 3 | 6, 224, 674 | 4, 314,156 | 1,682,600 | 145,123 |  | 50,795 | 32,000 |  |  |
| 37 | Vermont | 9 | 3,203,339 | 2, 850,460 |  | 20,477 | 10,506 | 6,041 | 292, 989 | 22,866 |  |
| 88 | Virginia | 16 | 19,773, 297 | 15, 414, 124 | 3,284,535 | 286, 557 | 598,200 | 30,732 | 151,559 | 57,597 |  |
| 39 | Washington. | 8 | 20,043,820 | 18, 574,439 | 191,793 | 406, 694 | 234, 894 | 274, 026 | 361,980 |  |  |
| 40 | West Virginia | 8 | 10,005, 352 | 9,039, 281 | 244, 819 | 106, 805 | 5,976 | 4,529 | 601,492 | 2,450 |  |
| 41 | Wisconsin... | 17 | 31, 334,728 | 29, 359, 238 | 708, 756 | 225, 314 | 388, 118 | 338,740 | 367,214 | 2,348 |  |
| 12 | Allother states and territories. ${ }^{3}$ | 11 | 29, 277, 080 | 27,630, 859 |  | 251,623 | 477,149 | 42,831 | 375,564 | 499,054 | 139,683 |
| 48 | Hawaii and Porto Rico. | 5 | 3,502,875 | 2, 181, 593 | 332,314 | 102,950 | 64,868 | 31, 950 | 778,161 | 11,039 |  |

1 Exclusive of reports for 20 companies which failed to furnish this information.
${ }^{2}$ Includes electrfe light plants owned by companies reporting.
Includes states and territories having less than 3 companies. in order that the operations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 ( 8 reports); Idaho, 1 ; New Mexico, 1 .

## AND LESSOR COMPANIES, BY STATES AND TERRITORIES: 1902. ${ }^{1}$



The methods of street railway companies in preparing their balance sheets are not uniform, and, although every effort has been made by the Bureau of the Census to bring the items to a comparable basis, it has been impossible in some cases to do so. Moreover, certain headings on both sides of the balance sheet represent such a rariety of items that the national and state totals for these headings do not give a precise idea of the financial situation of street railways.

The total assets and liabilities, as shown in the table, have been obtained by adding all assets and liabilities reported by individual companies without setting off the protit-and-loss surplus of some of the companies against the profit-and-loss deficit of others. The aggregate surplus reported by 463 companies was $\$ 51,991,159$, and the aggregate deficit reported by 225 companies was $\$ 11,285,047$, while 279 companies reported neither surplus nor deficit. The latter are largely lessor companies which have no current transactions, their income being directly disbursed to their stockholders and bondholder's by the operating companies. The net surplus for the United States, obtained by deducting the deficits from the gross surplus, was $\$ 40,706,112$. If the deficits were similarly deducted from total assets and liabilities they would be reduced to $\$ 2,533,847,258$. The table also shows for each state the net surplus or deficit obtained by combining the figures for companies showing a surplus with those for companies showing a deficit.
More than five-sixths of the reported assets of the street railway companies are placed under the head "cost of construction and equipment." It should be distinctly understood that this figure gives no indication of the actual cash which has been invested in tracks, appliances, and equipment. The Bureau of the Census undertook to secure an itemized statement of cost of construction from each company in accordance with the form prescribed by the American Street Railway Accountants' Association. Many companies furnished satisfactory returns, but many others were entirely unable to do so. The most important of the considerations that make the figures of cost in the balance sheet unsatisfactory is that a large proportion of the railway mileage, particularly of that which has had the highest valuation placed upon it, has changed hands during recent years, usually through the process of consolidation, but sometimes through reorganization after bankruptey or otherwise. Where this has occurred, the new company has, naturally enough, treated as the "cost of construction and equipment" the amount which it has actually paid in cash or securities for the assets of the old company or companies, as "going" concernsan amount which may be much more or much less than their original cost or the cost of duplicating them to-day. The new companies would seldom be able, even if they desired, to ascertain from the records of the old companies the amounts originally invested, either by items or as a whole. Another reason for inability to present
itemized construction accounts is found in the common practice of letting contracts for the ontire construction and equipment of railways at a lump sum. Such contracts are sometimes given to a construction company which is composed largely or wholly of the same men who are promoting the street railway company itself.

The item "other permanent investments" is variously interpreted by individual companies in making up their balance sheets. Some of them are disposed to put the value of their franchises under this head. The Bureau of the Census has sought to secure uniformity in the classification presented in this report, and has included under "other permanent investments" only the value of investments outside of street railways and lighting plants directly owned by the reporting companies which amounted to $\$ 152,513,997$. The most important form of such investments consists of the stocks and bouds of other street railway companies, which were usually wholly or partly controlled by the companies holding such securities, but which still maintained an independent existence and made an indopendent report to the Bureau of the Census. To the extent that securities of reporting railway companies are held by other reporting companies there is a duplication of both assets and liabilities, In cases where an operating company has completely taken over the business of a subsidiary company, which made no separate return to the Bureau of the Census, the value of the securities held has been treated as part of the cost of construction of the parent company. The cost of electric lighting plants and of parks or other real estato used in direct connection with the street railway business is also included with "cost of construction and equipment." On the other hand, investments in other forms of real estate, in water plants, ice plants, or other industrial enterprises, or in securities of any sort, are covered by the second head of the balance sheet. In some cases the cost of such outside properties is so closely interwoven with the cost of street railways that the segregation is based on estimates rather than on precise bookkeeping accounts. Some companies reported their own stocks and bonds held in the treasury as an asset, but in making up the table such securities have uniformly been treated as though not issued and have been omitted from both sides of the balance sheet.
The sundry assets, $\$ 152,617,703$, includes a variety of items. In a number of cases companies reported the value of franchises-corresponding practically to the difference between their reported cost of construction and other permanent investments on tho one hand and the amount of stocks and bonds issued, on the other-as a separate item, and this has been included here rather than under "cost of construction" or "other permanent investments." It must not be supposed, however, that the total value of all street railway franchises, as distinct from their cash cost, is shown under "sundry assets." Advances made by controlling companies to their sub-
sidiary companies for improvements on their lines or other purposes are also placed under this head. It is probable, however, that a part of the item " bills and accounts receivable" also represents advances of this sort that have not been specifically indicated as such by the companies. The balance sheet totals involve duplication to the extent of such advances from one company to another; the expenditures made out of them appear, usually as "cost of construction and equipment," among the assets of the subsidiary companies, and the obligations to the controlling companies appear among their liabilities.

The items "capital stock" $\$ 1,266,883,289$, and "funded debt" $\$ 974,112,422$, in the balance sheet are somewhat smaller than the amounts of securities reported as issued in Table 93, which were $\$ 1,315,572,960$ and $\$ 992,709,139$, respectively. Some of the operating companies which reported capital stock and funded debt did not present balance sheets. Again the capital stock of some other companies was not paid up in full, only the amount paid being treated as a liability in the balance sheet. If the par value of such stock were taken, it would be necessary to offset the part not paid in by an item "sundry assets" on the assets side, representing, presumably, real or anticipated franchise value. The practice of issuing stock without full payment is most conspicuous in Pennsylvania, where the total par value of stocks issued by operating and lessor street railway companies was reported at $\$ 211,728,495$, while the amount appearing in the balance sheet as paid in was $\$ 183,429,124$, a difference of $\$ 28,299,371$. . In Philadelphia many of the lessor companies have had only a fraction of their stock paid in. Treasury stocks and bonds are excluded from liabilities as from assets.

The item "bills and accounts payable" is a large one, $\$ 101,704,634$. A considerable number of companies, particularly in Massachusetts, seem to have adopted the
policy of carrying permanently a heavy floating debt, the proceeds of which have been used in construction and equipment. In other cases new companies that have not yet completed their entire road, or that have only recently done so, are indebted to the contractors for nearly or quite the full cost of construction and have as yet floated no securities. There are a few cases also in which controlling companies not reporting to the Bureau of the Census have made advances to the companies which they control and which did report.

The amount of "interest due" represents in part that which has accrued but is not yet payable; in part that which is payable but for which coupons have not yet been presented; but it apparently represents chiefly interest which the companies have been unable to pay.

Under "sundry liabilities," which aggregated $\$ 133,399,308$, the most important single item consists of the obligations of the subsidiary companies to controlling companies.

Cost of construction during the year.-An additional column on the same page with the balance sheet shows. the cost of new construction and equipment charged to the capital account during the census year, as reported by street railway companies. It does not include the cost of railways under construction but not yet in operation. It has been sought also to omit expenditures which merely repiesented the purchase of old companies by new ones. The complications in the construction accounts of new railway companies, particularly where settlements have not yet been made with contractors, are such that the figures for cost during the year can not be altogether correct. They serve, however, to give a rough idea of the rapidity with which new construction and improvement are taking place. The total cost of construction during the year amounted to $\$ 126,682,473$, or about 6 per cent of the aggregate cost of construction and equipment, as stated in the balance sheet at the end of the year.

## OHAPTER VI.

## EMPLOYEES, SALARIES, AND WAGES.

Totals for the United States and for states.-Table 92 shows for the United States as a whole and for each of the states the average number of salaried officials and clerks and of wage-earners of different classes, employed by street and electric railways during the census year 1902, together with the total amount of salaries and wages paid to each class. The table includes the figures for 797 of the 817 operating companies. The nonoperating lessor companies have no wageearners; and, while they maintain a formal organization and have certain officers, these, in most cases, receive no compensation. The 20 companies that failed to report statistics of employees and wages include the 18 companies mentioned on page $5 \pm$ as making no financial returns. In addition to these the Los Angeles Traction Company, with 26 miles of track and $5,040,154$ passengers, and the Punxsutawney (Pa.) Street Railway Company, with 12.13 miles of track and 988,555 passengers, failed to report employees and wages. The total trackage of the companies not covered by the statistics on this subject was 417.03 miles.

In accordance with the practice adopted by the Burean of the Census for the investigation of manufuctures, ${ }^{1}$ the average number of employees as stated in Table 92 is computed, not on the basis of the actual time the street railways were in operation, but on the assumption of continuous operation for all companies throughout the year. Thus a company operating six months and employing 30 men during that time is credited with 15 men employed for twelve months. The aim is to show the equivalent of the actual work done during the census year, or, in other words, the number of employees which would be necessary to perform that work if all of them worked the full year.

The average time of operation of the 57 companies which operated less than the full year was about six and two-thirds months. The number of employees of such companies, as calculated according to the method

[^26](94)
described, was only 2,066 . If the full number had been counted, regardless of the length of their employment, it would not have increased the total number of employees of all companies combined, or the number of most of the classes of employees, by 2 per cent. In some other cases companies operated part of their trackage during only a fraction of the year; but, all things considered, the average number of employees for all railways, as calculated on the basis of an assumed full year of operation, is not materially less than the number actually employed at any given time during the year.

Table 92 shows that the average number of salaried officials and clerks employed by the street railways of the United States in 1902 was 7,128 and the average number of wage-earners of all classes 133,641, a total of 140,769 employees. The salaries paid amounted to $\$ 7,439,716$ and the wages to $\$ 80,770,449$, a total of $\$ 88,210,165$ for salaries and wages. The wages alone, exclusive of salaries, were 56.8 per cent of the total operating expenses of the street railway companies. By far the most important groups of employees are conductors and motormen. These two classes, which are approximately equal in number and in wages received, together constitute about three-fifths of the total number of wage-earners, and their aggregate wages are equal to more than one-third of the operating expenses of street railway companies. Road and track men and mechanics are the next most important classes of employees.

Employees, salaries, and wages of companies classified according to power.-Table 69 shows for all companies combined and for the various groups of companies classified according to power, the number and compensation of salaried officials and clerks; the number and wages of all wage-earners and of conductors and motormen, respectively; and the relation of certain of these statistics to the length of track, to car mileage, and to the number of fare passengers carried.

Table 69.-EMPLOYEES, SALARIES, AND WAGES OF COMPANIES, CLASSIFIED ACCORDING TO POWER: 1902. ${ }^{1}$

|  | Total, | mlectric, surface. |  |  | Animal. | Steam and <br> electric ele. vated. | Cable, sur-face, indinelinedplanes. | $\begin{aligned} & \text { Steam, sur- } \\ & \text { face. } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Withoutcom. mercial lighting | With commercial lighting. | Paxt time. |  |  |  |  |
| Number of companies .. <br> Salaried offcials and cla | 797 | 554 | 2 | 57 | 52 | 5 | 14 | 3 |
| Average number....... | 7,128 | 5,617 | 990 | 184 | 44 | 250 | 39 |  |
| Per mile or track | 0.322 0.681 | - 0.305 | - 0.402 | 0.221 1.413 | 0.776 | $\stackrel{1}{0.299}$ | 1.240 | ${ }_{3.693}^{0.382}$ |
| Per 100,000 fare passengers carried during the year. | 0.151 | 0.140 | 0.324 | 0.488 | 0.181 | 0.079 | 0.201 | 2.354 |
| Wageearners: Salaries $^{\text {a }}$ (.................................... | 87,439,716 | 85, 950, 926 | \$998, 100 | 8121,124 | 827,927 | 8298,137 | \$40,622 | 82, 520 |
| Average number. | 133,641 | 111,044 | 12,498 |  |  | 6,768 | 441 | $1{ }^{6}$ |
| Per mile of track ${ }_{\text {Per }} 100000$ car mies run durin the | 6.031 | 6. ${ }^{6} 22$ | 5.080 | 2.264 | 6.354 | 29,671 | 13. 319 | 1. 327 |
| Per 100,000 car miles run during the year Per 100,000 fare pasengers carried during the year. | ${ }_{2}^{11.830}$ | +11.826 | 14.696 | 14.455 | 47.497 | ${ }_{2}^{8.091}$ | ${ }_{2}^{14.026}$ | 14.474 |
| Wages .............................................. | 880,770, 449 | 867, 904,546 | 86,741, 201 | ${ }_{8698,667}$ | \$5776, 285 | \$4, 512,388 | \$830,795 | \$6,617 |
| Per mile of track | \%8,645 |  |  |  |  |  |  |  |
| Per 100,000 car miles run during the year - 7 Per | $\$ 8,150$ 81,710 |  | \$82, 204 |  | \$10,164 $\$ 1,717$ | 85,394 <br> 881,432 <br> 8. | $\underset{\$ 10,521}{\$ 109}$ | \$86,110 |
| Conductors: <br> Average number. $\qquad$ |  |  |  |  |  |  |  |  |
| Weres | $\$ 24,025,204$ | $\$ 20,981,435$ | $\begin{array}{r} 3,090 \\ 81,545^{1}, 874 \end{array}$ | \$198, 109 | 8164,894 | $\$ 1,015,828$ | \$118,044 | \$960 |
| tormen: <br> A verage number <br> Wages | $\begin{aligned} & 421,617,155 \end{aligned}$ | $\begin{array}{r} 34,458 \\ \$ 21,288,717 \end{array}$ | $\begin{array}{r} 31,680^{\prime}, 235 \\ 8886 \end{array}$ | $\begin{gathered} 5913,814 \\ \$ 890 \end{gathered}$ | $\begin{aligned} & 3188,3038 \\ & 348 \end{aligned}$ | $\begin{array}{r} 1,228 \\ \$ 1,137,951 \end{array}$ | $\begin{aligned} & 105,629 \\ & \hline 140 \end{aligned}$ | \$2,655 |

1 Exclusive of reports for 20 companies which failed to furnish this information.

Very significant differences in these relations appear among the different classes of companies, although the differences are probably due not so much to diversity in the methods of traction as to variation in the density of traffic among the several classes. For all classes of railways combined the number of salaried employees was 0.322 per mile of track, 0.631 per 100,000 car miles run during the year, and 0.151 per 100,000 fare passengers carried during the year. The number of wageearners was 6.031 per mile of track, 11.830 per 100,000 car miles, and 2.829 per 100,000 fare passengers. These figures exceed slightly the averages for the most important class of companies, full-time electric surface railways without commercial lighting. The annual wages paid by all companies were $\$ 3,645$ per mile of single track, $\$ 7,150$ per $100,000 \mathrm{car}$ miles, and $\$ 1,710$ per 100,000 fare passengers. As might be expected, the companies furnishing commercial lighting, part of whose employees are engaged in the lighting branch of the business, show relatively more salaried employees, wage-earners, and wages, in proportion to the car mileage and passengers, than companies without
commercial lighting. The large number of wage-earners in proportion to car mileage shown for animal power railways is chiefly due to the slow speed of the cars. Elevated railways, with their extremely dense traffic, naturally show a much larger proportion of employees per mile of track than other classes of railways; but, on the other hand, the density of traffic and the high speed of elevated railways resulted in their showing a relatively small number of employees and a relatively small amount of salaries and wages in proportion to car mileage and to fare passengers carried. The number of wage-earners per 100,000 fare passengers for the cable roads was less than for any other group except the elevated roads. The inclined plane roads had 2.107, and the ordinary cable roads 2.320 wage-earners per 100,000 fare passengers.
Employees, salaries, and wages of companies classified according to population.-Table 70 presents for all railways classified according to population the same data as are presented in Table 69. The corresponding: tigures for full-time electrio surface railways without commercial lighting are shown in Table 71.

Table 70.-EMPLOYEES, SALARIES, AND WAGES OF COMPANIES, OLASSIFIED ACOORDING TO POPULATION: $1902 .{ }^{1}$


Table 71.-EMPloyees, Salaries, and wages of full-time eleotric sureaoe Railway Companies, WITHOUT COMMERCIAL LIGHTING, CLASSIFIED ACCORDING TO POPULATION: 1902. ${ }^{1}$

|  | Total. | urban centers, porulation. |  |  |  | interurban ramwaye. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 500,000 and over. | 100,000 but under 500,000 | 25,000 but | Under 25,000. | Fast, 10ng. | Other. |
| Number of companie | 554 | 47 | 37 | 66 | 165 | 40 | 199 |
| A verage number .-. | 5,617 | 2,259 | 1,026 | 457 | 438 |  |  |
| Per mile ar track | -0,305 | - 0.483 | ${ }^{1} .3188$ | 0.219 | 0. ${ }^{3635}$ | 0.165 | 0.217 |
|  | ${ }_{0}^{0.140}$ | 0.107 | ${ }_{0}^{0.114}$ | ${ }_{0.150}^{0.050}$ | ${ }_{0.351}^{1.145}$ | ${ }^{0.9886}$ | core |
| Salaries. | ${ }^{\text {s5, }}$, 950, 926 | 82, 390,778 | \$1, 293, 522 | 8537, 295 | \$340,658 | \$871, 9.44 | \$1,011, 730 |
| Average number | 111,044 | 53,957 | 24,649 | 8,709 | 4,008 |  | 15,392 |
|  | ${ }^{6.022}$ | ${ }_{12}^{11.545}$ | ${ }_{1}^{7.642}$ | 4.167 | 3.062 | 2. 002 | 3. 3196 |
| Per 10,006 war miles run during the year - | 11,826 2,768 | - 12.461 | ${ }_{2}^{11.260}$ | - 10.577 | ${ }_{\text {10, }}^{10.445}$ | (11.080 | 41. 419 |
| Wages-..i. .i. .-.............................. | \$67,901,546 | \$34, 094,449 | \$15, 325,583 | 85, 256, 288 | 82, 183,3300 | \$2, 482,5856 | 和, 1832,301 |
| Per 100,0xticar miles run durint the year | - | - 87,284 | - | ${ }_{8}^{82,515}$ | ${ }_{\text {c }}^{81}$ | 91, 125 | \$1,737 |
| Per 100,000 fate passengers caried during the year | \%1,692 | \$1, 621 | 81,708 | \$1, 721 | \$1, 733 | 政, 4, 419 | - ${ }^{1} 17,729$ |
| Average number. | 34,222 | 16,765 | 7,847 |  |  |  |  |
| Motrongen: | \$20,981,485 | \$10, 670, 686 | 84, 745,919 | \$1,697, 605 | 8019,208 | \$552, 654 | 82, 695, ${ }^{\text {c }}$ 23 |
| Warges.......... | $\begin{array}{r} 34,458 \\ 821,288,717 \end{array}$ | $\begin{array}{r} 16,338 \\ 810,509,465 \end{array}$ | $84,903,873$ | $\begin{array}{r} 2,959 \\ \$ 1,790,580 \end{array}$ | $\begin{array}{r} 1,421 \\ \$ 764,662 \end{array}$ | $\begin{array}{r} 1,049 \\ \$ 588,345 \end{array}$ | $\begin{array}{r} \text { 4, } 8281 \\ \$ 2,786,702 \end{array}$ |

${ }^{1}$ Exclusive of reports for 18 companies which failed to furnish this information.

It appears from Table 71 that the number of wageearners per mile of track, on railways of the more typical class, is greatest in urban centers of the first group, and that the number decreases rapidly with decreasing population of urban centers. An even greater decrease is shown in wages per mile of track. The explanation is found obviously in the declining density of traffic with decreasing population. The ratio of wageearners and wages to car miles run during the year also decreases with population, though in a much less marked degree. In explanation of the fact that the number of employees per 100,000 car miles is greater in large cities than in smaller towns, it may be said that certain classes of men, such as starters, switchmen, transfermen at junction points, and the like are not required in the smaller towns. In some small towns a single person serves both as conductor and motorman.
On the other hand, the density of traffic per car mile increases, broadly speaking, with population, and we find accordingly that the ratio of the number of employees to the number of fare passengers carried during the year decreases with increasing population. How-
ever, on account of the general tendency of the rate of wages to increase with population, there is less difforence in the ratio of wages to passengers among the four urban groups than in the ratio of wage-earners to passengers. The ratio of wage-earners to passengers carried is larger in the group of fast, long interurban railways than in any of the urban groups, because of the long distance traveled by passengers.

Relation of employees to trackage and trafio in the ten largest cities.-Table 72 shows the number of salaried employees and the number of wage-earners on the surface railways, including electric, animal, and cable lines, ${ }^{1}$ in the ten largest cities of the United States, together with the relation between these numbers and the traffic. It should be noted that, in some cases, the area and population of the cities as covered by this table do not correspond exactly with the area and population of the "urban centers," of which these cities are the chief part.

[^27]Table 72.-WAGE-EARNERS and salaried Employees of surface railways, in teme ten Largesi CITIES: 1802.


Marked differences appear among the cities in the ratio of wage-earners to track mileage. This ratio is particularly affected by the density of traffic, being high where the number of car miles operated per mile of track is great. Much less marked are the differences in the ratio of the number of wage-earners to the number of car miles run during the year. The highest ratio appears in New York, where there were 15.147 wage-earners per 100,000 car miles. Boston and San Francisco show nearly as large a proportion. The lowest ratio of wage-earners to car mileage is found in St. Louis and Chicago. As regards the relation of the number of employees to the number of fare passengers carried during the year, Buffalo and Boston present the highest ratio, both cities having more than 3 wageearners per 100,000 passengers carried annually. The lowest ratio of wage-earners to fare passengers carried appears in'St. Louis and Philadelphia.
Method of presenting wage statistics.-In the investigation of the wages of street railway employees the same methods have been followed that were adopted in the special investigation on employees and wages in manufacturing industries published by the Bureau of the Census in 1903. ${ }^{1}$ The number of wage-earners

[^28]whose wages fall within specified limits has been ascertained and presented.
As more fully shown in the Report on Manufactures (Vol. VII, page cexv), great caution must be exercised in making calculations of the annual average earnings of wage-earners from the statistics of aggregate wages and average number emplojed. This cantion applies with full force to the statistics presented in this report. The number and complexity of the other necessary inquiries in the street railway schedule precluded the use of such exhaustive methods of securing wage returns as were employed in the special investigation on employees and wages in the manufacturing industries. The companies were, therefore, asked to compute directly the number of wage-éarners in the different classes receiving stated rates of pay, and the special agents of the Bureau of the Census consulted pay rolls only incidentally and by way of verification.

Classified wages for all electric surface railways.Table 73 shows for all wage-earners on electric surface railways, and for the leading classes separately, the number receiving stated rates of daily wages within 25 -cent limits. It shows also the percentage which the number falling within each wage group bears to the total number of wage-earners of the class, together with cumulative percentages.

Table 73.-DISTRIBUTION OF WAGE-EARNERS OF ALL ELECTRIC SURFACE RAMLWAY COMPANIES ACCORDING TO DAILY WAGES REOEIVED: 1902.
[Each cumulative percentage shows the proportion of the total number receiving a wage as great as, or greater than, the lowest rate of the given wage group.]

| RATE PER DAY (DOLIARS). | ALL CLASSES. |  |  | CONDUCTORS. |  |  | MOTORMEN. |  |  | ROAD AND TRACE MEN. |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Number. | Percentage. |  | Number. | Percentage, |  | Number. | Percentage. |  | Number. | Percentage. |  |
|  |  | Of total. | Cumulative. |  | Of total. | Cumula ${ }_{\text {tive. }}$ |  | Of total. | Cumulative. |  | OF total. | Cumula. tive. |
| Total ................................... | 94,874 | 100.0 |  | 31, 869 | 100.0 |  | 32,412 | 100.0 |  | 9,826 | 100.0 |  |
| Less than 1.00. | 679 | 0.7 | 100.0 | 50 | 0.2 | 100.0 | 23 | 0.1 | 100.0 | 478 | 4.7 | 100.0 |
| 1.00 to 1.24. | 2,719 | 2.9 | 99.3 | - 899 | 2.8 | 99.8 | 884 | 2.7 | 99.9 | 4777 | 4.8 | 98.3 |
| 1.26 to 1.49. | 4,468 | 4.7 | 96.4 | 1,046 | 8.3 | 97.0 | 1, 123 | 8.5 | 97.2 | 1,368 | 18.8 | 90.5 |
| 1.50 to 1.74. | 15,481 | 16.3 | 91.7 | 3, 088 | 12.5 | 98.7 | 3,374 | 10.4 | 93.7 | 4,505 | 45.4 | 76.7 |
| 1.75 to 1.89 . | 15,213 | 16.0 | 75.4 | 5,426 | 17.0 | 81.2 | 5,481 | 16.9 | 83.8 | 1,280 | 12.9 | 31.3 |
| 2,00 to 2.24 . | 89, 668 | 41.8 | 69.4 | 17, 059 | 68.5 | 64.2 | 16, 665 | 51.4 | 66.4 | 1, 229 | 12.4 | 18.4 |
| 2.25 to 2.49 | 10,421 | 11.0 | 17.6 | 3,124 | 9.8 | 10.7 | 4, 325 | 18.4 | 15.0 | 884 | 8.9 | 6.0 |
| 2.60 to 2.74. | 3,262 | 3.4 | 6.6 | 192 | 0.6 | 0.9 | 291 | 0.8 | 1.6 | 162 | 1.6 | 2,1 |
| 2.76 to 2.99. | 1,045 | 1.1 | 3.2 | 17 | 0.1 | 0.3 | 7 | (1) | 0.7 | 8 | 0.1 | 0.5 |
| 3.00 and over | 1,996 | 2.1 | 2.1 | 73 | 0.2 | 0.2 | 289 | 0.7 | 0.7 | 40 | 0.4 | 0.4 |
| Rate per day (dollars). | ENGINEERS. |  |  | FIREMEN, |  |  | MECHANICS. |  |  | ALI OTHER CLAB8ES. |  |  |
|  | Number. | Percontage. |  | Number. | Percentage. |  | Number. | Percentage. |  | Number. | Percentage, |  |
|  |  | Of total. | Cumula- tive. |  | Of total, | $\begin{gathered} \text { Cumula- } \\ \text { tive. } \end{gathered}$ |  | Of total. | $\begin{gathered} \text { Cumula- } \\ \text { tive. } \end{gathered}$ |  | Of total. | Cumula tive. |
| Total..................................... | 1, 584 | 100.0 |  | 2,344 | 100.0 |  | 6,768 | 100.0 | ..-....... | 10,086 | 100.0 | -.---.... |
| Less than 1.00. | 3 | 0.2 | 100.0 | 16 | 0.7 | 100,0 | 21 | 0.3 | 100.0 | 70 | 0.7 | 100.0 |
| 1.00 to 1.24. | 5 | 0.3 | 99.8 | 76 | 8.2 | 99.8 | 83 | 1.2 | 99.7 | 295 | 2.9 | 99.8 |
| 1.25 to 1.49. | 89 | 2.5 | 99.5 | 185 | 5.8 | 96.1 | 195 | 2.9 | 98.5 | 562 | 5.6 | 96.4 |
| 1.60 to 1.74. | 104 | 6.8 | 97.0 | 469 | 20.0 | 90.3 | 896 | 18.3 | 95.6 | 2,100 | 20.9 | 90.8 |
| 1.75 to 1.99. | 89 | 6.8 | 90.2 | 697 | 27.2 | 70.8 | 1,062 | 15.7 | 82, 3 | 1,223 | 12.2 | 69.9 |
| 2.00 to 2.24 . | 295 | 19.2 | 84.4 | 770 | 82.8 | 48.3. | 1,707 | 25.8 | 66.6 | 1,959 | 19.5. | 67.7 |
| 2.25 to 2.49 . | 187 | 12.2 | 65.2 | 171 | 7.8 | 10.3 | 1,017 | 15.1 | 41.3 | 1,213 | 12.1 | 38.2 |
| 2.50 to 2.74 . | 274 | 17.9 | 58.0 | 48 | 2.1 | 3.0 | 986 | 18.9 | 26.2 | 1, 859 | 18.5 | 26.1 |
| 2.75 to 2.99. | 115 | 7.5 | 85.1 | 1 | (1) | 0.9 | 427 | 6.8 | 12.3 | 470 | 4,7 | 12.6 |
| 8.00 and over | 428 | 27.6 | 27.6 | 21 | 0.8 | 0.9 | 409 | 6.0 | 6.0 | 791 | 7.9 | 7.9 |

LLess than one-tenth of 1 per cent.

The statistics of classified wage-earners presented in this and the following tables are confined to electric surface railways (including those with and without commercial lighting), because the occupations for other classes of railways differ so much in character as to render comparison misleading. Even of the electric surface railway companies, 54 failed to report in full regarding classified wages of their employees and have been omitted from the classified figures. The most important of the omissions are the Chicago City Railway Company, the United Railways and Electric Company of Baltimore, the Boston Elevated Railway Company, the St. Louis Transit Company, the Cleveland Electric Railway Company, the Columbus Railway Company, and the Union Railroad Company of Providence.

In the above table the heading "all other classes" includes foremen; inspectors; starters; watchmen; switchmen; hostlers, stablemen, etc.; linemen; dynamo and switchboard men; electricians; and lamp trimmers. The schedule did not call for classified wages of a few other minor groups of wage-earners, and they accordingly do not appear in the table.

The total number of wage-earners covered by Table 73 is 94,874 , which is 71 per cent of the average number of wage-earners for all street and electric railways and 75.6 per cent of the average number of wage-earners on all electric surface railways.

The cumulative percentages in the table indicate the proportion of the total number of wage-earners of the different occupations who receive not less than the lowest rate defining the given wage group. Thus for all wageearners combined the cumulative percentage opposite the group of $\$ 1.75$ to $\$ 1.99$ per day indicates that 75.4 per cent of the total number receive $\$ 1.75$ or more per day. The "percentage of total" opposite the same wage group indicates that 16 per cent of all wageearners received between $\$ 1.75$ and $\$ 1.99$, thus leaving 59.4 per cent who receive more than $\$ 1.99$, which is the cumulative percentage for the next higher wage group.

Table 74 shows, for the same wage-earners who are covered by Table 73, the median groups of wages for different occupations, the percentage of the total number within each occupation who receive wage rates falling within the median group, and the percentages above and below the median rates.

By a median rate of wages is meant the rate of the employee who stands halfway between the lowest paid and the highest paid employee in the class under consideration; in other words, an absolutely precise median would be a rate such that equal numbers of employees receive wages respectively higher and lower than the rate named. For the purpose of permitting the medians to be calculated closely, the schedule called for a classification of wage-earners by their
precise daily rates of pay. In tabulation, however, the employees have necessarily been grouped according to certain limits, and the median in each case accordingly appears not as a single rate, but as a group, with upper and lower limits 5 cents apart. It follows that the median group itself covers a considerable number of employees and that the number above and below the median group can not, in any case, be exactly equal.
Table 74.-Median rates of wages and percentage of wage-earners: receiving median rates, and rates above and below median rates, on electric surface railways: 1902.

| CJABS, | Median rate (dollars). | PERCENTAGE OF WAGEEARNERS RECEIVING- |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | $\begin{aligned} & \text { Median } \\ & \text { rate. } \end{aligned}$ | Above median rate. | Below median rate. |
| All classes. | 2.00 to 2.04 | 82.7 | 26.7 | 40.6 |
| Conductors | 2.00 to 2.04 | 40.6 | 23.6 | 35.8 |
| Motormen .-....... | 2.00 to 2.04 | 39.2 | 27.2 | 83.6 |
| Road and track men | 1.50 to 1.54 | 40.4 | 36.3 | 23.3 |
| Engineers. | 2.50 to 2.54 | 13.6 | 39,4 | 47.1 |
| Frremen . | 1.80 to 1.84 | 3.2 | 47.6 | 49.2 |
| Mechanics ...... | ${ }_{2}^{2.00}$ to 2.04 | 23.2 16.9 | 43.4 40.8 | 33.4 42.3 |
|  |  |  |  |  |

Tables 73 and 74 show that there is not a wide variation in' the wages of most employees on electric surface railways. Of all wage-earners on such railways, 32.7 per cent received between $\$ 2$ and $\$ 2.04$ per day, which is the median group, while 68.8 per cent received between $\$ 1.75$ and $\$ 2.49$ daily: The rate of $\$ 2$ per day is more common than any other and is probably the precise median for all classes combined.

There is less variation in the wages of conductors and motormen than in the wages of all wage-earners combined. The median group for each of these classes is $\$ 2$ to $\$ 2.04$, and about two-fifths of each class are included in that group. More than four-fifths of all the conductors and five-sixths of all motormen received $\$ 1.75$ or more per day, while less than 2 per cent of either class received $\$ 2.50$ or more per day.
The median group for road and track men, who are practically all unskilled laborers, is $\$ 1.50$ to $\$ 1.54$, and more than two-fifths of all such employees fall within that wage group. The engineers are the best paid wage-earners, while the mechanics present the widest range of wages.

Classiffed wages for electric surface railways in cities of more than 100,000 inhabitants.-Tables 75 and 76 present in the same manner as in the preceding tables the classified wage statistics of wage-earners on electric surface railways in cities of more than 100,000 inhabitants. It will be recalled that the statistics for important companies in Chicago, Baltimore, Boston, St. Louis, Providence, Cleveland; and Columbus are omitted, but it is not probable that this omission seriously affects the distribution of the wage-earners throughout the scale.

Tabla 75.-DISTRIBUTION OF WAGE-EARNERS OF ELECTRIC SURFACE RAILWAYS IN CITIES OF 100,000 POPULATION AND OVER, ACCORDING TO DAILY WAGES RECEIVED: 1802.
[Each cumulative percentage shows the proportion of the total number receiving a wage as great as, or greater than, the lowest rate of the given wage group.]

| Rati per day (doliars). | ats classes. |  |  | conductors. |  |  | MOTORMEN. |  |  | Road and track men. |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Number. | Percentage, |  | Number. | Percentage. |  | Number. | Percentage. |  | Number. | Percentage, |  |
|  |  | Of total. | $\begin{gathered} \text { Cumula- } \\ \text { tive. } \end{gathered}$ |  | Of total. | Cumula- tive. |  | Or total. | Cumula- tive. |  | Of total, | $\begin{aligned} & \text { Cumula- } \\ & \text { tive. } \end{aligned}$ |
| Total . . . . . . . . . . . . . . . . . . | 56, 399 | 100.0 |  | 20,376 | 100.0 |  | 20,063 | 100.0 |  | 4,694 | 100.0 |  |
| Less than 1.00 | 50 | 0.1 | 100.0 |  |  |  |  |  |  | 14 | 0.8 | 100.0 |
| 1.00 to 1.24 to 1.49 | ${ }^{241}$ | 0.4 | 99.9 | 25 | 0.1 | 100.0 99 | 15. | 0.1 | 100.0 99 | 82 | 1.8 | 99.7 |
| 1.50 to 1.74 | 6,455 | 11.4 | 97.5 | - 1,676 | 8.2 | 98.6 | 810 | 4.1 | 98.6 | 2,288 | 48.7 | 92.1 |
| 1.75 to 1.99 . | 7,772 | 33.8 | 86.1 | 2,840 | 14.0 | 90.4 | 2,595 | 12.9 | 94.5 | 676 | 14.4 | 43.4 |
| 2.00 to 2.24 . | 27,813 | 49.8 | 72.3 | 12,653 | 62.1 | 76.4 | 12,002 | 69.8 | 81.6 | 872 | 18.6 | 29.0 |
| 2.25 to 2.49 | 8,688 | 15.4 | 23.0 | 2,771 | 13.6 | 14.3 | 3,979 | 19.8 | 21.8 | ${ }^{338}$ | 7.1 | 10.4 |
| 2.50 to 2.74. | 2, 162 | 8.8 | 7.6 | 125 | 0.6 | 0.7 | 216 | 1.1 | 2.0 | 137 | 2.9 | 8.8 |
|  | 775 | 1.4 | 3.8 |  |  | 0.1 |  |  | 0.9 | ${ }^{6}$ | 0.1 | 0.4 |
|  | 1,345 | 2.4 | 2.4 | 21 | 0.1 | 0.1 | 183 | 0.9 | 0.9 | 16 | 0.8 | 0.8 |
| rate per day (dollars). | enginemrs. |  |  | firemen. |  |  | mechanics. |  |  | all other classes. |  |  |
|  | Number. | Percentage. |  | Number. | Percentage. |  | Number. | Percentage. |  | Number. | Percentage. |  |
|  |  | Of total. | $\begin{array}{\|c\|\|} \text { Cumulale } \\ \text { tive. } \end{array}$ |  | Of total. | $\begin{gathered} \text { Cumula. } \\ \text { tive. } \end{gathered}$ |  | Of total. | $\begin{aligned} & \text { Cumula- } \\ & \text { tive. } \end{aligned}$ |  | Of total. | $\begin{aligned} & \text { Cumula. } \\ & \text { tive. } \end{aligned}$ |
| Total ............................... | 435 | 100.0 | ......... | 1,161 | 100.0 | ......... | 4, 241 | 100,0 |  | 5,429 | 100.0 | ......... |
| Legs than 1.00. |  |  |  |  |  |  | 3 | 0.1 | 100.0 | 33 | 0.6 | 100.0 |
|  |  |  |  | 4 | 0.4 | 100.0 | 55 | 1.8 | 99.9 | 60 | 1.1 | 99.4 |
| 1.25 to 1.49. |  |  |  | 10 | 0.9 | 99.6 | 96 | 2.8 | 98.6 | 214 | 3.9 | 98.3 |
| 1.50 to 1.74 | 15 | 3.4 | 100.0 | 99 | 8.5 | 98.7 | 453 | 10.7 | 96.3 | 1,114 | 20.5 | 94.4 |
| 1.75 to 1.99 . | 5 | 1.1 | 96.6 | 846 | 29.8 | 90.2 | 601 | 14,2 | 85.6 | 709 | 18.1 | 73.9 |
| 2.00 to 2.24 . | 42 | 9.7 | 95.5 | 490 | 42.2 | 60.4 | 828 | 19.5 | 71.4 | 926 | 17.1 | 60.8 |
| 2.25 to 2.49 | 88 | 8.7 | 85.8 | 157 | 18.5 | 18.2 | 702 | 16.5 | 51.9 | 688 | 12.7 | 43.7 |
| 2.50 to 2.74. | 68 | 14.5 | 77.1 | 42 | 8.6 | 4.7 | 764 | 18.0 | 85.4 | 815 | 15.0 | 31.0 |
| 2.75 to 2.99 . | 36 | 8.3 | 62.6 | 1 | 0.1 | 1.1 | 369 | - 8.7 | 17.4 | 363 | 6.7 | 16.0 |
| 8.00 and over . . . . . . . . . . . | 236 | 54.3 | 54.3 | 12 | 1.0 | 1.0 | 370 | 8.7 | 8.7 | 507 | 9.3 | 9.8 |

Table 76.-Median rates of wages and percentage of wage-earners receiving median rates, andrates above and below median rates, on electric surface railways in cities of 100,000 population and over: 1902.

| CLASS. | Median rate (dollars). | prrgentage of wageEARNERS RECEIVING- |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | Median rate. | Above median rate. | Below median rate. |
| All classes | 2.00 to 2.04 | 34.2 | 38.1 | 27.7 |
| - Conductors | 2. 00 to 2.04 | 41.2 | 85.2 | 23.6 |
| Motormen | 2.00 to 2.04 | 39.7 | 41.9 | 18.4 |
| Rond and track men | 1.60 to 1.54 | 48.5 | 48.6 | 7,9 |
| Engineers, | 3.00 to 3.04 | 15.6 | 38.7 | 45.7 |
| Firemen. | 2.00 to 2.04 | 40.6 | 19.8 | 39.6 |
| Mechanics. | 2.25 to 2.29 | 18.0 | 85.9 | 48.1 |
| All other classes | 2.00 to 2.04 | 14.2 | 46.6 | 39.2 |

A comparison of the figures in these tables with those for the employees of all electric surface railways combined shows, as might be expected, that there was a somewhat higher range of wages in the large cities. The difference would be still greater and more striking if the wages of employees in the cities of 100,000 and more inhabitants were compared directly with the wages in smaller places. It must be borne in mind that the statistics in Tables 73 and 74 are themselves very greatly influenced by the statistics for wage-earners in cities of more than 100,000 inhabitants. The median rates for all wage-earners combined, and severally for
conductors, motormen, road and track men, and miscellaneous employees, are the same for the largest cities as for the United States as a whole, though in every case a larger proportion of the wage-earners received more than the median rate in the great cities than in the entire country. For engineers, firemen, and mechanics the median was higber in cities of more than 100,000 inhabitants than for the country as a whole.

Classified wages for electric surface railways, by states.-Table 98 shows by states, for electric surface railways, the number of wage-earners of all occupations, and separately those of each important occupation, whose daily wages fall within stated 25 -cent limits, together with the 5 -cent group within which the median wage falls in each case. The statistics for Illinois, Maryland, Massachusetts, Missouri, and Rhode Island are seriously affected by the omission of important companies.

The highest wages were found in Montana, where the median for all classes of wage-earners on electric surface railways was $\$ 3.50$ to $\$ 3.54$. The only other states in which the median for all wage-earners combined exceeded $\$ 2.10$ per day are California, Colorado, Oregon, and Rhode Island. In eleven of the states named in the table the median group for all employees was $\$ 2$ to $\$ 2.04$, and these states include several of the most im-
portant. The median for all wage-earners was below $\$ 1.50$ in Alabama, Arkansas, Georgia, North Carolina, and Tennessee.
The median rate of wages for conductors, which corresponded closely with that for, motormen, was $\$ 2$ to $\$ 2.04$ in several of the leading states. Only in California, Colorado, Illinois, Michigan, Montana, Oregon, and Rhode Island was the median above this figure. In five Southern states the median for conductors was below $\$ 1.50$ per day. For road and track men several states have a median of $\$ 1.50$ to $\$ 1.54$. Of the states
in which the wages of road and track men were comparatively high, the most important are California, Colorado, Massachusetts, Minnesota, Montana, New York, Oregon, Utah, Washington, and Wisconsin. The median for this class of wage-earners was less than $\$ 1$ per day in four Southern states, where negro labor is largely employed.

Classified wages for fast interurban railways.-The following table presents classified wage statistics for leading classes of employees on fast, long interurban railways, by states:

Table 77.-DISTRIBUTION OF WAGE-EARNERS OF FAST, LONG INTERURBAN RAILWAYS, ACCORDING TO DAILY WAGES RECEIVED: 1902.

|  | Total. | $\begin{gathered} \text { Less than } \\ \$ 1.00 . \end{gathered}$ | $\$ 1.00 \text { to }$ | $\begin{aligned} & \$ 1,25 \text { to } \\ & \$ 1.49 . \end{aligned}$ | $\begin{aligned} & \$ 1.50 \text { to } \\ & \$ 1.74 . \end{aligned}$ | $\begin{aligned} & \$ 1.75 \text { to } \\ & \$ 1.99 . \end{aligned}$ | $\begin{aligned} & \$ 2.00 \text { to } \\ & \$ 2.24 . \end{aligned}$ | $\begin{aligned} & \$ 2.25 \text { to } \\ & 82.49 . \end{aligned}$ | $\begin{aligned} & \$ 2.50 \text { to } \\ & \$ 2.74 . \end{aligned}$ | $\begin{aligned} & \$ 2.75 \text { to } \\ & \$ 2.99 . \end{aligned}$ | $\begin{aligned} & \$ 8.00 \text { and } \\ & \text { over. } \end{aligned}$ | Median rate (dollars). |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| All classes. | 6,836 | 8 | 51 | 666 | 1,567 | 1,354 | 2,491 | 370 | 178 | 43 | 108 | 1.90 to 1.94 |
| Conductors | 1,849 |  | 16 | 59 | 239 | 467 | 990 | 77 |  | 1 |  | 2.00 to 2.04 |
| Motormen .......... | 1,931 |  | 10 | 408 | 586 | 49 | 1,007 | 19 | 2 | 1 | $\stackrel{\square}{5}$ | 2.00 to 2.04 |
| Engineers....... | , 190 |  |  | 1 | 5 | 13 | 48 | 20 | 52 | 12 | 39 | 2.50 to 2.54 |
| Firemen.. | 208 |  | 1 | 8 | 02 | 63 | 39 | 3 |  |  | 2 | 1.75 to 1.79 |
| Mechanics.. | 535 | 7 | 4 | 19 | 128 | 94 | 161 | 66 | 31 | 9 | 16 | 2.00 to 2.04 |
| All other classes. | 992 | 1 | 11 | 54 | 290 | 150 | 236 | 92 | 98 | 19 | 46 | 1.85 to 1.89 |
| All classeg by states: United States... | 6,836 | 8 | 51 | 666 | 1,567 | 1,354 | 2,491 | 370 | 178 | 43 | 108 | 1.90 to 1.94 |
| Illinois. | 446 |  |  | 50 | 60 | 56 | 212 | 17 |  |  |  | 2.00 to 2.04 |
| Indiana. | 901 | 2 | 4 | 162 | 267 | 248 | 165 | 27 | 18 | 1 | 7 | 1.75 to 1.79 |
| Michigan | 1,933 | 6 | 6 | 31 | 365 | 159 | 1,184 | 115 | 27 | 10 | 30 | 2.10 to 2.14 |
| New York. | ${ }^{1} 671$ |  |  | 170 | 139 | 140 | 128 | 42 | 27 | 4 | 21 | 1.75 to 1.79 |
| Ohio ..... | 2,358 |  |  | 128 | 667 | 581 | 707 | 129 | 70 | 15 | 26 | 1.90 to 1.94 |
| All other states | 527 |  | 6 | 119 | 69 | 170 | 95 | 40 | 11 | 7 | 10 | 1.80 to 1.84 |
| Conductors by states: United States . . . | 1,849 |  | 16 | 59 | 239 | 467 | 990 | 77 |  | 1 |  | 2,00 to 2.04 |
| Illinois. | 139 |  |  | 25 | 12 |  | 95 |  |  |  |  | 2.00 to 2.04 |
| Indiana. | 197 |  |  |  | 34 | 89 | 74 |  |  |  |  | 1.95 to 1.99 |
| Michigan | 583 |  |  |  | 43 | ${ }^{5}$ | 518 | 17 |  |  |  | 2.10 to 2.14 |
| New York. | 136 |  |  |  | 25 | 63 | 30 | 18 |  |  |  | 1.80 to 1.84 |
| Ohil .... | 683 |  | 16 | 29 | 115 | 233 | 255 | 34 |  | 1 |  | 1.90 to 1.94 |
| All other states | 111 |  |  |  | 10 | 70 | 18 | 8 |  |  |  | 1.80 to 1.84 |

It will be seen that the median wage for all employees of the fast, long interurban railways is $\$ 1.90$ to $\$ 1.94$, or somewhat less than the median for all classes of railways combined. The median rate for conductors and motormen on such interurban railways, however, is $\$ 2.00$ to $\$ 2.04$, the same as in cities of more than 100,000 inhabitants; and the general distribution of wage rates for these two classes of employees is nearly the same as in the cities of more than 100,000 inhabitants. The work of conductors and motormen on fast, long interurban railways is somewhat different in character from that of similar classes of employees in cities. On account of the high speed maintained by their cars their positions are, in some respects, more difficult and
responsible. Signals and telephone dispatches directing the movements of cars must be carefully attended to. On the other hand, the freedom from crowded streets relieves the motorman, and to a less extent the conductor, on the fast interurban cars from some of the continuous strain that is felt by the city employee. Many of the employees of interurban railways live in small towns and have the benefit of the fact that the cost of living is less than in the cities. Perhaps it may be concluded that the advantages of the employees of interurban railways, as compared with those on railways in the largest cities, are about offset by the disadvantages, as is indicated by the comparative wages.

## OEAPTER VII.

## INTERURBAN RAILWAYS-TCONOMIC, FINANCIAL, AND SOCIAL FEATURES.

## 1. <br> general development and extent.

Difficulties of definition and classification.-The conditions of business of the typical modern interurban railway differ so greatly from those of the ordinary street railway as to require special discussion. This subject has a peculiar interest because of the fact that the interurban business is of recent development, most of the faster and longer lines having been constructed within the past five years. The changes now taking place are so rapid that the census statistics covering the year ending June 30, 1902, will soon be out of date. Many new interurban railways were indeed under construction during the census year.
As already indicated (see page 5), many of the railways combine urban with interurban characteristics and traffic in such a way as to make attempts to classify them unsatisfactory. Such railways in their returns made no distinction between their strictly urban business and their interurban and suburban business, and in every case they have necessarily been treated as a unit and classed either as urban or interurban. In making this classification, therefore, it has been necessary to adopt more or less arbitrary rules. It will be recalled that the general rule followed in this respect has been to consider as interurban any railway which has more than one-half of its trackage outside the limits of incorporated municipalities; and to consider as a "fast, long" interurban any railway more than 15 miles in length, which has two-thirds or more of its trackage outside the limits of municipalities and which operates cars at a maximum speed of 20 miles or more per hour. On the basis of these rules, various companies have been classed as interurban the urban traffic of which might perhaps be found, if the information were at hand, to exceed somewhat their interurban traffic. The railways classed as "other" interurban railways are, however, much more heterogeneous in character than the "fast, long" interurbans, though even among the latter there are several which have a considerable amount of strictly urban traffic.
On account of its extensive urban traffic the Detroit United Railways Company, which operates some of the most progressive interurban lines, has been classed necessarily with the miscellaneous group rather than with the group of typical fast interurban railways.

It would be interesting, if possible, to distinguish more specific classes among the interurban railways, For instance, a distinction might be drawn between interurban lines proper and suburban lines, between companies which do a considerable proportion of their business within the limits of cities and those which do only a small proportion within such linits; and between lines which depend largely upon seasonal traffic and those which have traffic fairly well distributed throughout the year. The different railways grade into one another so imperceptibly in these respects, however, that, in the absence of more detailed information regarding the nature of the business of each company, such classification has been deemed impracticable, and it has been found necessary to group together all interurban railways except those of the special class of fast, long lines above defined.

Statistics of trackage outside the limits of incorporated cities and towns.-Because of the necessary imperfection of the classification of interurban lines adopted in the tables and general discussion, it is worth while, in order to get another view regarding the development of interurban railways, to consider the statistics of Table 94, which shows the amount of trackage lying outside the limits of incorporated cities and towns. This distinction is also an imperfect one, for the reasons that the limits of an incorporated place are often not identical with the limits of the area of dense population, and that there are many essentially urban communities, especially in New England, which are not incorporated. In order to avoid the second of these difficulties, some of the railway companies, in reporting their statistics of trackage, adopted more or less arbitrary limits to distinguish urban from rural districts in unincorporated places. In Massachusetts, however, where so many essentially urban communities are not politically separated from the unincorporated towns in which they lie, a large proportion of the companies were unable to make a satisfactory classification of their trackage, and the statistics of urban and nonurban trackage for the entire state have therefore been omitted in making up the totals for the country.
Despite these qualifications, however, the statistics of trackage lying outside the limits of incorporated places or other essentially urban communities, as shown in Table 94, undoubtedly show fairly well the amount of track which is extraurban, and thus throw an interest-
ing light on the extent to which suburban and interurban railways have been developed. Out of a total trackage of $20,063.82$ miles exclusive of Massachusetts, $6,855.58$ miles, or 34 per cent, were reported as lying outside municipal limits or the limits of urban communities as determined by certain companies. This item obviously has no direct relation to that of the total trackage of those railway companies which the Bureau of the Census has classed as interurban, although it so happens that the two are nearly the same.

An approximate indication as to the relative extent of interurban railways in the several states may also be gained from the figures for trackage without municipal limits in Table 94. For the reason just indicated, the returns from the New England states are less exact than those from the other parts of the country.

The states which have the largest amount of electric railway mileage outside of municipal limits are Connecticut, with 338.83 miles, or about three-fifths of the total trackage in this state; ${ }^{1}$ Indiana, with 278.34 miles, or 43 per cent of the total trackage; Maine, with approximately 200 miles, or about three-fifths of the total; Massachusetts, with probably two-thirds of the total of $2,525.65$ miles extraurban (exact figures not available); Michigan, with 558.62 miles, or 54.6 per cent; New Hampshire, with 85.99 miles, or 51.3 per cent; Ohio, with $1,278.55$ miles, or 54.3 per cent; Pennsylvania, with $1,113.54$ miles, or 44.9 per cent; and Virginia, with 197.89 miles, or 55.1 per cent. New York and Illinois have also large absolute amounts of electric railway trackage outside of municipal limits, but their urban railways are so extensive that the proportion of the total trackage which lies outside of municipal limits is comparatively small.

Leading centers of interurban raibway development.The conditions which favor the development of interurban railways may be considered from the standpoint of amount of traffic and from that of cost of service. From the standpoint of traffic the favoring conditions are (1) a comparatively dense population, arising from many and populous towns and villages; (2) connection with a large city, which attracts travel from the smaller towns and rural districts, and from which also summer traffic may be carried to resorts and rural districts; (3) general material prosperity and intelligence. From the standpoint of cost the important consideration is that the territory to be served shall be comparatively level, and otherwise free from physical obstacles to economical construction and operation.

It will be found by detailed study of the existing interurban railways that in sections where they are most conspicuously developed several or all of these conditions are present.

In proportion to its area, Massachusetts has much more electric railway mileage than any other state.

[^29]The $2,525.65$ miles of electric road in that state represent on an average about one-third of a mile of track for each square mile of area. Except for the Boston system, nearly all the railway companies in this state are classed as interurban, according to the rules adopted by the Bureau of the Census; although several of those which are so classed, because more than half of their trackage lies in essentially rural districts, probably carry more than half of their passengers within urban communities. The cities of Massachusetts lie so near together that it was a natural process for the street railways already existing in them to reach out and become united, and then to extend to the many prosperous villages in the vicinity. The agricultural population of Massachusetts, however, is comparatively sparse and has not contributed materially to the patronage of the electric railways. It is now possible to traverse the whole length and breadth of this state on trolley cars or to go from any important town to almost any other in this way. The car's operated on the interurban lines in Massachusetts are for the most part similar in size, motive power, and speed to those used in the cities. Table 97 shows that a large majority of the interurban companies of the state reported a maximum speed outside municipal limits of not more than 15 miles per hour. There is, however, an increasing tendency in Massachusetts, as elsewhere, toward the adoption of improved methods of interurban service, and several companies now operate cars which attain a maximum speed of from 25 to 35 miles per hour.

What is true of the interurban railways in Massachusetts is largely true also of those in Connecticut and Rhode Island, and of those in the more densely populated parts of New Hampshire and Maine, particularly along the coast where summer traffic is an important element. Pennsylvania is another state in which there has been extensive interurban development, but in which many railways show no sharp distinction between urban and interurban business. The rich agricultural and manufacturing regions in the east and southeast, the anthracite mining regions in the northeast, and the densely populated valleys of the western part of the state are the chief centers of interurban railway development. A few of the lines in Pennsylvania are equipped for heavy traffic at high speed. In New York interurban electric railways are found chiefly in the upper Hudson valley, in the Mohawk valley, and in the ricinity of Buffalo. High-speed electric cars now operate from Hudson to Albany, and from Albany north through Saratoga and Glens Falls to Warrensburg, a total distance of nearly 150 miles. Plans are on foot, which will probably soon be realized, to connect the existing interurban lines running out from the large cities in the middle of this state into a chain reaching from Albany to Buffalo.

The Central states, Ohio, Michigan, Indiana, and Illinois, possess the most extensive and efficient high-

speed interurban railways in the country, and illustrate most clearly the future possibilities of this method of transportation. Here coexist all the circumstances already mentioned which contribute to favor the development of such railways. In these states a clear distinction usually appears between urban and interurban lines, and, as a rule, the two classes of railways are controlled by different corporations. The fast interurban railways of these states are tending more and more to compete with steam railways for passenger traffic, even for rides of considerable length. The electric lines have been and are still being constructed with a view to ultimate combination into extensive systems. While the links have usually been built only where the local business itself was expected to prove profitable, the possibilities of through service have always been kept in mind. Already, in several places, the meeting of such shorter electric lines has made it possible to take long journeys by electric cars, in some cases without the necessity of change. Combination of detached lines into systems is being found, as was the case with steam railways, to bring many advantages to the public in the way of through cars and well-adjusted schedules, as well as to the owners in the way of economical operation.

By the courtesy of the Street Railway Journal, a map showing the electric railways of Ohio-as completed, under construction, and projected-is here presented.

The southern shore of Lake Erie is skirted by electric lines from the northeast corner of Ohio to Toledo, and a line which was under construction during the census year now connects Toledo with Detroit. The system from Cleveland to Toledo, which is now controlled by the consolidated Lake Shore Electric Railway Company, has 155 miles of main track. From Cleveland several other important electric railways radiate to the southeast, south, and southwest for distances of 50 miles or more, and it is expected that these lines will soon be extended to Pittsburg and Columbus. A group of four connecting trolley roads reaches from Toledo, through Findlay, Lima, Dayton, and Hamilton, to Cincinnati. The two longest links of this chain are controlled by a single syndicate, and it is probably only a question of time when the others will fall into the same hands.

Another important group of railways controlled by a single syndicate extends from Columbus to Springield and Dayton, and is expected soon to reach Cincinnati, and, by connections with other roads, Toledo also. A steam railway between Wheeling, W.Va., and Zanesville, Ohio, is now being equipped for electric operation, and when this is completed a chain of electric railways will extend from Wheeling, W. Va., through Columbus and Dayton, to Indianapolis, a distance of about 365 miles.

The rail ways radiating from Detroitare likewise extensive and highly efficient in organization and operation. One line reaches west to Jackson, another northwest
to Flint, and a third extends northeast to Port Haron. skirting Lake St. Clair. Each of these line in mote than 75 miles long, and with their interlewing branden they make an elaborate system. Another railway wet from Jackson was opened in 1908, and this compect at Battle Creek with a line reaching nearly acros the state. Probably within a short time connections will he made with Grand Rapids and with the two sstems which extend from there to Lake Michigam.
Indiana rivals Ohio in the extent of its interurban railways. The map herewith presented, aloo prepared by the Street Railway Journal, shows the line that were open, under construction, and projected at the close of 1903.

It will be seen that no less than nine interurtan lines radiate from Indianapolis, and that three others are under construction. Some of these lines run 7 ta mile or more. Perhaps the most extensive interurtan rallway system in the country is that of the Cnion Traction Company, which extends northeast from Indianapolls to Muncie and Marion and north to Kokomo and Logarmport. Additional lines connecting the preent sytexsm by direct routes with Chicago, Toledo, Cinemnati, and St. Louis are projected.
Several important electric railwass aso radiate from Chicago. One of these, the Aurora, Elgin and Chicago. which uses the third-rail system, is conspicuou for itheavy construction and its high speed. Coniderathe progress has also been made in the construction of fant. long electric railways in eastern Wisconsin, in part, of Iowa, in eastern Missouri in the ricinity of St. Louis, in the neighborhood of Los Angeles, Cal., and elsewhere.

## II.

## TRAFFIC AND EARNINGS OF INTERURBAN MAILWATS.

Because of differences in the length of journey- on the longer interurban railways, there is much less sig. nificance in the statistics of the number of passengers carried and the relation of that number to trackage and car mileage than in the case of urban railways. Eew. if any, interurban railways have as yet adopted the practice of steam railways in recording the distances traveled by passengers. The results of operation of fast, long interurban lines can, therefore, be satisfactorily studied only through financial data. Financial tatisties can not be presented for companies by name. However, averages or totals for states or for the countryas a whole, such as have been presented in the tables of Part I, Chapter V, correspond so little with the actual conditions on many individual railways that it has been considered desirable to present certain financial data for specific companies, omitting the names and other means of identification. Table 78 includes 53 of the fast, long interurban lines that reported financial data. The companies with commercial lighting, and those in operation only part of the census year, are distinguished
from the other companies. It should be noted that two or three companies of the larger group did not have all of their trackage in operation during the whole of the census year, but inasmuch as the companies themselves were in operation during the entire year, they have been included in the group of full-time lines. The table shows, per mile of track, the total operating earnings, earnings from strictly railway business (i. e., from passengers, chartered cars, freight, mail, and express), passenger earnings, and combined freight, mail, and express earnings, all of these ratios being based on the total trackage operated, including that under trackage rights. Earnings from the sale of current for light and power, or from miscellaneous sources, do not
appear as a separate item, but are equal to the difference between the first column and the second. The table presents likewise the total railway earnings per mile run by cars of all classes, and the total passenger earnings per passenger-car mile. It is impracticable to present the statistics of earnings from freight, mail, and express business per mile operated by cars devoted exclusively to this business, because of the character of the reports on this point, and because of the frequent practice of handling such traffic in passenger cars. Finally, the table indicates the total amount of operating expenses per car mile for all classes of cars, and the ratio of total operating expenses to total operating earnings.

Table 78.-GENERAL RESULTS OF OPERATION OF 53 FAST, LONG INTERURBAN RAILWAY COMPANIES: 1902.

${ }^{1}$ Car mileage not reported.

Earnings per maile of track.-Confining attention to full-time companies without commercial lighting plants, the average earnings from all sources per mile of track for all companies are $\$ 3,308$, of which $\$ 3,032$ is derived from passengers and $\$ 185$ from freight, mail, and express. Of the 40 companies in this class 9 earn less than $\$ 2,000$ per mile of track. At least 6 of these, however, did not have all their trackage in operation throughout the whole census year. Nine companies earned from $\$ 2,000$ to $\$ 3,000$ per mile of track; 11 , the largest group, from $\$ 3,000$ to $\$ 4,000 ; 4$ from $\$ 4,000$ to $\$ 5,000$; and 7 more than $\$ 5,000$ per mile. While some
of the companies with high earnings per mile of track derived a considerable part of their revenue from passengers carried within the limits of cities, others that earned $\$ 4,000$ or more per mile derived much the greater part of their earnings from strictly interurban business.

Nearly all of the earnings of the first group of railways shown in the table are from strictly railway business. The 5 companies that operate lighting plants, the second group in the table, liave a considerable revenue from that branch of the business, but their railway earnings proper are larger per mile of

track than those of most of the companies without lighting plants. Two or three of the 5 companies do an important urban as well as interurban business. The earnings per mile of track of companies operating during only part of the year vary greatly because of the difference in the length of time that they were operated.

The freight, mail, and express business of the interurban railways shows such widely differing stages of development that an average for all companies is not significant. Eight of the 53 companies shown in the table have earnings from these sources equal to more than one-tenth of their earnings from passengers, and of these 8 companies 3 have freight, mail, and express earnings equal to more than one-third of their revenue from passengers. All of the 4 companies in Michigan operating the entire year do an important freight and express business, and the same is true of the interurban lines of the Detroit United Railway Company, which is not included in the table. Among other companies whose freight and express business is important may be mentioned the Indianapolis and Eastern Railway Company, the Eastern Ohio Traction Company (Cleveland to Garrettsville, etc.), the Cleveland, Painesville and Eastern Railroad Company, the Dayton, Springfield and Urbana Electric Railway Company, the Toledo and Western Railway Company (Toledo to Adrian, Mich.), the Mahoning Valley Railway Company (Youngstown, Ohio, to Newcastle, Pa.), the Los Angeles Pacific Railroad Company, the Erie Traction Company (Erie to Cambridge Springs, Pa.), and the Albany and Hudson Railway and Power Company.

Earnings per car mile.-The ratio of earnings to car mileage on interurban railways is much more nearly uniform than the ratio of earnings to trackage. Moreover, this figure furnishes a basis for comparison of the financial operations of part-time and full-time roads which the ratio of earnings to trackage did not permit. The total railway earnings of the three groups of interurban companies in Table 78 are equal to 20.6 cents per car mile and the passenger earnings are equal to 20.3 cents per car mile. No great difference appears in these ratios as among the three groups of companies. Of the 52 companies for which car mileage was reported, 6 have railway earnings of less than 15 cents per car mile, 16 have earnings of from 15 to 20 cents, 19 from 20 to 25 cents, 10 from 25 to 30 cents, and 1 more than 40 cents per car mile.

Operating expenses.-The operating expenses per car mile for full-time interurban railways without commercial lighting average 12.4 cents, and those for companies operating only part of the year, most of which do not furnish commercial lighting, 13.7 cents. Some of the companies report remarkably low ratios of operating expenses, 10 showing less than 10 cents per car mile. Only 9 of the full-time companies without commercial lighting have operating expenses exceeding 15 cents per car mile, and several of these cases are easily ex-
plained by temporary or exceptional causes. The total operating expenses of companies which do an extensive lighting business are naturally relatively high per car mile.
The average ratio of operating expenses to operating earnings for the 53 fast, long interurban railways in Table 78 is 59.8 per cent. For full-time companies without commercial lighting the ratio of expenses to earnings is 59.9 per cent. Much the greater proportion of the companies have operating ratios between 50 and 70 per cent, but 8 reporta ratio of less than 50 per cent and 13 a ratio exceeding 70 per cent. The financial results of interurban railway business must be considered on the whole very satisfactory.

Growth of trafic.-Several interurban companies, in response to the request of the Bureau of the Census for additional information, presented statistical comparisons showing the growth of their earnings. None of the companies has been in operation more than a few years, but in several instances a marked increase of enrnings has taken place within that time. Thus the Eastern Obio Traction Company states that its passenger earnings were 24 per cent greater in 1902 than in 1901. The Detroit, Ypsilanti, Ann Arbor and Jackson Railway in 1901 had, with the same trackage, about 20 per cent more passenger- earnings in 1901 than in 1898. Much more remarkable has been the growth of freight traffic on some of the lines. The report of the railway last mentioned shows that freight earnings are increasing by from 20 to 30 per cent each year. The Schenectady Railway (Schenectady to Albany, N. Y.), during the twelve months from July 1, 1902, to June 30, 1903, earned about three and one-half times as much from freight and express as during the six months immediately preceding.

Relation between earnings and population served by fast, long interurban railways.-Much interest attaches to the question of the relation between the amount of earnings on interurban railways and the population served. Only rough approximations can be made on this subject. Conditions peculiar to each railway make it impossible to draw from its experiences definite conclusions that can be regarded as typical. The greatest difficulty is found in determining the extent of the population which is to be considered as tributary to a given railway.

For example, where an interurban railway connects a group of small towns with a large city, the resident population of the small towns usually furnishes much more traffic in the aggregate than the resident population of the city, although the inhabitants of the city may greatly outnumber those of all the other towns. The latter contributes some traflic, but it would be obviously improper to combine the population of the large city with that of the small towns in. calculating the per capita traffic. Where two large cities are connected by an electric railway, which also serves inter-
mediate towns, the traffic furnished by the cities is likely to bo somewhat greater than where only a single city is served. The amount of traffic will depend largely upon the distance between the two cities and the comparative speed and charges of the electric and steam service. But even where two cities are connected in this manner it would likewise be improper to count the population of the cities in the same way as that of the smaller towns in determining the relation of traffic to population. In other cases interurban railways connect only towns of mediam or small size. There is ordinarily less to attract travel on such a railway, and the ratio between earnings and population served may he expected to be lower than the ratio in the case of railways connecting with large cities.
It is quite impossible from the available statistics of population to determine the number of the inhabitants of rural communities who can be considered as tributary to an interurban railway. Ordinarily the township, which is the unit for reporting the population, is of such large area that only a small portion of its inhabitants have access to a railway running through it. In some cases, to be sure, interurban lines draw a considerable proportion of their traffic from the farming class. Usually, however, much the greater part of the traffic is furnished by the inhabitants of towns.

Table 79 shows the relation between operating earnings and population for 16 selected fast, long interurban railways. The population is that of the census of 1900 , while the operating earnings are for the census year 1902. The population taken as a basis in each case includes only incorporated places, and does not include large cities serving as termini, which are for convenience designated as "city termini." Of the railways under' consideration 8 are in Ohio, 5 in Michigan, and 1 each in Indiana, Illinois, and Missourí.

Table 79.-Relation of trackage and operating earnings to population served in the case of selected fast, long interurban railways: 1902.

| NUMBRIS OF compary. | Population of incorporated places, not including city termini, per mile of track operated. | Annual operating earnings per inhabitant served. | NUMBER of company. | Population of in corporated places, not including city termini, per mile of track operated. | Annual operating earning per inhabitant served. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1....... | 493 | \$6,61 | 9. | 816 | \$4.29 |
| 2. | 259 | 111.80 | 10.......... | 181 | 9.66 |
|  | 568 | 6.39 | 11.. | 350 | 6.89 |
| 4. | 278 | 14.24 | 12. | 557 | 9.66 |
| 5. | 494 | 27.74 | 13. | 1,009 | 3.98 |
| 6. | 570 | 6.13 | 14. | 1,618 | 8.49 |
| 7. | 230 | 14.83 | 15........... | 2,044 | 2.89 |
| 8. | 270 | 3.96 | 16........... | 696 | 1. 73 |

${ }^{1}$ Freight earnings more than one-seventh of total.
2 Operates a lighting plant.
The first 10 railways referred to in the table all connect towns of small or medium size with a single large city, Dayton, Ohio, with a population of 85,333 , being
the smallest "city terminus" in the group. Number 1 serves 8 towns of between 1,000 and 20,000 inhabitants, with a total population of nearly 40,000 . The largest town served has also another important interurban railway connection. Number 2 serves 5 small towns and 1 of about 20,000 inhabitants, situated at one end of the line. The total population of these towns is between 30,000 and 40,000 . Number 3 connects 1 large town and 4 towns of less than 3,000 inhabitants each with a city, the total population of the 5 towns being about 35,000 . Number 4 connects 4 small towns with a large city, the aggregate population of these towns being less than 8,000. Presumably, a considerable amount of traffic is in this last case furnished by rural communities, while some may possibly come from beyond the terminus of the railway. Number 5 has as one of its termini a town of more than 15,000 people, and serves 4 intermediate places of smaller size, the total population of these 5 towns being between 25,000 and 30,000 . Number 6 serves 3 towns of considerable size and 5 smaller towns, their combined population being more than 50,000 . The town population directly served by number 7 is very small, and it probably carries a considerable number of passengers to a connection with the steam railroad at its terminus. Number 8 connects 3 small towns with a large city. Number 9 serves 1 city of more than 30,000 people and 2 or 3 smaller towns, the total population served being more than 40,000 ; the larger town mentioned has also electric railway connections in other directions. Number 10 serves less than 10,000 people directly, these being mostly confined to the town at its terminus. Presumably, a considerable amount of traffic is due to steam railroad connections.

Numbers 11 and 12 each connect 2 large cities at considerable distances from one another. Probably, however, much the greater part of the traffic is furnished by the intermediate towns, which, in the one case have an aggregate population of more than 40,000 and in the other case of more than 60,000 .

Numbers 13, 14, and 15 do not reach large cities, but in each case have as their termini medium-sized towns with population ranging from 10,000 to 45,000 . They are all lines of considerable length and serve 2 or more minor towns in addition to their termini. Number 16 connects 4 towns of between 5,000 and 25,000 population, and also serves several smaller places. It will be observed that, as might be expected, the ratio of traffic to population is lower in the case of the last 4 railways than in most of the other cases. The "city terminus" has a strong tendency to attract travel on the part of the inhabitants of the neighboring smaller towns.

Most of the railways covered by Table 79 are highly prosperous. More than half of them report a ratio of operating expenses to earnings below 60 per cent, and only 3 have a ratio exceeding 75 per cent.

## III.

## CHARACTERISTICS AND SIGNIFICANCE OF INTERURBAN SERVIOE.

In discussing the broader questions regarding the social and economic significance of interurban railway traffic, it is difficult to avoid entrance into the domain of prophecy. Some of the electric railways have already made such progress in methods that certain prophets look forward to the complete superseding of steam traction by electric traction. However this may be, it is evident that, even if the electric railways confine themselves to the methods already widely prevalent, they are bound to become a social and economic factor of enormous importance. Remarkable benefits have
already been realized from the existing interurban lines, and the extension of such railways to a large proportion of our more prosperous communities seems but a matter of a short time.

As a means of studying more specifically the nature of the traffic of modern fast interurban railways, the Bureau of the Census addressed a special schedule of inquiries to a number of typical lines, most, but not all, of which are of the class designated as fast, long lines. Below is presented a tabulation, for individual companies, of the replies received, so far as they relate to traffic. Several of the railways enumerated are thoroughly typical modern interurban railways. The blanks represent in most cases inability or failure of the company to furnish the desired information.

Traffic of selected
[Prepared from replies to a

${ }^{2}$ Summer resort increases travel 50 per cent during the season.
interurban railways.
special schedule of inquiries.]

| estimated prorortion of passengers who abe carried- |  |  | Percentage of total steam and electric traffic carried by electrie lines. | Effect on local business of steam railways. | Proportion of earnings from freight, mail, and express to total revenue, approximate (per-centage). | Character of freight and express carried. | Remarks regarding frcight and express, |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Wholly within towns (percentnge). | $\begin{gathered} \text { Between } \\ \text { towns (per- } \\ \text { centage). } \end{gathered}$ | $\left\lvert\, \begin{gathered} \text { Between } \\ \text { town and } \\ \text { country } \\ \text { (per- } \\ \text { certage). } \end{gathered}\right.$ |  |  |  |  |  |  |
| 73 | 25 | (1) | 95................. | Decreased 80 per cent; fares unchanged. | 4.5 | Groceries and provisions, small farm products, dry | Will handle greater part of high-class goods ultimately. | ${ }^{1}$ |
| Few. | Nearly all. | Few. |  | Practically all taken awny; trains taken off. | 1 | Packages. | Mining region. |  |
|  | 97.5 | 2.5 | 80 to $90 . \ldots . . . . . . . .$. | Reduced greatly; trains taken off. |  |  |  |  |
| 10 | 75 | 15 |  | Round-trip fares reduced ...... |  | Just beginning | Is creating much new business; expects much express. | 4 |
|  | Nearly all. |  | 75 to 90. | Local business rednced, but long-disrume travel created. |  | Undeveloped. |  | 5 |
|  | 94.5 |  | Much greater part | Reduced slightly . . . . . . .-...... |  | Fruits, produce, groceries.. | 98 per cent is between towns... |  |
| 30 | 85 | 5 |  | Little effect...... |  | Mostly merchandise in mackages. | Express handled by separate company; heavy freiglat not sought. |  |
|  | 285 | 15 |  | Mueh reduced. ......... | $06$ |  |  |  |
|  |  |  |  | No direct competition. | 25 | General Groceries, beer, fruits, mer- | Handles cars from steam roads . | ${ }^{9} 10$ |
| 15 | 75 | 10 |  | Iittle reduction. | -1....... | Groceries, beer, fruits, merchandise. <br> Farm prodnce, groceries, dry goods, light merchan- dise. |  | $1 \begin{aligned} & 10 \\ & 11\end{aligned}$ |
|  |  |  |  |  | 8 |  |  | 12 |
| 3 | 77 | 20 |  | Reduced |  | Milk; beginning only |  | 18 |
| 40 | 40 | 20 | Practically all |  |  |  |  | 4 |
|  |  |  |  | stem fares roduced one -inir. |  |  | Handea by steam locomotives. | 16 |
|  |  |  | 60, of through business. | Affected smaller stations only.. |  | Prodnce, groceries, mili, beer. |  | 17 |
| 30 | 60 | 10 | $95 . .$. | No effect | 25 | General; rapidly growing.. | Thterchnnge with steam ronds; uses steam in part. | 18 |

The electric interurban railways possess, in contrast with steam railroads, several peculiar characteristics which directly affect their methods of operation, and these in turn determine the amount and character of their traffic.

Small units and frequent service.-The greatest difference between the electric and the steam railway lies in the fact that the former operates cars each of which has its own motors, supplied with energy from a single distant source, while the cars of the latter are moved by a separate locomotive which generates its own power. The economy of large scale power production is secured by the electric railway through the construction of a central station. It is, therefore, practically as cheap to run electric cars separately as to run them in trains. On the other hand, the cost of operating a steam railway is greatly reduced by increasing the size of engines and the length of trains. Steam operation, therefore, tends to infrequent service, while electric operation lends itself to frequent service.

The preceding tabular presentation of replies shows that in the Middle West, where the interurban railways usually connect rather small and quite widely separated towns with one another or with larger cities, the passenger cars run, as a rule, once each hour, though sometimes more frequently. The steam trains which actually stop at these minor towns number ordinarily not more than four or five each way per day. The very smallest country villages on the steam roads often have still less frequent train service. Where, as in the more densely populated parts of Massachusetts, the urban communities connected by electric lines are larger and nearer together, the frequency of the electric service is often much greater than that in the Middle West, and such frequency of service means great convenience and saving of time to patrons.

Frequenoy of stops.-The fact that single units of comparatively light weight are operated upon electric railways permits stops to be made much more quickly than with heary steam trains, and likewise permits a much more rapid acceleration after the start. Acceleration is also favored by the nature of electric power and motors. It is, therefore, possible for interurban cars to make comparatively frequent stops while maintaining a high average speed. This fact also tends greatly to increase patronage.

Cost of operation and fares lower than for steam rail-ways.-For reasons which need not be taken up here electric traction is cheaper for short distances and light traffic than steam traction. Interurban electric railways have, therefore, found it possible to charge fares materially below those of the steam railways, and as a result have not merely taken away traffic from the latter, but have developed traffio which otherwise would not have existed at all. The relation between low fares and low operating expenses is reciprocal. Low operating costs make low fares possible, and on the other hand
the reduction of charges stimulates traffic and thereby reduces operating costs and still more fixed charges per passenger.

The replies of interurban railways above presented indicate, in some cases by rather rough estimates, the average rate of fare per mile on typical interurban lines. Most of these lines approximate the steam railways closely in the quality and speed of their local service. The fare is usually from $1 \frac{1}{4}$ to 2 cents per mile, $1 \frac{1}{2}$ cents representing a rough average. Frequently some reduction is made for return trips. In most sections of the country the local fares of steam railways for one-way tickets are about 3 cents per mile. On many electric railways, which connect closely neighboring cities and towns and which have dense traffic, the charges per mile are materially less than those above indicated. This is true, for instance, in Massachusetts.

A prominent steam railway company, operating in several states, submitted to the Bureau of the Census a detailed list of all towns connected both by its lines and by electric railways, with the respective rates of fare in each case. The fares of the steam road for one-way tickets were from one and one-half to five times as much as those of the parallel electric roads. Broadly speaking, the steam railway fares averaged about double those of the electric lines.
The following is a specific comparison of some of the rates of fare on steam and fast electric railways in Ohio:

Comparative fares of steam and electric railways in Ohio.

| dourney. | DISTANCE (MILES). |  | FARE, ONE WAY. |  | FARE, ROUNDTRIP. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Steam. | Electric. | Steam. | Electric. | Steam, | Elec. tric. |
| Cleveland to Ravenna. | 57 | 45 | $\$ 1.15$ | 80.70 | \$2.07 | \$1. 10 |
| Cleveland to Akron | 88 | 36 | 1.00 | . 60 | 1.80 | 1.00 |
| Canton to Akron... | 23 | 21 | . 70 | . 35 | . 88 | , 65 |
| Massillon to Uhrichsville .... | 35 | 37 | 1.05 | . 65 | 1.89 | 1.00 |
| Cleveland to Creston. | 49 | 49 | 1.50 | . 85 | 2.70 | 1.45 |
| Columbus to Newark.......... | 33 | 37 | 1.00 | . 60 | 1.80 | 1.00 |
| Newcastle, Pa.; to Youngstown, Ohio. | 21 | 18 | . 65 | . 80 | 1.17 | . 60 |

Operation in the streets of towns and cities.-By running upon the public streets when they enter a city or town, and by making frequent stops within municipal limits, electric railways become usually much more accessible to passengers than steam railroads, which, as a rule, have only a single station in a town, and that, perbaps, at some distance from its business center. The electric railway is also able to create in addition to its interurban traffic a considerable amount of new traffic within the limits of towns. On the other hand the electric car suffers a considerable disadrantage in the eyes of through passengers, because of the necessity of reducing its speed while passing through municipalities. This matter is less serious in the small towns, but in the larger cities the speed of cars is so much reduced, and the distances to be covered at a slow pace are so great, that the duration of the journey of many inter-
urban passengers is materially augmented. Ultimately many interurban railways will probably secure entrance into cities on private rights of way, or on elevated or underground tracks, but the heavy expense involved will delay the adoption of this policy.
Other advantages of electric lines for interurban serv-ice.-Other peculiarities of interurban railway service, although they are of less importance, may be mentioned. One of these is the fact that the electric car can surmount grades and pass curves more readily than a steam train. This enables electric railways often to take shorter routes than the steam roads, and sometimes to reach villages or rich rural sections not considered accessible by the steam railways. Again electric railways, being capable of earning a profit from purely local business, are often built to connect towns directly, where it was formerly possible to travel from one to the other only by a roundabout journey and a change of cars. The freedom from smoke is a material advantage of electric over steam railways. This advantage is particularly appreciated in the summer, when it permits the electric lines to operate open or semiconvertible cars, giving the patrons the pleasure of a fast open-air ride.

Nature and social advantages of passenger traffo. The importance of the advantages possessed by electric railways for local traffic is sufficiently shown by the extent of their business and by the financial results, which have already been discussed. The interurban railways have greatly increased the aggregate amount of travel in those sections where they exist, the number of passengers carried by the electric lines being usually materially greater than the number formerly carried between the same points by the steam railways. Sereral of the replies received by the Bureau of the Census from interurban railway companies emphasize this point. The president of the Detroit, Ypsilanti, Ann Arbor and Jackson Railway Company said: "The increased travel is new business developed by the electric road from the population that very seldom travel by steam." The representatives of an important company in Ohio said they were informed that, before the electric railway was built between two particular cities of medium size, the steam railroad did a business between them of about $\$ 2,000$ per month. The electric railway now does three times that amount of business with a very much lower rate of fare, while the steam railroad seems to be handling about the same volume of business as before. Several of the officers of steam railways who reported to the Bureau of the Census regarding electric competition also dwelt upon the large new traffic created by the electric lines. (See page 117.)
A part of this new passenger traffic represents the patronage of farmers and their families. To the agricultural population as such the steam railways offer no special conveniences. The farmer must go to town to
take the train. If he lives on an electric railway, the car may stop at his very door. As appears from the tabulation on page 109, most of the interurban companies which reported on rural patronage estimated that from 5 to 20 per cent of their traflic was from the rural population. That the proportion is not larger is due chiefly to the fact that farm dwellings are so widely scattered. A system of interurban railways connecting all the towns and villages in a given section would be conveniently accessible to only a fraction of the agricultural community.
The importance of the service of the electric railway to such of the rural population as come within its reach can scarcely be overestimated. The farmer and the members of his family can go to the neighboring village at the time most convenient to them, and far more quickly, cheaply, and comfortably than by team. In many cases they even become accustomed to make frequent trips to larger cities at a greater distance. The contact with town and city life which is thus made possible contributes greatly to the breadth of view, culture, and happiness of the farm family. The accessibility to markets and shops improves the table and dress and increases the comforts of the home. The social life, the amusements, and the varied interests of the town are made accessible to the country dweller as never before. The children are enabled readily to avail themselves of the superior school facilities of the town. In fact, the electric railway has doubtless contributed materially toward the advancement of the modern movement for the consolidation of rural schools.

Even more important has been the new traffic created by the trolley railway from among the inhabitants of small and medium-sized towns. The greater part of the traffic of most interurban railways either moves between such towns or between them and larger cities. The increased accessibility of the cities to village dwellers is one of the most important services of interurban railways. Many of the interurban lines of the miscellaneous group connect smaller towns only, but it has been found by experience that those lines which reach large cities are the most profitable. In such cities the shopper finds greater variety and often lower prices than at his home town. There the pleasure seeker finds opportunities for enjoyment vastly superior to those in the small towns. Some interurban electric railways have adopted the practice of running special theater cars.
The convenience of the electric service has greatly increased the amount of travel for purposes"purely of pleasure and of social intercourse. From the social standpoint it is probably safe to say that these railways have proved a greater benefit to the women of the communities they serve than to the men. The trolley railway widens the circle of acquaintanceship. Not infrequently special cars are chartered by parties for picnics or for some other social object. Interurban
railways likewise offer facilities for travel, both from the small towns and from the large cities, to outing places and other pleasure resorts, such resorts being maintained in a number of instances at the expense of the interurban companies themselves.

The influence of electric railways in fostering suburban life has already been pointed out in another connection. (See page 28.) It is worthy of note here that some of the longer interurban railways are seeking to develop a form of long-distance suburban trafficthat is, the traffic of persons who go every day to their business in the city and live in the small town, One method adopted to further this object is that of the operation of "limited" cars on a fast schedule on several railways. Thus there is a "limited" service between Cleveland and Painesville, which permits business men to live in the smaller town and yet to reach their offices in the city, 25 miles away, within an hour. Three "limited" cars are also run each way daily between Toledo and Cleveland.

Nature of freight and express traffe. -The method of conducting freight and express business on interurban railways is discussed in Part II, Chapter IV. The nature of this traffic varies considerably on different railways, as may be seen from the statements, tabulated on page 109 , regarding the leading articles carried by several important lines. Generally speaking the traffic consists of light weight commodities.

The significance of the electric railway as a factor in the transportation of commodities lies chiefly in two directions. In the first place it carries considerable quantities of goods between town and country. This transportation business it has largely created, for it either carries goods which were not carried at all before, or else it carries goods previously transported by wagon rather than by steam railway. The farmers who live within a reasonable distance of the electric line can send their milk, butter, provisions, vegetables, and fruits to market far more promptly and easily than before. In this way the nature of farm industry has been materially affected in some communities where the freight business of the electric railways has been highly developed. Moreover', the farmer can get groceries, meats, dry goods, and other light articles from the town much more easily than before the advent of the railway. In the second place, the electric railway furnishes much more trequent and prompt service between small towns, and between these towns and large cities, than is furnished by the steam railways. This is the case not only as compared with the light freight traffic on steam lines but even as compared with their express traffic.

People living in the small towns served by electric railways can now obtain packages of merchandise from the cities more cheaply and promptly than ever before. Local merchants are already making extensive use of
the interurban lines to obtain smaller consignments of merchandise.

The electric railways have in most instances not yet attempted to carry heary freight. They usually do no carload business and have no arrangements for exchanging freight with the steam railways. It has been held by the New York courts that a steam railway, as a common carrier, is bound to exchange freight with electric lines and to furnish the same facilities for doing so that it furnishes to steam railways. Many representatives of the interurban roads express the opinion that the business of handling express and light freight may be greatly developed, but that there is little to be gained by entering the field of general freight traffic. The cases where electric lines have undertaken a general freight business are usually explained by exceptional local conditions.

Influence of interurban railways on local retail busi-ness.-At this point the question arises as to the economic effect of electric interurban railways upon the business of small towns. The class most likely to be affected in its economic interests is that of the local merchants. It scarcely seems probable that the location of manufacturing industries can be materially affected by interurban railways. These railways doubtless tend in some measure to increase local population in cases where the town is near enough to a great city, or to a small industrial center undesirable for residence purposes, to draw as residents people who are engaged in business elsewhere. For example, part of the recent increase in population in Elyria, Ohio, consists of those employed in the new steel and other industries at Lorain, a few miles distant. The small town may also draw some permanent residents from the agricultural sections, who, because of the improved methods of transportation, can reach their farms easily. Increased population, of course, benefits retail trade and local economic interests generally. On the other hand, the railway may tend to take away some of the former patronage of retail merchants, not merely because of the convenience with which customers can go to the larger cities to buy goods, but also because of the convenience with which goods ordered by mail can be delivered. The competition is likely to be felt most keenly by merchants who handle the most valuable and least perishable classes of commodities. But even if there were a net economic injury to the local merchants, the economic advantage to the buyers of goods would probably more than offset the injury, and, from the broad social standpoint, may properly be considered as more important.

In order to ascertain the opinions of merchants themselves regarding the effects of electric railways, the Bureau of the Census addressed schedules of inquiry to prominent dealers in numerous towns that are connected with larger cities by fast and efficient interurban roads.

These schedules were sent chiefly to dealers in dry goods, clothing, and general merchandise. A considerable number of replies were secured, mostly from towns of between 3,000 and 20,000 inhabitants. The gist of these replies is presented in the statement below, which distinguishes the towns of less than 5,000 inhabitants from those of larger size. Four of the most important questions contained in the schedule were as follows:

Have you observed any decline in your trade because people of the town take advantage of the electric railway to go to the larger city to buy goods?

Have you observed an increasel patronayt- frant farnato mat their families as a result of the develoment of the elestru rations
 in your town as to the advantage or dieadnantage to theos frota the construction of interurban electric railways?

Has the interurban railway facilitated yompantes in any hber way, as by enabling yon to get goole from the eity ant fromyly, to go to the city to make wholesale purchaste, or wherwines?
The answers to these questions are presented in the last four columns of the statement, the latt column containing in addition certain other general remarks of a pertinent character which accompanied the answers.

Effect of electric interurban railways
[Replies of local merchants to a
A.-TOWNS OF LESS

| 边 | large citips with whigh connecten, | Name of town reporting. | Popula- tion. | Approximate distance from city (miles). | Merchunts' class of business. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | Philadelphia and Allentown, Pa. | Quakertown, Pa | 3,014 | 10-15 | General merehandise |
| 2 | Erie, Pa................... | Cambridge Springs, Pa. | 1,495 | 25 | Generul merchandise |
| 3 | Cleveland, Ohio | Chagrin Falls, Ohio. | 1,586 | 20 | Dry grods. |
| 4 | Cleveland, Ohio | Oberlin, Ohio | 4,082 | 30 | Clothing... |
| ${ }_{6}^{6}$ | Clevthandand Akron, Ohio Clevelandand Akron, Ohio | Kent, Ohio... | 4,541 | 30-10 | General merehandise |
| $\frac{6}{7}$ | Toledo, Ohio ........... | Ravenira, ohio.. | 4,008 1,766 | ${ }_{10}^{35-15}$ | Dry goods. Dry goods and coothing. |
| 8 | Toledo, Ohis | Perrysburg, Ohio | 1,766 | 10 | Groceries and provisions... |
| , | Dayton, Ohio | Franklin, Ohio. | 2,724 | 15 | Genern merchandise ...... |
| 10 | Daytom, Ohio. | Mfamisburg, Ohio | 3,941 | 15 | Dry goods ........... |
| 112 | Cincimnat, Ohio................-- | Harrison, Ohio. | 1,760 | 20 | Generul merchindise....... |
| 15 | Youngstown, Ohio, and Newcastie, | Mubbard. Ohio... | 1,230 3,829 | $8-15$ | General merchundise ..... |
| 14 | Loz Angeles, Cal ....... | Santa Monica, Cal | 3,829 3,057 | 15 | Dry goods and carpets. Dry goods |
| 15 | Indianapolis, Ind | Greenfield, Ind | 4,489 | 20 | General merchandise |

B.-TOWNS OF MORE

| 16 | Albany and Troy, N. Y. | Glens Falls, N. Y | 12,613 | 45-40 | Dry goods |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 18 | Abany and Troy, N. Y. | Cohoes, N, Y. | 23, 910 | 10-5 | Dry goods |
| 19 | cleveland, Ohio....... | Elyria, Ohio | 8,791 | 25 | Dry goods. |
| 19 | Clereland, Akron, and | Massilion, Ohi | 11,944 | 60-20-10 | Dry goods. |
| ${ }_{21}^{20}$ | Toledo, Ohio. | Bowling Green, Ohio . | 5,067 |  | Dry goods and clothing |
| 22 | Daytor, Ohio. |  | 9,654 | 30 | Dry goods . . . . . . . |
|  | Dayon, Onfo. | Xenia, Ohio | 8,696 | 15 | General merchandise |
| 24 | Davton, Ohio. | Greenville, Ohio. | 5,501 | 35 | General merchnndise |
| 25 | Youngstown, Ohio | Warren, Ohio | 5,881 | 20 | Dry goods.. |
| 28 | Detroit, Mich... | Jackson, Mich | 8,829 $-8,180$ 0 | 15 | Dry goods. |
| ${ }_{28}^{27}$ | Letroit. Mich. Detroit Mich. | Flint, Mich . | 2,180 18,103 | 70 | Dry goods........... |
| 29 | Detroit. Mich. | Mt. Clemens, Mich | - 6,576 | 60 | Genera merchantiso |
| 30 | Grand Rapids, Mieh | Yopsiland, Mich. | 7,378 | 95 | Dry groods. |
| 31 | St. Louis, Mo. | Eellerille, Ill | 7,790 1748 | 25 | Furniture |
| 33 | St. Louis, Mo ... | East St. Louis, | 17,484 29,655 | 15 | Dry goods. |
| 34 | Fort Wayne, Ind | Peru, Ind ..... | 29,655 |  | Dry grods. |
| 35 | Chicago, Il . | Evanston, I | 8,463 19,259 | 15 | General merchundise |
|  | Сйgo, | Joliet, II. | 29,353 | 35 | Dry goods............. |

## INTERURBAN RAILWAYS-ECONOMIC, FINANCIAL, AND SOCIAL FEATURES.

upon retail business in small towns.
special schedule of inquiries.]
THAN 5,000 POPULATION.

| Effect of railways on sales to people in town. | Effect on sales to farmers and people from smaller villages. | General opinion of merchants as to effect of railways. | Remarks. | 宮 |
| :---: | :---: | :---: | :---: | :---: |
| Decrease | Some increase . . . . . . . . . . . - | Harminl. | Trade about 6 per cent less in 1903 than in 1902.............. | 1 |
| No effect | Increase, especially in bad weather. | No harm ...................................... | Smallest towns suffer | 2 |
| Many go to city | No effect ................... | No reply. | "Bleeding us and feeding cities". | 3 |
| No effect. ......... | Increase .................... | Merchants about evenly divded.... |  | 4 |
| Our trade increased | Increase in rainy weather... | Majority think beneficial | Sales increased about 40 jer cent since 1896. |  |
| No injury..................... | Increase... | Beneficial | Can get goods more promptly. .................................. | 6 |
| No injury.................... | Little effect | Beneficial | Increased facilities for going to market and transporting merchandise. | 7 |
| No injury. | No effect | Beneflcial | Convenience in getting goods at short notice. | 8 |
| Decrease ....... | No effect | No reply | "Big city will swullow" | 9 |
| Checks ingrease | Decrease | Harmiul | If 20 miles away from eity would be all right. | 10 |
| No injury. | Increase. | Beneficial | Increase of population using interurban cars to go to work. | 12 |
| Noinjury. | Increase | All think benefiei | Increase of trade about 18 per cent in four years. | 13 |
| Takes avay certain classes of trade. | No effeet | Great benefit | Sales rapidly increasing; country prospering; aid in getting of goods. |  |
| Decline in clothing ........ | Increase | Very beneficial. | Easier to gel goods; carry less stock..................... | 15 |

THAN 5,000 POPULATION.


A marked diversity of opinion appears among these replies. Doubtless the differences are partly due to the "personal equation," but in part they must represent differences in actual conditions. Whether the effect of the opening of an electric railway between'a town and a large city will be beneficial or injurious to the town merchants depends upon the size of the town, upon its distance from the city, upon the comparative excellence of the shops, upon the character of the rural population surrounding the town and the extent to which that population is served by the railway, and upon other similar causes.
Of the merchants in towns of less than 5,000 inhabitants, 5 express in one form or another the opinion that the interurban railway has been detrimental to their interests, 8 hold that they have been benefited, 2 are indefinite, and 2 do not reply. In most cases the persons who reply think that the general opinion of merchants agrees with their own.
Five merchants in the 20 towns of more than 5,000 inhabitants declare that they have suffered injury from the electric railway. One of these towns, Evanston, however, is essentially a suburb. The merchants of Ypsilanti and Mt. Clemens are particularly emphatic. These towns lie 20 miles or more from Detroit, but they have highly efficient electric service. They are in a rich agricultural region, and one might expect some increase in trade from farmers who patronize the electric railway, but such increase is denied in these reports.

A majority of the merchants of this group, however, assert that the local retailers have derived a benefit. Several of the replies, however, come from towns of considerable size, situated at some distance from any large city. The new railways naturally bring trade to such towns from the smaller villages. Several of the dealers of this group, especially in the larger and more distant towns, emphasize that point strongly. Numerous dealers in towns of less than 5,000 inhabitants, as well as in the larger towns, report an increase in their country trade as the effect of the trolley lines, three referring particularly to the advantage in this respect during inclement weather. Several merchants also speak of the advantage which the railway has conferred in enabling them conveuiently to go to the city to make wholesale purchases, and also in enabling them, through the express and freight service, to get goods delivered more promptly, thus aroiding the necessity of keeping large stocks or of disappointing customers.

Some of the replies from merchants are very suggestive. One from Massillon, Ohio, says:

Complaints are occasionally heard from merchants and dealers in small places and country towns that the interurban lines would carry their trade to the larger places, but I think in most cases they have been more than compensated by the extra number of people coming in and going out all the time and, as a rule, are very well satisfied after the lines are established. The old idea of carrying off trade and scaring the horses is dying out, and we predict that
before long the electric lines will be carrying the bulk of the farmers' produce to market.
The following is from a large concern in Jackson, Michigan.
We anticipate that trading centers, both large and small, will be considerably benefited by the extension of electric car service. If we lose by customers going to the larger city in some'instances, we gain by an increased number coming from smaller places to us, and smaller towns will benefit by the ease with which farmers can get to them.
In opposition to the opinions of these two merchants as to the benefit derived from the electric railway by the smallest towns should be noted two or three replies from towns which have experienced a benefit, in which the opinion is expressed that retail trade in smaller towns has suffered. Had more numerous replies been secured from towns of less than 2,000 inhabitants, it is possible that the proportion of unfavorable opinions would have been larger.
There can be little doubt that more people than formerly go from the small towns reached by electric railways to the cities to buy certain classes of goods. In some, and possibly a majority of instances, this loss to the local merchant is more than offset by the increased population of the town and by the increased patronage from the farming classes. That the merchants in the large cities served by interurban railways have profited to some extent is beyond question. The Bureau of the Census, in fact, received replies to its schedule of inquiries from a number of merchants in such towns as Akron, Dayton, and Syracuse, which asserted that trade had been materially increased by the interurban lines. The electric railway not merely creates new passenger traffic but it creates at the same time a new demand for goods and augments the total retail trade of the sections served.

## IV.

## INFLUENCE OF INTERURBAN ELEOTRIC RALLWAYS ON STEAM RAILWAYS.

The frequent service, convenient stops, and low fares of interurban electric railways have, in many instances, seriously affected the local traffic of steam railways connecting the same towns, this being specifically asserted in many of the replies from interurban railways presented on page 109.

It is probable that the increase in the average length of journeys on steam railways, as revealed by the official statistics, is in part attributable to the relative decline of local traffic through electric competition. During the five or six years prior to 1897 the average length of passenger rides on the steam railways had not increased by more than 5 per cent. On the other hand, the average ride increased from 25.04 miles in 1897 to 30.3 miles in 1902, or 21 per cent. ${ }^{1}$

[^30]There is considerable difference of opinion as to whether, in general, electric railway competition up to the present time has been injurious to the interests of the steam railways. In order to ascertain the views of dailroad officials themselves on this subject, inquiries were addressed to the traffic officers of the leading railroads in the Northern and Eastern states. Replies were received from 14 of these companies, namely: 'The Baltimore and Ohio; Boston and Albany; Boston and Maine; Chicago, Cincimnati, and Louisville; Erie; Flint and Pere Marquette; Lake Erie and Western; Lake Shore and Michigan Southern; Lehigh Valley; New York, Chicago and St. Louis; New York, New Haven and Hartford; Pennsylvania; Toledo, St. Louis and Western; and the Wabash. The substance of these replies is presented in the tabular statement below,
the names of the individual companies being omitted. The first 7 companies in the table are situated, in whole or in part, in the seaboard states, while the last 7 are situated in the North Central states. The most important questions in the schedule were as follows, the questions corresponding in order to the columns in the statement:
To what extent, if at all, has the local passenger traffic of your company been reduced by the competition of these lines?
To what extent, if at all, has long-distance traffic on your railroad been created by the conveniences offered by electric railways for reaching the steam road?

Has your company, as the result of electric railway competition, (a) Reduced fares? (b) Increased or decreased the number of trains? (c) Otherwise changed or improved its loual service?

Do you anticipate such further extension or improvement of interurban lines as to render them more serions competitors for either local or long-distance passenger traffic?

Replies of steam railroads regarding the effect of electric railusay competition.

| Number. | EFFECT Of ELECTRIC LINES | Eftect on long-distance traffic. | effect on practice of steam innes. |  | Ulimate and general effect on steam linus. |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | POINTS. |  | Fares. | Number of trains. |  |
| 1 | For distances of 15 miles or less: proportion lost varies. | Inappreciable. | Reduced on one braneh. | Increased by 11. | Do not anticipate sreater competition; can not tell. |
| 2 | 90 per cent. . . . . . . . . . . . . . | No reply...................... | Reduced in a few cases. | None | Will hecome more serious competitors in longdistance travel. |
| 3 | Considerable | No reply. | None. | Trains and stops reduced; better service forlonger rides, | No reply. |
| 4 | 10 miles or less, decrease 90 per cent; 10 to 50 miles, 50 to 75 per cent. | None | None | Decreased to mininum. | Will cut into business up to 50 miles. |
| 5 | Decreased for distances to 25 miles. | None | No reply................. | No reply. | Steam lines can not overcome loss of busimess by lowering faras. |
| 6 | Materinl..................... | No reply. | No reply | No reply. | No reply. |
| 7 8 | Enormous | No reply Cross lines serve as feeders. | No reply ............... | No reply. | Noreplr. |
| 8 | St percent | Cross lines serve as feeders. | None . ${ }^{\text {Reducer slightly...... }}$ | Nome... | Bencficial; creating long-distance travel. No immediate change anticipated. |
| 10 | Practically all business done by clectric line. 1 | No reply........................ | None .................... | None | Serious where lines are parallel, at least on local business. |
| 11 | About 25 per cent....... | Will finally increase it . . . . . | Reduced | None | Bencelichal; inereasing long-distunce trayel. |
| 12 | 25 to 75 per cent | None | None .... | Nome | Will take away mone business by extension. |
| 13 | Increase checked | Increased at one or two points. | Reduced | None | Not serions; probably creates freight business to suburbs. |
| 14 | 25 to 75 per cent | None. | None | None | New lines will eat further into local trafite. |

${ }^{1}$ Electric railway built before stenm road.

Of the 14 replies in the table, one states that increase in local steam railway traffic between points served by the electric railways has been checked, while all the rest say that local traffic has been reduced, in most cases very sharply. The distance within which electric competition is at present effective naturally varies with the efficiency of the electric service.
Statistics showing the effect of interurban competition have been published in various railroad and other periodicals. Thus, one journal states that oi the Lake Shore and Michigan Southern Railroad the number of local passengers carried between Cleveland and Oberlin and intermediate points fell from 203,014 in 1895 to 91,761 in 1902, and the number carried between Cleveland and Painesville fell from 199,292 to 28,708. On the New York, Chicago and St. Louis Railroad the passengers between Cleveland and Lorain fell from 42,526 in 1895 to 9,795 in 1902. ${ }^{1}$
Some of the representatives of interurban railways

[^31]assert that whatever loss the stenm railways suffer in local traffic is offset by the gain in long-distance traffic induced by the electric lines. The fact is pointed out that much of the passenger traffic on the electric railways is new traffic. It is suggested that the habit of traveling is being developed among people who formerly seldom traveled at all, and that this fact, combined with the fact that steam railways have been made more accessible through connection with electric lines, leads to the conclusion that steam railway systems will ultimately be benefited, if they are not already deriving benefit. An official of a prominent eastern steam road recently asserted that the electric roads take away about 65 per cent of the local business, but in a year or two new through business, more profitable than that lost, comes to the steam railway through the aid of its competitor. Three of the officials of steam railways, replying to questions of the Bureau of the Census, take somewhat the same position. One says, "I myself do not view competition as being detrimental to the interests
of this company. Am of the opinion that interurban lines, as a whole, will finally work out to the good of the public and induce long-distance travel by people who have heretofore been indifferent to things that were not purely local." This official, however, does not claim that the benefit mentioned has been as yet definitely experienced.

A majority of the replies from officers of the steam lines, however, deny that there has been an increase in long-distance travel as a result of the electric railways, and several assert that they expect still more serious injury in the future from the increase in the number and length of electric lines and the improvement of their facilities. The consensus of opinion seems to be distinetly hostile to the electric railways. Doubtless the time has been too short to enable steam railway officials to reach final conclusions on this subject, and it is perhaps natural that they should at first be more suspicious and hostile than the ultimate effects of electric competition would justify.

The policy of steam railways with regard to meeting electric competition varies greatly and is much affected by the local conditions. Five of the 14 replies above tabulated state that local fares have been reduced, at least in some cases, but 6 assert definitely that this has not been done. Another company says that because of the other advantages possessed by electric railways the loss of business can not be overcome by lowering the fares on the steam railways. This appears to be the general view of steam railway men. ${ }^{1}$.Two of the companies report that they have been forced to reduce the number of local trains on account of inability to compete with electric lines. One company, on the other hand, apparently as a competitive measure, has increased to some extent its local train service.

As an illustration of a policy which is probably pursued by a considerable number of companies, the following more extended quotation from the reply of a prominent traffic official may be given:

It has been the policy of this company not to meet trolley competition by a reduction in rates, for the reason that this action on one division of our system would create jealousy on the part of people living in other suburban territory, and is likely to result in similar reductions on all branches in suburban districts.

Our experience has taught us that the electric railway, in being able to take the passenger from his house direct to his office at a nominal rate, eventually gets enough of the steam line's traffic to eat up all its profit and it can not be covered by any reduction in rates. We have therefore followed the method employed by [certain other lines], viz, to take off stops at near-by points most affected by trolley competition, thus giving patrons at stations farther away from the terminal quicker and better service, and wait for the overflow travel served by the trolley lines in the outlying districts, which seeks the railroads in bad weather and eventually increases to some extent its aggregate of business.

The open trolley cars in warm weather are particularly attractive to the suburbanite, as is shown by a comparison of the earnings of our $* * *$ branch during the month of August as compared

[^32]with November, aggregating about $\$ 5,590$ in the former and $\$ 11,700$ in the latter.
The suggestion in this letter that the reduction of certain kinds of suburban service on the steam railways permits improvements in other parts of the service, is one which has been brought out at various times by other representatives of the steam railways. Some few have gone so far as to hold that the benefit resulting from the reduction of the local service was greater than the injury suffered. A writer in a prominent railway journal has even claimed that suburban service is usually unprofitable to the steam railways and that it interferes very seriously with their through traffic.. Evidently what would hold true of some railways would not hold true of others. Some companies have derived a large part of their revenue from local passenger traffic, and have built branches primarily to accommodate such traffic. It is probably a fair conclusion from experience that a main line may gain traffic by being paralleled by an electric railway, but that a branch line is almost sure to lose.
Two or three of the important steam railways which have been most affected by electric competition have sought to meet it by themselves introducing electric service between certain points. As far back as 1895 , the New York, New Haven and Hartford Railroad Company equipped its Nantasket Beach system with electricity, and later three other branch lines were so equipped. The most important of these branches is that between Providence and Fall River. The fare between these points was reduced from 50 to 20 cents, and the frequency of service greatly increased. More recently, the Boston and Maine Railroad has built, an electric line for heavy service between Concord and Manchester, N. H., and it also controls an electric system in Maine. The Pennsylvania Company has an electric system along the seashore in southern New Jersey. The Long Island Railroad has a stretch of track along the seashore which it has equipped with overhead trolley wires. Local electric cars and steam trains covering longer journeys operate over the same track. Such a combination has at the present stage of development many advantages, but the conditions of traffic are not always adapted to it.
In several instances electric traction has been applied to entire railways which were formerly operated by steam, or has been combined with steam traction on new lines. In most such cases, freight traffic is hauled by steam locomotives. Among railways of this type are the Cincinnati, (xeorgetown and Portsmouth, the new line between Bellaire and Zanesville, Ohio, the Peoria and Pekin Terminal Railway, and the Waterloo and Cedar Falls Railway (Iowa).
In two or three instances, steam railways have permitted separate companies to equip a part of their tracks

[^33]with electricity for the handling of local traffic. Such an arrangement exists on the line of the Northern Pacific Railway between Everett and Snohomish, Washington.
It is very probable that steam railways will, to an increasing extent, equip existing tracks with electricity for the bauling of a part or all of their traffic, or will build new electric lines at least for suburban passenger service. While the main purpose of the New York Central and Pennsylvania railways in introducing electric traction at their New York termini is to promote safety in the tunnels, they will gain also in the greater attractiveness, frequency, and cheapness of the suburban service which they furnish. In the case of the New York Central, at least, suburban trains will be operated to their destination by electricity. Two serious difficulties are, however, encountered by steam railways in attempting to use electricity for suburban trains. In the first place, it is hard to carry the electric current through the complicated switch tracks in the terminal yards. In the second place, if trains are run often enough to compete with those of the purely electric railways, they are likely to interfere with through passenger and freight trains. Indeed, the suburban service of a large city, whether conducted by steam or electricity, can be made thoroughly satisfactory only where it uses its own tracks, completely separated from the tracks devoted to through traffic.
This last consideration also bears on the question of the general future development of electric railways. It is not likely that interurban electric lines of the present type, even though they may be extended into long systems, can handle satisfactorily and on a large scale both local and through passenger and freight business. Even if single tracks be replaced by double tracks there is apt to be great interference between these different classes of traffic as soon as the aggregate
business becomes heavy. The advantage of the local service of the interurban lines consists in its frequency and its numerous stops. Local cars are very likely, therefore, to get in the way of fast through trains; while on the other hand the slower through freight trains will tend to impede the local passenger cars. It has been suggested that freight trains might be broken up into separate units. This would largely do away with the necessity of switching, which is one of the chief causes of the delay in handling steam railway freight, and would thus increase the speed of through freight service. But to do this would so greatly multiply the number of moving units on lines with an extensive business that a single track could not possibly accommodate all the traffic in one direction.
These same considerations also cast doubt upon the possibility of so revolutionizing the working of the more important of the present steam railways, by the partial or complete introduction of electric power, as to enable them to perform both their present functions and the added functions of the interurban lines. Whereever traffic is very dense two distinct railway systems seem desirable-one for local traffic, both passenger and freight, and the other for through traffic. Both of these systems may ultimately be operated by electricity. Both kinds of railways in a given section may finally fall under the same ownership. Cooperation between them would afford many conveniences and economies. But the public will gain if these two conflicting kinds of traffic are handled on separate tracks. Where, however, the aggregate traffic is comparatively light, much would doubtless be gained if the present steam railways, following the example of the interurban railways, would increase the frequency and convenience of their local freight and passenger service by the use of single cars operated by electricity on their existing tracks.

## CHAPTER VIIT.

## CONSOLIDATION OF STREET RAILWAYS.

Generul tendency and its results.--One of the most important factors in street railway progress has leeen the combination of formerly independent railways into great systems. Fifteen or twenty years ago most of our large cities were served by several separate animalpower railways. Many of the old companies operated one line only, occupying either a single street or a few streets connecting with one another, and furnishing transportation to a single section of the city. There was usually no competition between these independent companies in the matter of fares. In many instances, indeed, the opportunity for competition was slight, the areas served by the different companies overlapping but little; yet in some cases, as in New York, parallel lines existed which, to a limited extent, competed for traffic by improvements in service.
The introduction of mechanical traction, especially of electric traction, developed a much stronger tendency toward consolidation than existed before. One motive for combination was doubtless a desire to eliminate competition, for the cheapening of the cost of operation by the new method tended to increase the number of competing lines. By combination also unnecessary duplication of trackage was avoided. Even more important was the desire to reduce operating expenses. So long as oach car had possessed its independent source of power, as was the case with animal traction, there was, after the system had reached a limited size, little saving in cost through doing business on a larger scale. Cable or electric power could be much more economically furnished by power plants of great capacity, capable of operating several railway lines. By consolidation, moreover, it was possible to locate the power houses in such a way as to reduce the amonnt of electrical or cable equipment necessary for the distribution of power, and also to sare in the expense of bringing coal to the plant. A further advantage from operation under unified control was found in such instances as frequently arise in the business centers of cities, where a single track is used for cars of sereral different lines. If these lines were operated by separate companies it became necessary, with electric traction, either to maintain several overhead wires or to euter into complicated agreements for the assignment of the cost of power from a single wire. If operated by a consolidated company the power furnished by a single set of wires would serve, without
elaborate calculations, for the operation of all the lines. Other minor economies of a like character secured by combination do not call for discussion.
The greatest advantage of consolidation was one which accrued both to the users of the service and to the street railways themselves. The establishment of a unified system made it possible to carry passengers more nearly where they wanted to go and to carry them longer distances. In many cases these advantages were secured by moditying and extending the routes covered by single cars; in other cases transfers to comnecting lines were given. ${ }^{1}$ So long as connecting lines, were operated by different companies, the use of transfers involved complication and difficulty and was rarely known. The lengthening of the possible trips, which increased the attractiveness of the street railway, so augmented the traffic that it proved decidedly profitable to the companies.
So great were these various advantages from combination found to be, that in almost every great city of the United States all, or nearly all, of the formerly independent companies have been gradually brought together into one system during the past ten or fifteen years. This has been true in Brooklyn, Baltimore, Boston, Philadelphia, Buffalo, Cincinnati, Pittsburg, Cleveland (since the census year), Detroit, St. Louis, in the urban center consisting of Jersey City, Newark, Paterson, and smaller tomns, in Minneapolis and St. Paul, in New Orleans, Louisville, Milwaukee, Denver, Omaha, and in several other large cities.

In several of these cities one or more minor lines, mostly of a suburban character, are still outside the consolidation. In Manhattan and Broux boroughs of Greater New York a single company now operates the surface railways, while another company controls all the elevated railways as well as the subway system. The greater part of the street railway traffic of San Francisco is carried by a single company recently consolidnted, although several independent companies of some importance still exist. Combination has been effected to a considerable extent in Chicago, but that city still has two extensive systems of surface railways and several minor systems, as well as four elevated railways which are independent of the surface railways and

[^34]of one another. These various lines, however, largely serve separate sections of the city. In Washington two important companies are still in independent existence.
Elsewhere has been pointed out the increase in the average importance of the individual railway companies in operation in 1902 as compared with 1890, an increase due largely to the process of consolidation. This increase in the importance of companies is still further brought out by the following table, which, for 1890 and 1902 , classifies the operating companies according to the number of miles of line operated (first main track, not all tracks), and also indicates the total length of line owned by companies falling within the various groups. The figures for 1890 include only the companies for which precise returns of trackage were made.

Table 80.-Distribution of operatirg companies according to length of line: 100 and 1890.

| d, ENGTH OF JINE (MLLES). | 1902 |  | 1890 |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Number of comspanies. | Length of line, miles. | Number of companies. | $\begin{aligned} & \text { Length of } \\ & \text { nine, } \\ & \text { miles. } \end{aligned}$ |
| Total. | \$17 | 16, 651. 68 | 601 | $15,119,53$ |
| Under 10 | 394 | 1,957.16 | 6in | 2,304, 49 |
| 10 but under 20 | 214 | 3,144.91 | 99 | 1,353. 42 |
| 20 but under 30 | 76 | 1,878.64 | 16 | 400.39 |
| 30 but under 40 | 34 | 1,197.88 | 7 | 251. 74 |
| 40 but under 50 | $\underline{9}$ | 1,117.05 | 1 | 178.04 |
| 50 but under 60 | 16 | 892.86 | $\stackrel{4}{2}$ | 101.57 |
| 60 but minder 70 | 12 | 785. 22 | 2 | 130, 33 |
| 70 but under 80 | 7 | 583.46 | 1 | 76.48 |
| 80 but under 90 | ${ }^{6}$ | 515.30 | 1 | 81.42 |
| 90 but under 100 | 3 | $\underline{277.12}$ |  |  |
| 100 and over | -5) | 4,349. 10 |  | 288.65 |

${ }^{1}$ Exclusive of 663.94 miles, estimated, in 1890.
It will be seen that in 1890 more than tbree-fourths of all the companies had less than 10 miles of line each, and the total line of such companies was more than twofifths of the total for the United States. In 1902, on the other hand, less than one-half of the companies were of this small size and their total length was only about one-eighth of that for the country. In 1890 there were only 8 companies with more than 50 miles of line, while in 1902 there were 69 companies of this size. In 1890 only 2 companies had more than 100 miles of line and their length was less than one-twentieth of the total. In 1902, 25 railways were more than 100 miles long and their aggregate line was considerably more than one-fourth of the total for the United States.

Methods of combination.-The three leading methods of consolidation in the street railway business have been:
(1) Merger. The properties of the former companies are bought outright, for cash or for shares of the new corporation, and the old corporations go out of existence.
(2) Lease. The controlling company takes over the entire operation of the system of the lessor, often for nine hundred and ninety-nine years, and agrees to pay
a definite rental to the lessor company, the latter continuing at least nominally in existence.
(3) Stock ownership. Purchase of all, or of a controlling interest in, the stocks of companies, which continue in existence and may even continue to maintain nominally independent operation.

In several cities, two or even all three of the abovementioned methods of combination bave been employed, more or less indiscriminately, in bringing together a single street railway system. In others, one method of combination has been followed exclusively or has predominated. State laws or municipal charters and franchises have sometimes been the determining factor as to the form of combination used.

Probably the greater number of the street railway consolidations have been effected through merger. This was the form of combination employed in most mediumsized cities. It was also the form followed, in whole or in part, by the West End Street Railway Company of Boston (which is itself now, however, leased to the Boston Elevated Railway Company), the Detroit United Railway Company, the New Orleans Railways Company, the United Railways and Electric Company of Baltimore, and others.
Consolidation by means of leases ${ }^{1}$ is particularly common in New York and Pemnsylvania, the laws of the latter state rendering other forms of consolidation less practicable. The operating company or lessee regularly assumes the indebtedness of the lessor company, and guarantees a fixed dividend on its stock, except in cases where stockholders receive no return from any source. It is quite a common arrangement that the rate of dividend guaranteed shall increase year by year from the date of the lease, till, after six, eight, or ten years, a maximun is reached which remains the basis of future payment. In a few instances the lessor companies continue, at least temporarily, to be operated separately, but usually they are as completely united with the controlling company under one management as if they had been merged with it.
The lease is sometimes used where its object is not primarily that of consolidation. Thus, the St: Louis Transit Company, in 1899, acquired by lease the United Railways Company, which had already secured control of all the street railways of the city except two or three suburlan lines. So, too, the Cincẹmati Traction Company recently leased the lines of the Cincinnati Street Railway Company without increasing the number of companies in the combination. The purpose in such cases may be to facilitate a change in the control of the business; or the lease may be merely a device by which, without any real change in ownership, a large part of the net earnings of the system may be given the appear-

[^35]ance of being necessary to meet fixed charges, since the operating company always treats its rentals as such.

The third method of combination, by stock ownership, while found less frequently than either of the others, is being adopted apparently as the favorite method to accomplish the greatestconsolidations. Like the lease, it offers the advantage that the original companies maintain their corporate existence, upon which the validity of franchises and privileges sometimes depends. It has the further advantage that a company may be brought into combination merely by the purchase of a majority of its stock withont the purchase of its entire property. For this reason this form of combination is sometimes made a preliminary step toward a later combination by merger or lease.

Companies which are already operating railways quite frequently buy a majority or the whole of the stocks of other companies in order to secure control. In such case the subsidiary company may keep up nominally independent operation, but in reality its operations are merged with those of the controlling company to whatever degree the latter desires, for the purpose of effecting economies or for other objects. Thus the Metropolitan Street Railway Company in New York (itself leased to the Interurban Street Railway Company) has for a number of years held a controlling interest in the stocks of three other railways, which it practically operated directly, although separate reports of their business were made.
The latest development in methods of consolidation is the securities company; a corporation which merely holds the stocks of operating street railways and does not itself own any tracks or conduct any operations, but receives its income from the dividends of the corporations whose stocks it holds. This method has been employed, for example, in recent great street railway combinations in New York, Brooklyn, Pittsburg, Buffalo, Minneapolis and St. Paul, and San Françisco. In some cases a holding company of this type leaves all of its subsidiary companies in separate operation, though, of course, their independence is only nominal. Inseveral cities the holding company has placed the entire operation of the plants which it controls in the hauds of a single one of the subsidiary companies. Thus the Philadelphia Company, of Pittsburg, which, besides holding practically all the street railways of that city and vicinity by stock ownership or lease, also controls gas, electric light, and other properties in the same way, has handed over the operation of its street railway system to the Pittsburg Railways Company, specially chartered for that purpose. A similar arrangement exists between the International Traction Company of Buffalo, a holding company, and the International Railway Company, which operates its lines. The consolidation in San Francisco took the same form.
An interesting recent development is that of bringing together under common ownership street railway
lines widely separated from one another. Comparatively little of the advantage of combination between connecting or competing lines is secured in such case. There may be some slight economy in doing away with unnecessary superior officers, and methods of operation may be improved by reason of the superior capacity and experience of the officers of the central company. The chief object in the formation of such companies, however, is to furnish a convenient form of investment to capitalists. Instead of individually buying the securities of railway companies situated, perhaps, in distant sections of the country, with whose operations they could have little familiarity, investors form a holding company, with officers whose duty it is to represent their interests and watch the management of all the different railways.

Holding companies of this type have been developed to a greater extent in Philadelphia than anywhere else. The Interstate Railways Company, which succeeded the United Power and Transportation Company in 1902, controls about 15 street railway systems in Pennsylvania, New Jersey, and Delaware, together with 2 electric light companies. It has also acquired the stock and franchises of numerous new railway companies. Some of the lines controlled are more or less closely connected, and others may be brought into comection later, but the primary purpose has been, apparently, not so much to make a single great system as to provide a convenient form of investment. The American Railways Company of Philadelphia controls 8 or 9 widely separated street railways and lighting plants in Ohio, Illinois, New Jersey, and Pennsylpania, and also a minority interest in the stock of the Chicago Union Traction Company. The Railways Company General controls stocks of 7 railway lines, and lighting plants in New York, Pennsylvania, and Michigan.
The United Gas Improvement Company, of Philadelphia, has recently extended its investments into the street railway field. This company operates the Philadelphia Gas Works and controls, in one way or another, the gas and electric light properties in more than thirty cities of the United States. One of its subsidiary corporations is the Connecticut Railway and Lighting Company, which in 1900 secured control of street railways serving a dozen different towns and cities in Connecticat, including about 160 miles of track, or more than one-fourth of the entire trackage of the state. The Connecticut Railway and Lighting Company also operates water, gas, and electric light plants. The United Gas Improvement Company in 1902 secured control of almost the entire street railway system of Rhode Island. Its relation to its subordinate companies in that state is peculiarly complicated. A corporation known as the United Traction and Electric Company, chartered in New Jersey, owns the stocks of the three leading street railway companies of Rhode Island. These companies, however, are leased to the Rhode Island Company, an
operating corporation created in 1902 by special act of the Rhode Island legislature, which has agreed to pay a rental sufficient to provide the United Traction and Electric Company with interest on its bonds and 5 per cent dividends on its stock. This rental is guaranteed by the United Gas Improvement Company, which is the promoter of the entire combination. Finally, the stock of the Rhode Island 'Company is owned by the Rhode Island Securities Company, a New Jersey corporation, through which the United Gas Improvement Company exercises its control. The street railway trackage in this combination amounts to about 270 miles. The Rhode Island Securities Company is also acquining gas and electric light properties in this same territory. In 1908 a consolidation of nearly the entire gas, street railway, and electric light business of northern New Tersey was effected under the name of the Public Service Corporation, and this company is said to be affiliated with the United Gas Improvement Company.

Centralized ownership of street railway properties has also been brought about in a number of instances without the intervention of formally organized companies. The very wide reaching street railway investments of the so-called Whitney-Elkins-Widener syndicate is the most important instance. A number of banking firms in eastern cities control, in the interest of their clients, several railway and lighting plants in scattered localities.

A combination of somewhat unusual form is that known as the Massachusetts Electric Companies, formed in 1899. This is not an incorporated company, but, a voluntary association managed by a number of trustees, who hold title to the stocks of street railways and electric light plants, and who have issued trust certificates, common and preferred, to the amount of about $\$ 35,000,000$. This association has bought up the securities of thirty or forty companies originally separate and has consolidated most of them into three operating companies-the Boston and Northern Street Railway Company, the Old Colony Street Railway Company, and the Hyde Park Electric Light Company. The street railways controlled have more than 850 miles of track, including nearly all the lines in eastern Massachusetts outside of the city of Boston. This combination has aimed to establish a unified system of transportation out of the formerly disconnected lines. It has been able through combination to renlize important economies, as well as to give advantages to the public. The Boston Suburban Electric Companies is a less important combination of the same character.

Street railway consolidation in New York city.-The recent history of the surface railways of New York city illustrates strikingly the strength of the tendency toward consolidation, and likewise furnishes examples of all the different methods of combination which have been described. In 1890 the surface railway business of the present borough of Manhattan was in the hands
of about fifteen independent operating companies, no one of which controlled more than 30 miles of track, out of a total length of about 210 miles. Consolidation had begun even before this time, but had not gone far. The Broadway and Seventh Avenue Railway had leased the newly established cable system of the Broadway Surface Railway, and also the South Ferry Railway, so that it had a continuous line on Broadway and Seventh avenue, forming a great central stem to which branch lines could be attached with advantage. The Twentythird Street Railway had, as far back as 1876, leased the BleeckerStreet and Fulton Ferry line. Half a dozen of the great longitudinal avenues of the city, however, were still occupied by as many independent street railway lines.

The first important step toward general consolidation was taken in 1891 by the organization of the Metropolitan Traction Company, which was a stockholding corporation only. Within two years it had secured a controlling interest in the stocks of more than one-half of the surface railway companies. In 1893 the Metropoli$\tan$ Street Railway Company was organized as an operating company, subordinate to the traction company. This company took over the Houston, West Street and Pavonia Ferry line and the Broadway Surfaceand South Ferry lines. In the following two years the new cable railways of the Metropolitan Crosstown, the Lexington Avenue and Pavonia Ferry, and the Columbus and Ninth Avenue companies were also absorbed in the Metropolitan Street Railway Company. Meantime, the latter company leased the older lines of the Broadway and Seventh A venue, the Forty-second Street and Grand Street Ferry, the Central Park, North and East River, the Bleecker Street and Fulton Ferry, the Twenty-third Street, the Ninth Arenue, and the Sixth Avenue companies, whose stocks were said to be largely owned by the traction company. By 1895 the system controlled by the Metropolitan Traction Company included 132 miles of track out of an entire trackage of surface railways in Manhattan borough of 286 miles. It owned all the important longitudinal railways except those on Second, Third, Fourth, and Eighth avenues.

The progress of consolidation for some years after 1894 was less rapid. In 1896 the street railway lines of the New York and Harlem Railroad Company (Fourth and Madison avenues), and the Eighth Avenue line, and in 1898 the Second Avenue Railway, were leased to the Metropolitan Street Railway Company. Several new railways were constructed during these years, separate charters being taken out for the purpose of securing the franchises. The stocks of the corporations operating these new lines-the Twentyeighth and Twenty-ninth Streets Crosstown, the Thirtyfourth Street, the Thirty-fourth Street Ferry and Eleventh Avenue, and the Fulton Street Railway com-panies-were all held by the Metropolitan Traction Company. In 1897 the traction company bought control
of the Central Crosstown Railroad Company, to which the Christopher and Tenth Street line had previously been leased. Four of these last-mentioned companies have continued to operate separately. In 1898 the Metropolitan Traction Company, having fulfilled its object of securing control by stock purchase, was dissolved, and the securities held by it became the property of the operating company, the Metropolitan Street Railway Company.

At the beginning of 1900 this company found only one important competitor still in existence, the Third Avenue Railroad Company. As far back as 1895 the Third Avenue Company had begun to realize that to maintain its position it must secure branch and connecting lines. It accordingly bought a controlling interest in the extensive Forty-second Street, Manhattanville and St. Nicholas Avenue Railway in the upper west side of the city. In 1897 it similarly obtained control of the Dry Dock, East Broadway and Battery Company, with an extensive system of horse lines in the lower part of the island. In the next year the Third Avenue Railroad bought a majority of the stock of the Union Railway Company, which had grown up by the gradual consolidation of a dozen or more companies and which operated 50 miles of track in Bronx borough and the adjacent parts of Westchester county. In 1899 the Third Avenue Company bought up the Tarrytown, White Plains and Mamaroneck Railway and the Yonkers Railroad, which added a large amount of track to its system in Westchester county.

At the beginning of 1900 the Third Avenue Railroad Company controlled more than 200 miles of track, or nearly as much as that of the Metropolitan Street Railway system. Considerably less than half of this trackage, however, was in Manhattan horough, while nearly all that of the Metropolitan system was included within that borough. With the adoption of underground electric traction the Third Avenue system seemed likely to become a very serious competitor of the older combination. The officers of the Metropolitan Street Railway Company took advantage of a heavy fall in the stocks of the Third Avenue Company, due to difficulty in meeting the wasteful expense connected with its installation of electric traction, to buy in open market a controlling interest in the stock of its rival. Soon thereafter the Metropolitan took over the Third Avenue Company by lease, but for the time being it has maintained the separate operation of the lines of that company and of those of each of its subsidiary corporations, paying them the amount of their net earnings as a rental.

In 1902 a still further combination "was effected. The Interurban Street Railway Compan ${ }^{r^{1}}$ had been formed in 1901 to construct new trolley lines in the borough of Bronx and in Westchester county, for which it held extensive franchise rights. This company now leased

[^36]the entire Metropolitan Street Railway system, assuming all the indebtedness and agreeing to pay a rental of 7 per cent on the $\$ 52,000,000$ of stock. At the same time the Metropolitan Securities Company was formed, under the business-corporation law of New York. This holding company owns all of the shares of the Interurban Street Railway Company, and thus has ultimate control of the entire surface railway system of Manbattan and Bronx boroughs and the adjacent territory. For a long time to come by far the greater part of the profits of the street railways in this combination will be devoted to rental payments on the immense amount of stock and bonds of the various lessor and sublessor companies.

No form of combination has yet been effected between the elevated railways and the surface lines of Manhattan borough; although several years ago the Third Avenue Railroad entered into an operating agreement with the Manhattan Railway (elevated) by which, on payment of 3 cents in addition to the regular fare, a passenger on either system could transter to the other. It is significant, however, that in 1903 the elevated railway company was merged with the company which constructed the new underground transit system, the Interborough Rapid Transit Company. The elevated system itself is the result of a consolidation of three companies.

The process of consolidation in Brooklyn has paralleled that of Manhattan. By merger, lease, and ownership of securities, both the elevaced and the surface lines have been brought together under the Brooklyn Rapid'Transit Company, which controls at present more than 500 miles of track.

The process of consolidation in Greater New York has been contemporaneous with great changes and improvements in methods of operation. It is therefore impossible to judge from statistics the degree to which consolidation has increased traffic or reduced operating expenses. That it has done much in both directions is beyond question. The changes in the routing of cars and the extension of the transfer privilege have materially increased the attractiveness of the service.

Street railway consolidation in Philadelphia. ${ }^{2}$-The process of street railway combination in Philadelphia began earlier and was completed earlier than in New York. During the period from 1857 to 1874 about 40 separate companies were given charters in Philadelphia. In 1876 there were in existence 17 separate companies, operating altogether 289 miles of track. It appears that from 1859 on the companies had largely acted in harmony so far as the fixing of fares and the like were concerned, through an organization known as "The Board of Presidents of City Passenger Railway Companies." In 1879 and 1880 the process of combination began by the lease

[^37]of two or three extensive lines to the Union Passenger Railway Company. In the next year three other roads were brought together into the People's Passenger Railway Company. These two systems carried about two-fifths of the entire number of passengers in the city. In 1883 the Philadelphia Traction Company was formed by men who have since extended their street railway interests into many cities of the United States. This company never owned any track, but gradually extended its control by means of leases. The Union system, already described, was the first to be leased to the Philadelphia Traction Company. In 1887 an act was passed by the state legislature for the purpose of facilitating the combination of strect railways, which provided special powers for what were legally known as "traction companies." The People's Traction Company, which was soon organized under this act, leased the People's Passenger Railway Company, as well as a number of other formerly independent railways. The Philadelphia Traction Company continued to absorb additional lines. The movement was favored by the change from horse to electric power. By 1895 practically all the street railways of the city had been brought together into four systems. The Philadelphia Traction Company controlled 203 miles of track; the Electric Traction Company, 130 miles; the People's Traction Company, 73 miles; and the Hestonville, Mantua and Fairmount Passenger Railway Company, 24 miles.

The time had now arrived for complete consolidation. The new Union Traction Company, under sanction of the act already mentioned, took over all of the stock of the Electric Traction Company and the People's Traction Company, issuing in exchange therefor trust certificates bearing 4 per cent interest. It also took over by lease the Philadelphia Traction Company, and, in 1898, the Hestonville, Mantua and Fairmount Passenger Railway Company. The lines of the Electric Traction Company and the People's Traction Company were also leased to the Union Traction Company, thus giving a double form of control.

In 1901, by special act of the state legidatase and hos ordinance of the Philadelyhia city conacil, a large nam. ber of interrelated franchises were granted to at man syndicate, which proceded under them t", organza. various companies to construct -urface elevated, and underground railways. It was the intention that theos new lines should constitute a competing syotem. In 1902, however, the Philadelphia Rapid Tranit Company was organized, which acquired all of the stow and franchises of the now companiex. and alow towh over by lease the entire existing astem of the Cnow Traction Company, agreeing to pay therefor a rexthl on the par value of its $\$ 00,000$, ,906 of stock tof which only $\$ 10.500,000$ was paid in). This rental wan : per cent at the begiming, and is to increate by 1 per went every two years until 6 per cent is reached. The Philddelphia Rapid Transit Company has aloo veured control of the Doylestown and Willowgrove Railway Company, operating in the suburbs of Philadelphia. and it in quite possible that further consolidation with suhurtan wom panies may take place in the future.
The complexity of the process of convolidation in Philadelphia may he seen from the list, on paye whata of companies united under the Union Traction Compary. Thirty-nine companies altogether are manreated in this list, and their relations to one another ay - haswa by the degree of indentation. The form of onmbay tion universally employed is the leate, though in many cases it is supplemented by owner-hip of part of ath of the shares of the lessor company by the controlling company. The table shows. for example, that the Philadelphia and Darby Railroad Company wa- Ieawed to the Philadelphia City Pasenger Railway Company, The latter was subsequently leased to the Wert Phimdelphia Pasenger Railway Company, which beame later a lessor to the Philadelphia Traction Conntans. The last-named company was leased to the Cnion Tracetion Company, which, as already stated, is now a lesor to the Philadelphia Rapid Transit Company, thus making six stages in the process.

## CHAPTER IX.

## FRANCHISES, PUBLIC REGULATION, AND PUBLIC OWNERSHIP.

During recent years widespread and active interest bas been manifested in the relations between street railway companies and the local governments representing the interests of the people. Two peculiarities of urban railways bring this relation into special prominence and justify reasonable public regulation. The first is the fact that the railway in urban communities usually occupies public streets and ways. The second is the tendency of the street railway business toward monopoly, a tendency which has been abundantly demonstrated by experience. With the growth of population a constantly increasing proportion of the people in the cities are forced to patronize the railways, and the need of protection against the possible abuse of monopoly power correspondingly increases.

The actual regulations in force with regard to the operation of street railways differ widely among the different states. Indeed, they vary almost as widely among different companies in the same state or even in the same city. For the purpose of ascertaining more fully the provisions of state and local legislation with respect to street railways, the Bureau of the Census included in its general schedule addressed to the street railwar companies several questions regarding their franchises. It also addressed inquiries to the mayors of a large number of municipalities, including one or more in every state and all the largest cities. Much valuable information was received in response to these inquiries, especially from the mayors. Copies of city charters and of franchise ordinances were furnished in many instances. It was impracticable to attempt to learn in detail the provisions of every local franchise, as many consolidated companies are operating under a score or more of separate grants with widely varying terms. In the detailed presentation by states in the latter part of this chapter the aim has been to set forth the present policy of leading states and cities, as shown in existing statutes and in recently granted franchises, while only more general statements are made in relation to earlier franchises which are still in force. In this presentation only questions bearing upon the fundamental relations between the street railway companies and the governing authorities or the people are taken up. The most important subjects covered are the methods of granting franchises and their duration, the regulation of fares, and the requirements regarding
compensation for franchise privileges. No attempt is made to present the less essential features of the law regarding the organization, management, and powers of street railway companies, or the details of local ordinances regarding car schedules, methods of construction, safety regulations, and the like.

## I.

## METHOD OF GRANTING FRANCHLSES.

Authority of state and municipal governments.Street railway companies, like other corporations, derive their charters, which give them the right to exist and which regulate in a general way their internal government, from the state, either through general or special statute. The privilege of occupying a specific street or highway usually requires further authorization, and it is this authorization which is designated by the term "franchise" in the more limited sense. In some state constitutions the legislature is expressly prohibited from granting the use of the streets and highways without the consent of the local governing authorities, while in nearly all other states the practice of the legislature is to give the local governments control in this respect. This control involves ordinarily the right of the local authorities to impose such con-' ditions as they may see fit at the time the franchise is granted. In the detailed presentation of street mailway law in section VII only deviations from this rule are mentioned.
So far as recent practice is concerned, such deviations are mostly contined to the New England states, where a large proportion of the street railway companies have been chartered by special acts of the legislature. Many of these charters have given to companies the use of the streets with no provision for interference by the local authorities further than was necessary to regulate the details of construction and make them conform to the grade and surface of the streets. This policy has been particularly common in Connecticut and Rhode Island. In Massachusetts the railroad commission must approve all grants of franchises by local authorities; moreover, where a street railway is desigued to serve several towns or cities, those towns which favor a fianchise may appeal to the state board of railroad commissioners if any one of the local governments withholds its consent. This latter proviso was inserted in the law
on the recommendation of a special committee on the relations between cities and towns and street railways, which reported to the Massachusetts legislature in 1898. ${ }^{1}$ In New York, Connecticut, Rhode Island, Maine, New Hampshire, and one or two other states the state railroad commission has also some control over the construction of street railways, but this control is of a less thorough character than in Massachusetts.

It is quite common for the state, by general or special statute, and sometimes by its constitution, to regulate the procedure which must be followed by the local governments in granting franchises to street railway companies. Often these regulations apply to other classes of public utilities also. The corruption which has often characterized the action of municipal authorities in bestowing franchises has been one of the motives for the adoption of safeguards concerning procedure.
In many cases a larger proportion of the city council, or other local governing body, is required to pass a franchise ordinance than to pass ordinances on most other subjects. Provisions of this character are so common that, with a few exceptions, they have been omitted in the detailed statement in another part of this chapter. One of the most stringent regulations concerning the procedure in granting franchises is found in the New York city charter. Not only is the rote of three-tourths of all the members elected to the city council required, but the grant must also be approved by the board of estimate and apportionment, a small body chiefly composed of executive officials, Which has the main control over the city's finances. This board is directed particularly to inquire into the value of the privileges conferred and the adequacy of the compensation offered for them. A precisely similar method is prescribed in the charter of the city of Baltimore.
In most states the law does not distinguish between ordinary urban street railways and interurban electric lines, either as to the methods of securing privileges or as to the general regulation of business. In those states where interurban railways are most highly developed, however, they have either been placed under the same laws as steam railways or under special laws more akin to those governing steam railways.

- Consent of voters or of abutting owners.-The movement in favor of "direct legislation" has led to the requirement, in various states and cities, that franchises shall be submitted to popular vote, either in all cases, or on petition of a certain proportion of the voters. Such use of the referendum is most common in the Western states. In Colorado, South Dakota, and

[^38]Utah, for example, all municipal ordinances are subject to the referendum on petition, or the optional referendum, as it is commonly called. The same requirement is found in the San Francisco charter, and in the charters of various other cities. In Nebraska and Arizona all public franchises in cities must be submitted to popular vote; in Montana and Colorado to the vote of the taxpaying electors. In Iowa one-fifth of the voters in any city may require any franchise to be submitted to popular vote. The optional refereudum with reference to franchises exists in incorporated towns in Indiana, in Parkersburg, W. Va., by its new charter, and in various other places. In Detroit a local ordinance provides that proposed franchises shall be submitted to popular vote, but such vote is purely advisory, not binding. Provisions for popular vote on franchise grants are for the most part of recent origin, and there is comparatively little experience as to their practical working. The fear has sometimes been expressed that the people will be unduly hostile to the corporations, and will ignorantly deprive themselves of needed facilities by refusing franchises altogether, or by insisting upon impossible conditions.
Somewhat similar to the requirement of a popular vote for the grant of street railway franchises is the provision in a number of states that the consent of the owners of abutting property shall be secured. Usually the provision is that the owners of more than half of the frontage must give their consent. This is true, for example, of all cities in Colorado, Missouri, Nebraska, New Jersey, and Ohio, and of cities of more than 40,000 inhabitants in Kansas. The same requirement existed in Illinois prior to 1899. In Louisiana one-half in number of the owners of abutting property and the owners of one-balf in value of the property must consent to the construction of the railway. In New York the owners of one-half in value of the property must consent, but there is a proviso that if the necessary consent can not be obtained appeal may be taken to the courts, which shall decide whether there is publie necessity for the railway. This proviso was enacted in recognition of the fact that the rights of the people, as a whole, are paramount to those of the property owners upon the streets directly concerned. In some cases, moreover, the owners of property, pariticularly if the streets were peculiarly desirable or necessary for the coustruction of a general railway line, or of a connecting link in a system, might take unfair advantage of their position to demand excessive compensation from the railway company as a condition of their consent. This does not imply that any compensation whatever would necessarily be excessive, for it is entirely proper that a railway company should compensate property owners for actual damage to their property or decrease in its value, and provisions of this sort are almost universally found in state laws or in local
ordinances and franchises. In Massachusetts the rights of owners of abutting property are protected by provisions for appeal to the state railroad commission.

Competitive bidding for franchises.-During recent years it has become quite common, with a view to obtain more favorable terms, to offer franchises at public competition. This requirement often applies to other classes of public utilities as well as to street railways. In California, Nevada, Kentucky, and Virginia the general state laws require competitive bidding, but contain no provision specifying the character of the bids, which apparently might, at the discretion of the local authorities, be either in the form of lump sums or of annual payments. In New York and Louisiana the bids must be on the basis of a percentage of the gross annual earnings. In Ohio the franchise must be granted to the bidder offering the lowest rates of fare. A similar method is required by the individual charters of certain cities, and in a few others it has been adopted voluntarily by local authorities. The city ordinarily reserves the right to reject all bids. In Virginia the local authorities may, if for any reason they deem it to be for the interests of the people, grant the franchise to some other than the highest bidder, but they must give their reasons for the grant in the franchise ordinance.

In most states there has been as yet comparatively little experience with the working of the method of competitive bidding for public franchises. The method has, however, been employed long enough in California, New York, and Ohio to afford a fair basis for a judgment as to its success. In two or three instances there has been active competition for street railway franchises in New York city, but for one reason or another the franchise grants made as a result of bigh bids have been set aside or the railways authorized have never been built. ${ }^{1}$ In one case the bids for a certain extension were run up until seventy times the total gross receipts of the proposed new line were offered in payment for the franchise. This absurd procedure, which was obviously not in good faith, was stopped by an injunction. Finally the franchise was sold for 100 per cent of the gross receipts, but the road has not yet been constructed. In fact the highest compensation which has actually been paid to the city treasury as the result of competitive bids for street railway franchises is 8 per cent of the gross receipts. ${ }^{2}$ It is probable that competition had something to do with enabling the city of Columbus to obtain unusually low fares as a condition precedent to the extension of the franchise of the leading railway in that city.

Generally speaking, however, there has been little or no competition for franchises, and the local govern-

[^39]ments have obtained no more favorable terms than were prescribed as a minimum by state or local legislation. The reason is obvious. The proposed franchise is almost invariably petitioned for in the first instance by a duly organized corporation, which asks the right to occupy specifically named streets and which has carefully considered, in advance, construction plans and probable financial results. Even when a considerable period of time is allowed for others to investigate the proposed plan and to estimate the value of the franchise, these possible competitors are at a great disadvantage as compared with the original promoters. It often happens that there are few people in a city who are familiar with the street railway business and at the same time in command of the necessary capital. Effective competition is still less likely when the proposed railway is in the nature of an extension or outlying line, the success of which will depend almost wholly upon cooperation with existing lines. The process of consolidation among street railways has gone so far in most large cities that there is only one important system in existence with which a new railway can be connected.

The method of competitive bids is apt to prove of greater value when applied to renewals of the franchises of existing railway systems. It has already been so applied in a few instances, and under existing laws will apply to many such renewals in the future. Of course the old corporation has a great advantage in the competition for a renewal of the franchises; but the value of the privilege is so much better appreciated and so much more easily measured than in the case of a new railway that other capitalists will often stand ready to offersuch competition as will at least compel the present owners to make important concessions to the people. The best results, however, are secured where the system of competitive bids is supplemented by careful bargaining on the part of the local authorities. This method is provided for in the charter of New York city. If the board of estimate and apportionment receives no satisfactory bid for a franchise, it becomes its duty to seek better terms by negotiation. In two or three cases the efforts of the board have resulted in securing a compensation for street railway franchises considerably in excess of that originally offered. ${ }^{3}$ The New York system in this respect has been copied by Baltimore.

## II.

## DURATION OF FRANCHISES.

State constitutions or laws usually, though by no means always, limit the duration of corporate charters of all classes. Such limitations, however, are ordinarily of a formal character, and unless some action to the contrary is taken by the state legislature at the

[^40]time of expiration, a charter can usually be renewed by a simple procedure on the part of the stockholders of the corporation. Nevertheless, the limitation on the duration of the charter offers to the state the possibility of imposing new restrictions if it so desires.

Most states, including those which limit the duration of corporate chartexs, provide in their constitutions that the legislature shall have the right to repeal or amend any general or special incorporation law if passed subsequent to the adoption of the constitution. This provision has been inserted in view of the judicial doctrine announced in the famous Dartmouth College case that, in the absence of such provision, an act conferring privileges upon a private corporation constitutes a contract on the part of the state. It is probably safe to say that nearly all important street railway companies in the United States hold charters. which are either limited in duration or subject to amendment or repeal by the state legislature. In case of such amendment or repeal, however, the courts are disposed to require that regard be given to vested property rights, and the legislature is subject to limitations in those states whose constitutions prohibit special and local legislation, and in which, accordingly, changes must apply to an entire class. ${ }^{1}$

Limitations on the duration of local franchises are another matter. State constitutions or laws seldom reserve to the state or local authorities the right to terminate a franchise, or to revise its provisions during the prescribed term, nor have the local authorities in granting franchises ordinarily reserved this right.

The most important exception to the statement just made is found in Massachusetts. For a long time it has been the policy in that commonwealth to grant street railway and other franchises for an indefinite term, subject to revocation either by the state or by the local governments. The Massachusetts committee on street railways of 1898, whose report has already been referred to, characterized this system as utterly illogical in principle; but asserted that, because of the conservatism of the governing authorities in the state, it had not resulted, as might have been expected, in hindering the development of public service corporations. The committee found, on the contrary, that the street railway companies preferred this plan to one by which their franchises would be terminated after a period of years. The law was, however, amended on the recommendation of the committee, so as to require the approval of the railroad commission for the rerocation of a "location."

Many street railway franchises, particularly those of early date, are perpetual, and there is no state or local provision under which they can be revoked or amended. Where, however, a corporation whose charter is subject to revocation or amendment holds such an unlim-

[^41]ited franchise, the state legivhture can virtually mand it, or change the terms of the franchise, through it control over corporate existence. Even if luth the charter and the franchise of a publie service compent. are unlimited in duration, the state nayy. subect per haps to certain self-imposed limitation-. exervios. , il. rectly or through local governments, its. right of embent domain to purchase the property for publive awe The payment in such a case would ordinarily indude not merely the tangible value but the full frambie salue. Several state constitutions contain clause providing that the public authorities shall always reserve the right of eminent domain over the property and franchises of corporations. Such provisions, buweser. merely declare a generally recognized principle. A constitutional amendment in Colorado, adopted in 1 , 2. confers upon municipalities the right of eminent do. main over "public utilities," and similar provisions are found in the statutes of a few states.

Franchises which are perpetual. and not subject to modification by the local authoritie, are still permitted by the state laws of New York (except an regardo vertain cities), New Jersey, Pemerlvania. Miwomic. In. diana, all of the New England statex. and a fow others. Many of the most important framhise in the largest cities of the country are perpetual, and wan bue ber modified by the local governments. In a majority of states the present policy is to limit the duration of atrent ratlway franchises by state law. The limit of life i-ninety-nine years in Lonisiana the law applying on! to parishes), fifty years in Arizona, Idaho, and recomidclass cities of New York, and by epecial act the estastitutionality of which is in litigation) in Cincimati. Ohio; thirty years in Michigan, Virgimia. Alatrama. and Florida; twenty-five years in Ohio, lowa in cities under special charters), San Francisoo, (al., St. Paul. Minn., and Portland, Oreg.: twenty years in Illiwis. Kentucky, Nevada, South Dakota, and Montana: and ten years in $W$ roming. There is apparently a tendency to shorten the duration of franchises, the more recent enactments usually prescribing the shorter perieds. In many cases cities have limited the life of franchicu. where no state restriction existed, or have fixed termshorter than those prescribed by state law.
One modification of the limited franchise is that which contains in the original instrument provision for renewal with revised terms. By the charter of New York city and that of Baltimore, the original grant of a framchise, which is limited to twenty-five years, may prowide for renewal for a further period not to exceed twentyfive years, with a readjustment of the conditions of the contract, to be made by bargaining or by appraial. In Cincinnati the fifty-year franchise, passed under authority of the act above mentioned, permits the cits to change the fares after twenty years and again fifteen years later, but at no other times. Such an arraugement increases the security of the street railway com-
pany and renders it more willing to introduce the best and most expensive construction and equipment.
Ordinarily, the local authorities are permitted to renew franchises at their expiration by the same procedure as is required for original grants.
Usually the laws limiting the term of franchises contain no provision regarding the disposition of the tangible property of the holder of the franchise at its expiration. Most franchises for street railways also have no provision on this subject, except the requirement that at the expiration of the franchise the company shall remove its tracks from the streets. In practice, such an arrangement has less of a tendency to check improvements than might be expected. Before the expiration of the old franchise the local authorities very frequently make new grants to existing companies, and the compensation demanded for these grants has not, as a rule, been excessive. Corporations have often anticipated such liberal treatment and have made improvements in their property even near the close of the term of the franchise. In some cases, where changes in methods of traction, consolidations, or extensions of existing railway lines have been desired, the local governments have granted new franchises long before the expiration of the old ones. By the laws of a few states the extension or renewal of franchises is not permitted until within a short time before the expiration of the existing grant. This restriction is designed to prevent corruption, but it would seem the part of wisdom to modify it in such a way as, under careful restrictions, to permit new grants when necessary to take advantage of improved methods or to secure needed extensions.
The difficulties growing out of limited franchises have led to the adoption in several recent statutes of provisions for compensating the holders for the value of their tangible property at the expiration of the franchise term. Such an arrangement seems the more desirable in cases where local governments are by law prohibited from granting renewals of franchises directly to the existing companies, and are either required to take over the property or to dispose of the franchises by competitive bids. In Indianapolis, Ind., Baltimore, Md., Portland, Oreg., and elsewhere, municipal charters, or other state laws, provide that if the city takes possession of a street railway at the end of its franchise it must pay the appraised valuation of the tangible property, but must pay nothing for the franchise itself. By general law in Virginia and by the Greater New York charter it is provided that the original franchisemust specifically state whether, at its expiration, the city shall pay for the tangible property or shall receive it without compensation. In San Francisco, on the other hand, the city charter requires that the property of all corporations to which franchises shall hereafter be given shall revert to the city without compensation at the end of the prescribed period. In Indianapolis,

Ind., and Portland, Oreg., where competitive bidding for the renewal of franchises is required, it is specifically provided that, if the grant is made to another person or corporation, the new grantee must buy the tangible property of the former holder at its appraised valuation. The same requirement is probably intended in the Virginia law and in the Baltimore charter, by which competitive bidding is also required. An arrangement of this sort has the great merit that it largely removes the discouragement to improvements which is otherwise characteristic of limited franchises.

## III.

## regulation of street railway fares.

In a considerable number of states the legislature has enacted laws limiting the fares of street railways throughout the state or in individual cities. With few exceptions the maximum fare thus fixed is 5 cents. Thus, in New York no railway built after 1884 may charge more than 5 cents for a ride over its lines within the boundaries of any municipality, a provision which is held to require the issue of transfers on its lines wherever they are necessary to reach the desired destination. In nearly all local franchises limitations are imposed in advance upon the fares. Usually neither the state nor the local government reserves the right to change these limitations during the term of a franchise. This is so generally true that in the detailed presentation by states only departures from this rule are noted. In a large majority of cases the maximum fare provided in local franchises is 5 cents, and it has not been deemed necessary to mention the limitations unless lower fares are prescribed.

Several states, by constitution or statute, have reserved to themselves the right to regulate street railway fares at any time. This is true in New York as regards all railways built since 1884. Moreover, it is generally held that unless the state clearly waives or limits this power, the general authority to regulate common carriers and their charges gives the state this power over street railways in any case. The general municipal corporations act of Illinois confers the power to regulate hackmen, truckmen, and "all others pursuing like occupations." This has been held by the supreme court of Illinois to permit cities to fix street railway fares, and Chicago and several other cities have accordingly done so. (See page 42.) Provisions of somewhat similar character are found in the special or general municipal laws of various other states, but they have not usually been interpreted as applying to the street railways.

The cities of Nebraska and the cities of more than 100,000 inhabitants in Missouri, by the general laws of these states, and the city of San Francisco by its municipal charter, have the right to regulate railway fares at any time. All these cities, however, with the excep-
tion of San Francisco, where such waiver is expressly prohibited, could probably waive the right at the time that the franchise is granted.

In Massachusetts the city council or board of selectmen of a town may petition the state board of railroad commissioners to revise the fares of any company, but it may not reduce them below the average fare charged by other companies in the state operating under similar conditions. With the aid of the reserve power of the legislature in this state it is possible that, at some future time, fares may be reduced either generally or in individual cities; but as yet there have been no important instances of the exercise of this authority.

In Part I, Chapter III, will be found a summary of the facts with regard to street railway fares in the United States. In many, if not in most instances where a fare of less than 5 cents is found, it has been secured by the action of the local governments, usually being demanded as a condition precedent to the grant of franchises, renewals, or additional privileges. In some instances, however, companies have voluntarily reduced their fares, and often they have, on their own initiative, granted or increased transfer privileges. The situation regarding fares in Columbus and Cleveland, Ohio, and Detroit, Mich., more fully described on pages 142 and 145 , illustrates particularly the activity of local governments in seeking to reduce fares.

## IV.

COMPENSATION FOR FRANOHISE PRIVILEGES.
The growing recognition of the value of the privileges conferred upon street railway companies, particularly in the larger cities, is manifested in the many recent laws and franchises which require special payments to the local governments. Payments which are distinctly designed as a compensation for the peculiar privileges bestowed are in principle sharply differentiated from ordinary taxes upon the property or business of street railways, which seek merely to obtain from them a contribution equiralent to that demanded from other forms of property and business. Taxes in the strict sense are imposed by virtue of sovereign power and are independent of the terms of charters and franchises; while, generally speaking, payments for franchise privileges rest upon contract with the corporations. It may readily happen, however, that the ordinary taxes on street railways in some cities represent a relatively heavier burden than the taxes and the franchise payments combined in other cities.

It is not the purpose of this report to enter fully into the complex subject of general taxation as applied to street railway corporations. In view of the interest which attaches to the methods of taxing such corporations in Massachusetts and New York, however, a brief description of them is given elsewhere (pages 141 and 144). In Part I, Chapter V, will be found general sta-
tistics showing the contributions of railways to the state and local governments, but these statistics do not distinguish between taxes proper and special franchise payments.

A considerable difference of opinion prevails as to whether a local government more truly promotes the public welfare by obtaining from street railway corporations, in return for franchise privileges, low rates of fare for railway patrons or larger cash payments into the city treasury which will reduce the burden of general taxation. The same question arises in fixing the charges of a public utility of any class which is operated by a municipality directly. The opinion seems to be gaining ground, as is seen in various laws and franchises of recent date, that the social benefits which accrue from low fares on street railways are so great that the public interest is better served by seeking reductions in charges than by seeking high financial compensation. As a matter of fact, in most of the important cases where special franchise payments of significant amount are required from street railways, the fare charged is 5 cents, while in the cities where lower fares are found, compensation for franchises is seldom paid to the public treasury.

The authority of the state or local government with regard to special franchise payments rests on essentially the same principles as the authority with regard to fares, and is more fully discussed below. However, the power is not usually reserved, either by state law or by the terms of franchises, to change the requirements concerning compensation during the life of the grant.

Oar licenses.-The statement just made does not always hold true with regard to license fees, the local authorities being sometimes empowered to collect such fees at rates which they may prescribe from time to time. License fees are usually a fixed amount per car, sometimes per pole or per mile of track. The theory is that the license fee, like that, for example, on hackmen, hucksters, and those pursuing similar occupations, is intended for regulation rather than for revenue. ${ }^{1}$ Presumably the courts would not uphold a municipality in an attempt to impose an exceedingly heavy fee. Indeed, the state law or the local franchise ordinance often limits the amount of the license fee.

License fees of one kind or another are collected from street railway companies in a large number of cities. They are particularly common in the Southern states, where licenses are commonly employed as a method of taxing all kinds of occupations. In New York, Chicago, and Philadelphia the car licenses are $\$ 50$ yearly and in St. Louis $\$ 25$. In most other important Northern cities the fees are lower. In Cincinnati, at least formerly, and in one or two other places the license is based, not on the number of cars, but on the total length of the cars used, the idea being that a large

[^42]car should properly pay more than a small one. In some cases car licenses are based on the total number of cars owned, in others on the average number in use daily during the year. The latter method would seem to be preferable, especially where a different type of car is used for summer trarel, since such cars lie idle for a good portion of the year. An objection to car licenses lies in the possibility that they may reduce the number of cars operated, to the disadvantage of the patrons of the railway.
In a few states it is common for local governments to charge an annual license fee on the poles of trolley railways. This practice exists, for example, in several cities of Pennsylvania.

Paving and care of streets. - It is an almost universal practice to require street railway companies to bear the expense of paring or surfacing the space between their tracks in a manner corresponding to the rest of the street or highway. Usually the company must also pare a certain space outside of its tracks, ranging from 9 inches to 2 feet. Where such requirements exist, the railways are generally obliged also to maintain the pavements in repair. In many instances, moreover, the railway company is compelled to clean the street space occupied, to remove snow and ice from it, and sometimes tor sprinkle it. All of this work is often done by the local authorities, the expense being collected from the corporations. Provisions regarding the paving and care of the street surface occupied are so common and so nearly uniform that they are not ordinarily mentioned in the detailed presentation in section vIr of this chapter.
The most important deviations from the ordinary practice in relation to the paring and care of streetsare found in Massachusetts and Philadelphia. The Massachusetts statute of 1898 abolished all former requirements in this respect, and substituted for them an annual tax on gross receipts, payable to the local authorities. In Philadelphia the street railway companies are obliged to pave and maintain, though not to clean, the entire surface of the streets which they occupy. The companies have spent sereral millions of dollars in paving, and the interest charges on these investments, together with the cost of maintenance of the pavements, represent virtually a larger compensation for franchise privileges than is required in most other American cities.

Oceasionally small towns require street railway companies to furnish free street lights, and it is quite common to require free transportation for policemen or other classes of municipal employees.

Percentage of gross receipts. -The most common form of special compensation for franchise privileges, aside from car licenses and paving requirements, is the percentage of gross receipts. Apart from those cases in which the law provides for the sale of franchises to the bidder offering the largest percentage of gross receipts,
there are many others in which street railway companies are obliged by state law, or by local franchise ordinances, to make such payments. Thus in New York city, by state law, all surface railways built after 1884 must pay at least 3 per cent of their gross receipts to the city during the first five years of their franchises, and at least 5 per cent thereafter. The rate of 5 per cent is found also in Richmond, Va., Providence, R. I., Newark, N. J., and one or two other cities. In Cincinnati, Ohio, the company pays 6 per cent of its gross receipts into the city treasury, and in Baltimore, Md., no less than 9 per cent, the rate in this city having been originally 20 per cent. In Buffalo the leading company pays 3 per cent. In St. Louis, Mo., varying percentages are required by different franchises and the total revenue derived by the city is considerable. In most other cities and towns which have adopted this method the percentages actually received in addition to the ordinary taxes are less than 3 per cent, but in some places recent charters or ordinances require larger payments for franchises hereafter granted.

Other forms of payment.-Quite frequently, either as the outcome of competitive bidding or of bargaining with a single corporation, cities have obtained lump payments as compensation for new franchises or additional privileges. In other cases, railway companies have been compelled to pay fixed annual sums prescribed in advance in the franchises.
Occasionally a provision is found for an annual payment based on profits rather than on gross business. Thus, in the state of Massachusetts and in the city of Philadelphia, railway companies are required to pay a certain proportion of the excess of their dividends if the latter exceed a fixed rate. In Des Moines, Iowa, a percentage of netearnings is demanded, and in Topeka, Kans., one-tenth of the excess of net earnings over 10 per cent on the investment. In none of these cases is any important revenue derived by the local governments. The mayor of Des Moines states that the railway claims never to have had auy net earnings. In fact, as has been often the experience of states in levying taxes based on net earnings or dividends, this method, which is the most just in principle, is very hard to apply satisfactorily in practice, because of the difficulty of correctly ascertaining the net earuings. Payments based on dividends, particularly if they aim only at the excess of dividends above a certain rate, are unsatisfactory unless the issue of bonds and of stocks be properly regulated.

## V.

## GENERAL CONSIDERATIONS REGARDING THE REGULATIION OF FARES AND COMPENSATION.

The foregoing shows in street railway legislation of recent date a growing feeling manifested that it is essential to the protection of the public interests that local governing authorities should retain some control
over the fares of street railways, or over their financial obligations to the public treasury, which is capable of exercise either continuously or at frequently recurring intervals. It is argued that increase in population, or improvements in methods, may render a fare or compensation which is reasonable to-day unreasonable in the future, and that the conditions may change even within a comparatively short time. It is admitted that companies often find it necessary, through extensions of their lines or otherwise, to increase constantly the quantity and quality of the service which they offer to the passenger; but it is maintained that, even so, it may happen that the profits of the business, under prevailing terms, become excessive.

It would seem, however, that, if the authority to regulate the fares and the payments of street railways is to be thus retained, the practice should be guarded by certain well-defined rules which will protect the interests of the railway companies as well as those of the people. Not only is the street railway company justly entitled to legitimate return on its investment, but in the long run the city will deprive itself of the best service unless it permits such a reasonable return. Such rules need to be applied both where continuous or recurrent regulation is attempted, and where new franchises or extensions of old franchises are granted, As already suggested, provision for competitive bidding in granting franchises can not always be relied upon to secure reasonable terms. The city must be prepared to bargain with the street railway company, and to do this satisfactorily its officers must possess proper knowledge and must properly recognize the rights of both parties.

Publicity of accounts.-It has been repeatedly urged that a fundamental prerequisite to the intelligent and just regulation of street railways, whatever be the procedure by which such regulation is attempted, is an accurate knowledge of the financial conditions of the business, both as to cost and value of property and as to operating expenses. The legislature of Ohio recently enacted a statute of great significance in this connection. It requires uniform methods of accounting and publicity of accounts, both on the part of local governments of all grades and on the part of local public service corporations. ${ }^{1}$ The recent charters of San Francisco, Cal., and of Portland, Oreg., likewise demand complete publicity of the financial affairs of corporations holding municipal franchises, and some measure of publicity with regard to such corporations is demanded in a few other less important instances.

Regulation of capitalization.-Closely allied with publicity is the regulation of the issue of capital stock and bonds by public service companies. A considerable proportion of the income derived from the charges "of street railways must always go to interest and divi-
${ }^{1}$ Laws of Ohio, 1902, page 511.
1165-05-10
dends, and the public has a right to demand that these returns should be based on a reasonable capitalization. While this result can be secured in some measure through publicity in construction and equipment accounts, the actual limitation of stocks and bonds is simpler and more effective. The legislation of Massachusetts on this subject has attracted much attention. In that state, no securities may be issued by a street railway company (or by steam railways), except on the approval of the board of railroad commissioners. Only such amounts may be issued as the board may declare reasonably requisite for the specific purposes set forth in the application of the company, and these purposes must be stated in detail in the resolution of the commissioners authorizing the issue. A further provision declares that, when new stocks are issued by an existing company, they must be offered to the present stockholders, not at their par value, but " at not less than the market value thereof at the time of the increase," as determined by the railroad commissioners, "taking into account previous sales of stock of the corporation and other pertinent conditions." ${ }^{2}$ In other words, the state undertakes to provide that the corporation shall get as much money for its shares as they may be expected to be worth on the market, and to guard against the distribution of stock dividends. When a consolidation of street railways is made, the same painstaking care is used to prevent the issue of securities in excess of the actual value of the property. Similar provisions are found in Massachusetts with regard to other classes of public service corporations. In Rhode Island, also, the issue of stocks and bonds by street railway companies is subject to the control of the railroad commission. In most states and cities, however, no attempt has been made to restrict the capitalization of street railways.

Sliding scale systems.--Sliding scale devices of various sorts are sometimes introduced into street railway laws and franchises for the purpose of securing an automatic adjustment of fares, or more commonly, of compensation for franchises, so that the people shall share in the advantages of an increase in earnings or a reduction in operating expenses. A greater degree of stability is thus assured to the corporations than they would possess if the public authorities reserved the unrestricted right to revise fares or franchise compensation at any time.

A rough form of the sliding scale which is quite often found, requires the fares to be reduced, or the compensation to the local government to be increased, by prescribed amounts, at certain intervals of time. This is based on the assumption that gross earnings and net profits will increase with the lapse of time. The requirement regarding franchise payments in the new San Francisco charter is a prominent illustration.

[^43]Another form of sliding scale is based on the contingency of an increase in the gross receipts of the railway, either as a whole or per mile of track. Thus, by the franchise of the Columbus Railway Company, fares must be reduced materially when the gross receipts reach $\$ 1,750,000$ annually. By state law in Wisconsin, and by some of the franchises in New York city and elsewhere, the percentage payable to the city increases as the gross receipts increase. In other countries more elaborate regulations of this sort are found than in the United States. For example, by the franchise of the Montreal Street Railway Company, granted in 1892 for thirty years, the company is required to pay to the city annually 4 per cent of its gross earnings up to $\$ 1,000,000 ; 6$ per cent on earnings in excess of $\$ 1,000,000$ but less than $\$ 1,500,000 ; 8$ per cent on earnings from $\$ 1,500,000$ to $\$ 2,000,000 ; 10$ per cent on earnings from $\$ 2,000,000$ to $\$ 2,500,000$; 12 per cent on earnings from $\$ 2,500,000$ to $\$ 3,000,000$; and 15 per cent on all earnings over $\$ 3,000,000$. Toronto has a very similar arrangement. ${ }^{1}$ The arrangement in these cities, by which the higher rate is applied only to the excess above the specified amount of earnings, serves to remove the strong incentive which might otherwise exist to keep down earnings, at least for a time.
The assumption underlying a sliding scale of this sort, that, as the gross receipts of a railway system increase, the rate of profit on capital invested increases correspondingly, is not always a correct one. Even an increase in gross earnings per mile of track may result from a corresponding increase of investment in improving trackage or equipment. It would seem that, if a sliding scale regulation of charges or franchise compensation on the basis of gross earnings is to be attempted, a proper adjustment should be made whenever the railway company extends its lines or otherwise increases its investments materially.
It requires no argument to show that the theoretically ideal basis for the determination of just fares or franchise compensation is the net profits of the business rather than the gross earnings. If the actual profits could be correctly ascertained, a sliding scale based upon them would furnish the simplest and most satisfactory method of adjusting fares and payments to the city. Any other method of automatic adjustment must be largely arbitrary and is bound to work some injustice either to the people or to the corporations.

As far as can be ascertained there is no instance in the United States where a franchise provides for a reduction of street railway fares as profits increase. The most familiar example of such a sliding scale in Europe is found in the franchise of a leading London gas company, which is required to reduce the price charged as the rate of profit increases, with the result

[^44]that the people share with the corporation in the gain due to added consumption or reduced operating costs. In a few cases in this country a sliding scale based on net profits or dividends has been adopted to determine the compensation to be paid to local authorities for franchise privileges.
The most conspicuous illustration is the Massachusetts act of 1898 , by which any street railway company which has from the beginning of its corporate existence paid in the aggregate dividends equal to 6 per cent on its capital stock, and which is now paying more than 8 per cent, is required to pay a tax, which should more properly be called a franchise payment, equal in amount to the excess of the dividends above that rate. In other words, when the profits exceed 8 per cent the excess must be equally divided with the municipality. In view of the careful restrictions upon capitalization in Massachusetts it is quite possible that this arrangement may ultimately result in considerable revenue to the local governments, though it has so far brought little or nothing. It was urged by the special committee on whose recommendation this law was enacted that the provision for a division of the excess of profits between the corporations and the government was "not subject to the criticism, which appears to be sound, that a limitation of dividends hampers enterprise and improvement. Where a corporation is not limited in the amount of dividend it may earn, but is simply required to pay over a sum equal to the excess of dividends actually paid, over a fixed and reasonable percentage on its capital stock, it will be constantly spurred to render such service that its profits will increase. Being a public service corporation, owned and operated for private profit, it seems just, and in accordance with sound principles, that when the private ownership has received a reasonable return upon its investment, the public should share, through a form of special taxation, in the increment of profit, provided it can do so without the danger of offering an inducement to those in control of the property to stint or conceal their profits." "
Foreign municipalities have often adopted sliding scales based on net profits for determining the compensation to be paid by street railways for franchise privileges. In Berlin the leading company, besides paying 8 per cent of its gross earnings to the city, divides evenly with it whatever net profits exceed 12 per cent on the capital stock which was outstanding at the time the franchise was granted and 6 per cent on shares thereafter issued. A more complicated arrangement is found in Hamburg. The street railway company pays about 10 per cent of its gross receipts to the city in lien of charges for paving, cleaning streets, and the like. In addition it pays to the city 25 per cent of its profits above 6 per cent on its capital stock, if the dividend rate is between 6 and 74 per cent; 30 per cent of the excess

[^45]above 6 per cent if the dividend is between 74 and 8 per cent, and so on until if the dividend exceeds $10 \frac{1}{4}$ per cent, the city receives 50 per cent of the profits above 6 per cent. In foreign cities where such provisions exist the capitalization of the corporations is carefully regulated. ${ }^{1}$

## VI.

## MUNICIPAL OWNERSHIP.

Legislation permitting municipalities to own and operate street railways has recently been enacted in a number of states. As yet, however, there is no instance in the United States of municipal operation of a street railway. The leading instances of municipal ownership and private operation are the subways in Boston and New York. It was only, however, after private capital had declined to make the necessary investment that the city of New York undertook the financial responsibility for its present subway. The contract between the city and the Interborough Rapid Transit Company (successor to the Rapid Transit Subway Construction Company) required the latter to build the subway and the tracks therein at a cost to the city of $\$ 35,000,000$, aside from certain expenses for terminals and from the payments for damages to private property. The company then received a lease of the property for fifty years, with the privilege of renewal under modified terms for twenty-five years longer. The lessee was required to equip the system with electric apparatus, cars, etc., and to pay interest on the bonds issued by the city, and, subject to certain limitations, 1 per cent on such bonds annually as a sinking fund. It is expected that the city will ultimately own the subway free of debt, and it will probably then be in a position to lease it at much more favorable terms. The lease of the Boston subway is for twenty years only. The disposition of the majority of the people, both in New York and Boston, appears to be in favor of municipal ownership of subways hereafter constructed, with operation by private companies under lease.

The Massachusetts committee on the relations between cities and towns and street railway companies expressed itself strongly in favor of municipal ownership, but it was still more strongly opposed to municipal operation. "The essential point to which the committee desires to call attention is the distinction here drawn between the ownership of the pavement, and consequent full control of the street, and the running of the vehicle." The committee thought it would be desirable to provide in all future franchises for a reversion of the tracks to the public authorities. It also considered it feasible to take over the property of existing companies under the right of eminent domain, if authorized by statute. The assumption of ownership of the tracks by the local government was not

[^46]itself, however, to torminate the right of the street railway company to continue operation under lanst. The proposal of the committec has never been carrimed out in actual legislation in Massachuetts.?

The principle that the city should at loast own. if not operate, its public utilities was adopted by the spectal commission which framed the present charter of New York city. That law procides that hereafter asery franchise for the use of the streets for rallway or other purposes must be limited in duration, and that at itm expiration the property in the street- shall revert to the city, which is not permitted to dispoe of it. but must either operate or lease it. A similar prorisinn is found in the San Francisco charter. In that city all the existing street railway franchises are limited. st that municipal ownership on a large sale seems libely to become an accomplished fact. The San Francime charter, indeed, specifically declares that it is the purpose of the city ultimately to own all it-public atilnien, and provides in detail the procedure by whitely thi* may be accomplished. There is, however, no rimetith provision for taking the property of exinting motyonations by eminent domain, although the city by the atening the construction of competing plant might bring pressure to bear to compel the ale of the ariot. ing properties at a moderate price. At a rewnt dee. tion in San Francisco a majority of the voter- favored the acquisition of a certain railway, hat the two thirdy vote required to authorize the issue of lond waw mot secured.

Many other laws authorize municipal ownership and operation of street railways, either in general, or under certain limited conditions. Thus by statute it in often optional for a local government, at the expiration of a franchise, to take over the property. In some though not in all, laws of this sort, the municipality may operate a railway so acquired. In a number of states the local authorities are empowered to construct or parchase railways, and also, as a rule, other public utilities, and to operate them. For example, this is trua generally, or in the case of certain classes of cities, in Illinois, Indiana, California, Oregon, Minnesota. Colsrado, and Washington. In Colorado a recently adopted constitutional amendment gives cities specitieally the power of eminent domain over existing "public utilities." In some instances where municipal ownership is authorized, a popular vote is required by the statute to secure permission for actual construction, muquisition, or operation. In Illinois an important additional provision is that the fares under municipal operation mast be high enough to pay operating expernes, interest, and sinking fund charges on bonds issued for the purpowe of acquisition. Systematic methods of heeping aceount are also required by the law of Illinois, the purpowe being to make the people acquainted with the cost of operating the railway, and thus give them the power

[^47]to prevent the public utility from becoming a public burden. The people of Chicago, by a large majority, have voted in favor of acquiring the street railways in that city, and active steps toward accomplishing this object are being taken.

Municipal operation of street railways has become very common in Great Britain and in Germany and is rapidly extending in both these countries. (See pages 150 and 153.) It is probably too soon to express judgment regarding the success of the policy abroad, nor would success there be conclusive evidence of the wisdom of municipal operation in the United States. The street railway service in England and Germany is undoubtedly inferior to that in American cities, but there has been an enormous improvement in the past few years, during which time electricity has been rapidly superseding horse and steam traction. It can not at once be concluded that the inferiority of European railways is due wholly or largely to municipal ownership or even to the strict limitations upon private corporations operating street railways. Probably, however, the limitations put upon private corporations have tended to hamper development much more than municipal ownership has. Even where there is no important public regulation, private enterprise in European countries is often far behind that in the United States, especially as regards technical methods. The density of urban population, particularly on the Continent, where large tenement houses are almost universal in cities, makes street railway transportation less important than in American cities. To be sure, the crowding together is itself in some measure due to the lack of satisfactory street railpay facilities, but other more important historical causes have contributed to it.

## VII.

CONDENSED DIGEST OF STATE LAWS AND LOCAL FRANGHISE REGULATIONS IN LEADING STATES.

California.-Under a recent general state law all local franchises must be sold to the highest bidder, apparently cash payment being intended, though probably the city could provide for aunual payments or percentages. The law requires that sealed bids must first be made, but it permits the highest bids to be raised by an additional oral bid, with an advance of not less than 10 per cent, and so on. ${ }^{1}$ Special provisions regarding franchises are also found in the individual charters of certain cities, particularly in those charters which have been prepared and adopted locally, as permitted by the California constitution. Thus the San Francisco charter of $1890^{2}$ requires the sale of any street railway franchise to the bidder offering the highest percentage of

[^48]the gross receipts. By this charter also 15 per cent of the voters of the city may, by petition, require the submission of the franchise ordinance to popular vote. ${ }^{3}$

The general state law limits the duration of charters of all classes of corporations, and that of franchises of street railways, to fifty years. A large majority of the franchises reported to the Bureau of the Census run for fifty years, but several are for twenty-five years and a few for other periods. The San Francisco charter declares that no future street railway franchise shall be granted for more than twenty-five years, and that at the expiration of the franchise the plant must become the property of the city, which may lease but not sell it.

A general law of the state limits street railway fares in cities of the first class (over 100,000 population) to 5 cents. ${ }^{4}$ The new San Francisco charter provides that the local government shall have the power, under franchises hereafter granted, at all times to regulate rates of fare. ${ }^{3}$

The general state law, in addition to the above provision for the sale of franchises, requires that every street railway shall, after five years of operation, pay 2 per cent of its gross receipts to the local government. ${ }^{5}$ Many of the earlier franchises in existence, however, require no special payment. The San Francisco charter provides that the minimum payment to the city on franchises hereafter granted shall be 3 per cent of the gross receipts during the first five years, 4 per cent during the next ten years, and 5 per cent during the last ten years of the grant. ${ }^{3}$ Oakland apparently receives no annual compensation, but the city recently sold a franchise for $\$ 500$ in cash. The mayor of Los Angeles reported that the city had received about $\$ 125,000$ from street railways during the census year. The state law also requires all street railways to pay car license fees and limits the fee which may be imposed by local authorities to $\$ 50$ in San Francisco and $\$ 25$ elsewhere.

The San Francisco charter, besides the above-mentioned provision that street railways established under future franchises shall become the property of the city at the expiration of twenty-five years, further declares that it is the purpose and intention of the people of the city that its "public utilities" shall be gradually acquired and ultimately owned. To this end the city supervisors must, from time to time, obtain estimates of the actual cost of different classes of enterprises. The supervisors shall then enter into negotiations for permanent acquisition, by original construction, condemnation, or purchase, of such public utilities as they may think most important, but they must first consider offers for the sale to the city of plants already existing.
Moreover, 15 per cent of the voters of the city, if at

[^49]any time they desire any given public utility to be owned by the municipality, may, by petition, require the supervisors to submit to a general vote of the people a plan for accomplishing the desired object, The adoption of such a measure requires only a majority vote, unless the plan involves a bond issue, in which case approving votes must be cast by two-thirds of those voting. ${ }^{1}$
A vote was recently taken in San Francisco on a proposal to acquire one of the street railway lines, and a majority of the voters were recorded in favor of the proposal; but as the plan involved a bond issue, and less than two-thirds of the votes were cast in favor of it, the proposal was not carried.
Colorado. -The general state law requires the written consent of the owners of more than one-half of the frontage on the street concerned before a street railway can be constructed. An amendment to the state constitution (1902) provides that in Denver, or in any other city adopting the provisions of the amendment, franchises of all sorts shall be granted only by a vote of the taxpaying electors. ${ }^{2}$
Several of the earlier franchises granted in Denver are unlimited, but other franchises in this city, and all those elsewhere in the state, are limited to periods of from twenty-five to ninety-nine years.
The laws of Colorado contain no provisions regulating fares or special compensation for franchises, and no important provisions on these subjects appear in local franchise ordinances.
The above-mentioned constitutional amendment of 1902 provides that in Denver, or in any city adopting the provisions thereof, the local government may construct or acquire street railways or other public utilities, and may exercise the right of eminent domain for the acquisition of existing properties. The issue of bonds for this purpose requires a majority vote of the taxpaying electors.

Connecticut.-In Connecticut, somewhat exceptionally, all street railways receive from the state legislature not only their corporate charters, but also, by special act in each case, their rights to occupy the streets. Ordinarily the local authorities have no control over the matter, except with regard to the details of adjustment of the tracks to the street grade and other matters of this sort, and even as to these details the railway company may appeal from the decision of the local authorities to the state board of railroad commissioners. The general statute relating to street railways gives the local governments no authority to regulate fares or impose other conditions. ${ }^{3}$

The legislature has made it a practice, in chartering individual street railway companies, to grant them perpetual rights, but under the state constitution corporate

[^50]charters are subject to amendment or repeal by the legislature.

There is in the state law no general provision as to fares and the special acts for individual railways ordinarily contain no unusual restrictions in this respect.
In Bridgeport, New Haven, and Hartford, the only cities in Connecticut from which reports on this point were received, there is no speciul compensation to the city for street railway franchises, and the general laws of the state contain no provision on this subject.

Georgia.--The legislature of Georgia has provided a general incorporation law for street railways, but the state also grants special charters. Under the general law, the consent of the local authorities is required for the laying of tracks in the street. ${ }^{4}$

The general state law limits the life of street railway charters to thirty years, but the reports of the companies show that the local franchises vary widely in duration. Two franchises, including that of the company in Savannah, are perpetual; two run for twenty years only; while several range from fifty years, or longer periods, up to ninety-nine years.

The general street railway law contains no provision as to fares, and the prevailing rate is 5 cents.

There are no general provisions of law with regard to compensation for franchise privileges. In Atlanta, however, the consolidated railway is required, by the terms of a city ordiuance of 1902, to pay to the city 1 per cent of its gross earnings during the first three years, 2 per cent during the next twenty years, and 3 per cent thereafter till the expiration of the various franchises. These percentage payments are in lieu of license taxes, but the company pays the ordinary property taxes. A cash payment of $\$ 50,000$ was also made to the city at the time of the consolidation. ${ }^{5}$ Sayannah, in addition to the property tax, requires the payment of a fee of $\$ 25$ per year on each car and of $\$ 100$ on each mile of track. These payments, however, do not indicate any policy of securing special compensation for franchise privileges. They are merely part of a general licensing policy which is applied to all classes of business in most of the Southern states.
Illinois.-The constitation of 1870 prohibits the legislature from granting the right to use the streets of a city to a street railway company without local approval. The general state law before 1899 provided that local authorities could grant franchises to street railways only upon petition of the owners of one-half of the frontage on the streets concerned. By legislation in 1899 this provision was omitted as regards surface railways, though apparently it is still in force as regards elevated railways. ${ }^{\circ}$

Corporate charters of all classes are limited to ninety-

[^51]nine years and may be amended or repealed by the legislature. The state law of 1874 limited franchise grants to twenty years, though some earlier grants were for longer periods and some were even perpetual. In 1897 the limit was extended to fifty years, and it was also provided that cities might grant extensions of existing franchises for the same period of time. No franchises were granted or extended in Chicago under these laws because of opposition from the citizens. In 1899 the act of 1897 was repealed and the twentyyear limit was again imposed. ${ }^{1}$

A large majority of the existing franchises in Illinois are limited to twenty years, but a considerable number exist with limits of twenty-five, thirty-five, forty, and fifty years.
The date of the expiration of the more important street railway franchises in Chicago has been a matter of much dispute and litigation. These grants were originally made by the city government in 1858, 1859, and 1861, and were limited to twenty-five years. In 1865 the state legislature passed an act extending the corporate charters of the railway companies holding these franchises so as to make their total duration ninety-nine years. This act sought also to extend the local franchises for a corresponding period of time, but the right of the legislature to do so was later disputed by the city authorities. When the question arose in 1888, at the expiration of the period fixed in the ordinances of 1858 , its settlement was postponed by agreement, and the city passed a new ordinance extending all the existing franchises for twenty years. This extension expired July 30,1903 , but the companies claimed rights for important parts of their trackage under the ninety-nine-year act of 1865 . This contention was upheld by the Federal circuit court in May, 1904, despite the argument that the act of 1865 related to horse railways only, and appeal from this decision is now pending. Meanwhile, however, various franchises granted after 1865 bave expired and the city is moving to oust the companies from the trackage covered. There have been many negotiations between the companies and the city with reference to an extension of the franchises, but no agreement has yet been reached as to terms, and apparently a large majority of the people are determined not to permit such an extension under any conditions, but to insist on municipal ownership, if not also municipal operation.

A general provision of the municipal corporations law of Illinois authorizes cities to license and regulate hackmen, draymen, and "all others pursuing like occupations." This provision has been interpreted by the state supreme court as empowering the cities to regulate fares on street railways, and under it Chicago has fixed the maximum fare mithin the city limits at 5 cents, requiring that transfers be given to passengers who have

[^52]paid cash fares at any connecting point on the lines of any single company. ${ }^{2}$ In Peoria the street railway is required to sell 12 tickets for 50 cents or 100 for $\$ 4$, and in Rockford and Springfield 25 tickets must be sold for $\$ 1$, but elsewhere in the state there has been little attempt to reduce fares below 5 cents.

Under the general provision mentioned above, authorizing cities to license those engaged in local transportation, Chicago and Peoria both require street railways to pay a license fee of $\$ 50$ per car. No other special compensation is at present obtained from the street railways in either of these cities, nor, so far as has been ascertained, in any other Illinois city.
In 1903 the state legislature passed a law which may be adopted by any city on popular vote. If adopted the city may construct street railways and acquire them by purchase, but without the exercise of the power of eminent domain over existing lines. A majority vote of the people is required for the authorization of each acquisition, and before the city can itself operate a railway the approving vote of three-fifths of the electors voting on the question must be secured. The issue of bonds or other obligations also requires a separate popular vote. The charges under public operation mist be high enough to provide operating expenses, interest, and sinking fund for bonds issued. The bonds may be issued as a general obligation of the city, or they may be secured by mortgage of the street railway property only. ${ }^{3}$ No city owning a railway may lease it for a period of five years or longer without having given opportunity for a protesting petition, which, if signed by a specified proportion of the electors, makes necessary the submission of the matter to popular vote.
In April, 1904, the people of Chicago, by a large majority, adopted this law, and by a separate vote of 120,744 to 50,893 favored the acquisition of all the street railway lines in the city. In view of the complications and litigation regarding the expiration of the franchises of the existing lines it will presumably be some time before the acquisition can be accomplished, and it is possible that a compromise may be effected by which private operation, or even private ownership, may be continued.
Indiana.-In cities having boards of public works this body must act in connection with the city council in granting franchises. In incorporated towns 40 per cent of the voters may by petition require any proposed franchise grant to be submitted to popular vote. ${ }^{*}$
The duration of corporate charters of street railway companies under the state law is unlimited, and that of franchises granted by local authorities is not limited by statute; but, with few exceptions, the franchises reported to the Bureau of the Census are limited. The most common period is fifty years, but many have a

[^53]shorter duration. A recent state law authorized Indianapolis to extend the charter of the street railway company in that city for net more than thirty-four years. At the end of that period the city may purchase the lines at an appraised valuation, or may open the franchise to competition for an extension of not more than thirty years. In the latter case the successful bidder, if it is not the existing company, is required to buy the lines of that company at an appraised valuation. ${ }^{1}$

The general street railway law authorizes the companies to fix fares, but this does not preclude the local government from regulating fares by the terms of franchise grants. In various instances local authorities by the terms of franchises have required 6 tickets to be sold for 25 cents. Several years ago a state law was passed establishing a 3 -cent fare in Indianapolis, and this was held constitutional by the supreme court of the state under the general power of the legislature to regulate common carriers. ${ }^{3}$ But the Federal district court declared that, under the clause of the state constitution forbidding special legislation, the general street railway law, which authorized the corporations to fix fares, could not be amended except by a statnte which should apply to all companies. ${ }^{*}$ The later law above mentioned, which authorized an extension of the franchise in Indianapolis, required 6 tickets to be sold for 25 cents, or 25 for $\$ 1$.

There is no general state provision on the subject of compensation to cities for franchise privileges. The extended franchise of the Indianapolis Street Railway Company, granted in 1899, required it to pay to the city $\$ 30,000$ yearly up to 1925 and $\$ 50,000$ yearly thereafter. In Eransville the local franchise requires the company to pay 2 per cent of its gross receipts for the first twelve and one-half years and a gradually increasing percentage thereafter up to 4 per cent for the last' twelve and one-half years of the fiftr-year grant. The payment to the city during the census year was $\$ 3,485$. In Fort Wayne the company is required by its franchise to pay 2 per cent of its gross receipts and $\$ 1$ annually on each pole. The receipts are about $\$ 8,000$ per year. In Terre Haute the company recently paid $\$ 78,000$ for a fourteen-year extension of its franchise.

Several of the classes of cities distinguished by the state laws of Indiana are authorized to purchase, erect, and operate street railways, but no details as to procedure or other matters appear in these statutes, and there is no instance of municipal ownership. ${ }^{5}$

Iowa.-By a general state law of Iowa a popular vote may, on petition of citizens, be required for the granting of a franchise that involves the use of a city's

[^54]streets by a public service corporation. Interurban railways have the same power that is granted to steam railway corporations for condemning land, but the use of the publichighways requires the consent of the countyr authorities. ${ }^{\text {a }}$
The present statute limits grants of franchises, by cities under special charter, to twenty-five years, but no such limitation appears in the general municipal corporations law. ${ }^{7}$ The majority of the franchises in the state are for twenty-five years, but several are for fifty years, two or three are for other periods of time, and four or five are perpetual.

The state laws are silent on the subject of fares, but the franchises granted in a number of cities and towns require tickets to be sold at a reduced price, usually 6 for 25 cents.

The general laws of Iowa have no provision on the subject of special compensation to cities for franchises. In Des Moines the railway pays 5 per cent of its gross earnings from mail, express, and freight traffic, and is also supposed to pay a certain percentage of its entire net earnings in lieu of other taxes. The company has always denied that it had any net earnings, and has paid the ordinary property tax only. In Sioux City there is a car license fee of $\$ 25$. In Davenport and Dubuque no special payments are required from street railways.

Kentuchy.-By the Kentucky constitution, which dates from 1891 (section 164), local franchises of all sorts must be sold to the "highest and best bidder."

The present state constitution also limits the duration of local franchises to twenty years. Several railways, however, hold part or all of their lines under earlier grants, some of which are perpetual and others for periods ranging from thirty to ninety-nine years.
The state laws do not regulate fares, but the local franchise ordinances in some of the smaller cities require tickets to be sold at a price somewhat less than 5 cents each.

The mayors of Lexington, Covington, and Frankfort reported that no annual payments as compensation for franchises are received, and the same seems to be true in most, if not all other cities of Kentucky; but in Frankfort a franchise was recently sold, apparently for a cash payment.

Louisiana.-Recent state laws in Louisiana, applying. to New Orleans and to all parishes, provide that street railway franchises may be granted only to the bidder offering the highest percentage of the gross receipts. The general state law regarding franchises in parishes further requires a petition of a majority in number and amount of the abutting property holders. ${ }^{5}$ As most cities have special charters, they do not make uniform

[^55]requirements as to franchises; nor is the subject covered by the general municipal corporations law of 1898.

All corporate charters are limited by the constitution to ninety-nine years, and the recent law mentioned above establishes the same maxinum limit for local franchises in parishes; nearly all existing franchises in cities, however, are for shorter periods. Most of the franchises of the consolidated street railway system in New Orleans expire between 1950 and 1960.

The state laws contain no general provisions as to fares, and the prevailing rate on all lines is 5 cents.

Few, if any, franchises have ever been granted under the recent laws requiring competition. In New Orleans the street railways make no special franchise payments.

Maine--Some railways in Maine are incorporated under a general state law, but others have obtained their charters by special act. Under the general law (as well as ordinarily under special acts) the consent of the local authorities is required for the use of the streets, but appeal may be taken by a railway from the action of the local authorities to the supreme judicial court, and the approval of the state railroad commissioners is also necessary. ${ }^{1}$

There is no general restriction on the duration of franchise grants. Most of those reported are perpetual, but several are limited to from twenty to fifty years.

The general law is silent as to fares, and no unusual provisions appear in special acts or franchises.

On the subject of special compensation to cities the general state law has no requirement. Augusta and Portland reported that they received no special compensation under the franchises granted by them.

Maryland.-There is no uniform municipal law or street railway law in Maryland. The companies in Baltimore have been incorporated by special statutes, but their right to use the streets has been granted by local authorities. By the new Baltimore charter ${ }^{3}$ the granting of a franchise requires not only favorable action by the city council, but also the approval of the board of estimates, a body composed of 5 officials and having general control of the city finances. This board is directed by the law to inquire ciligently as to the money value of the franchise; and while the law provides that future franchises shall be first offered at competitive bidding, the board is supposed to supplement this method, when necessary, by careful bargaining.

The greater proportion of the existing street railway franchises in Baltimore and elsewhere in Maryland are perpetual, but under the constitution the charters of the companies may be amended or repealed by the legislature. The present charter of the city of Baltimore (section 9) limits future franchises to twenty-five years, but the grant may provide in advance for exten-

[^56]sions not exceeding in the aggregate twenty-five years, at a fair revaluation. At the expiration of the grant the city may renew it, in accordance with the original procedure for an equal period or the city may take over the plant, either without compensation or at a valuation to be fixed by appraisal (without allowance for value of franchise), as may have been provided in the original ordinance.

The only instance in Maryland in which a city fare of less than 5 cents for adult passengers has been reported is in Cumberland, where 6 tickets must be sold for 25 cents.

Baltimore is quite exceptional in having from the first introduction of street railways insisted upon a large payment to the city for the privilege of using the streets, the city ordinances making the first extensive grants, which date from about 1860 , requiring the companies to pay 20 per cent of their gross receipts to the city. Subsequently the payment was reduced by state law to 9 per cent, which is at present required from all the railways in the city. The companies also pay a low car license fee. ${ }^{3}$ These special payments-the percentage tax and the license fees-amounted in the census year to $\$ 324,398$.

The Baltimore charter (section 9) permits the city, at the expiration of the franchise of any public service corporation, to become the owner of the plant and either to operate or lease it.
Massachusetts.-The state of Massachusetts is peculiar and interesting in its policy with regard to public service corporations generally. The present state law regarding street railways, ${ }^{4}$ which was adopted in 1898, after a careful investigation by a special commission, headed by Charles Francis Adams, jr., conforms in general to the earlier policy, but it contains some important modifications. Many street railways obtain their charters by special law, although a general incorporation law has been in existence for some time. By the act of 1898 , as was ordinarily true before, the consent of the local governing authorities is required for the use of the streets, and they may impose such restrictions at the time of the grant as they see fit. The law, however, provides that, on appeal by the owners of more than one-half in value of the abutting property, or by ten owners of such property, the action of the local authorities in granting a franchise is subject to revision by the state board of railroad commissioners, and a later law has required that all "locations" of street railways shall be approved by that board. ${ }^{5}$ Where a railway seeks to operate in several towns or cities, part of which bave granted a location, appeal may be taken to the railroad commissioners from the refusal of another city or town. In granting to any company the right to extend its railway lines the local

[^57]authorities are probibited from imposing restrictions or obligations not contained in the original franchise.

All state charters in Massachusetts are perpetual, but are subject to repeal or amendment by the legislature. The state law also permits the local authorities to make perpetual franchise grants, and, without exception, the existing franchises reported are perpetual. The state has, however, reserved to the local authorities the right to revoke the "location" at any time; but under the law of 1898 the board of railroad commissioners must approve such revocation if the company opposes it. The franchises for elevated lines in Boston are not, however, subject to revocation.
The general policy in Massachusetts has been to reserve to the public authorities a continuous control over street railway companies, this control being enforceable by the right to revoke the charter or the franchise. Under the law of 1898 the local governments can not directly change any important provision in a street railway franchise, but they may petition the board of railroad commissioners, which, after a due hearing, may regulate fares. Fares shall not, however, without the consent of the company, be reduced below the average rate charged by other companies for similar service under substantially similar conditions. This last provision would seem in considerable measure to destroy the eflectiveness of the regulation of fares. It would be impossible to lower the fares of any railway at all, however excessive they might be, if all companies similarly situated happened to charge equally excessive fares. As yet there has been no important instance of the exercise of this power to regulate fares. The fare for ordinary passengers is almost universally 5 cents.

A Massachusetts law which is very important in its bearing upon charges requires that all issues of stocks and bonds by steam and street railway corporations shall be approved by the hoard of railroad commissioners, and that they shall not exceed in par value the necessary cost of construction, stock dividends and other methods of stock watering being prohibited. This law has been carried out with considerable vigor, and as a result the street railways are much more conservatively capitalized than those of most other states. ${ }^{1}$

As far as can be ascertained, the earlier franchises and laws in Massachusetts did not ordinarily require special compensation to the local governments for the use of the streets by railway companies, nor have requirements additional to those imposed by general law been inserted in more recent franchises. Massachusetts has for a long time, however, taxed corporations of all classes more effectively than most states. The general tax on street railway companies is based on the value of the track and franchise in excess of the value of machinery, buildings, and other locally assessed

[^58]property. This "corporate excess" value is determined by the state tax commissioner, and is ordinarily based on the market value of the company's securities. The tax rate on the value thus ascertained is equal to the average rate upon other forms of property in the state as a whole. The tax collected, which is in lieu of all taxes upon the shareholders in the street railway companies, is divided among the local governments throughout the state in proportion to the street railway mileage lying within their limits. This arrangement results in giving to cities and torns within which lie the less profitable street railways an amount greater than they would le able to obtain if they collected a tax directly from the local companies.
In addition to this general tax, the law of 1898 provided a form of special franchise taxation which is quite unusual in this country. Any company that shall have paid dividends since the date of its organization averaging 6 per cent yearly on its capital stock, and that now pays more than 8 per cent on such stock, is required to contribute to the state aunually a sum equal to the excess of its dividends above that rate; in other words, to divide its excess profits evenly with the public. The same provision appears in the Boston Elevated Railway charter of 1897. ${ }^{\text {a }}$ The receipts from the special franchise tax are also to be divided among the localities in proportion to the street railway mileage lying within their limits. As yet no companies in the state pay more than 8 per cent on their capital stock, but several have attained that rate, and the Boston Elevated and several other leading companies already pay 6 per cent. In view of the careful restriction of capitalization, it is probable that as railway profits increase considerable sums may ultimately be received from some of the railways under this provision.
Still another tax in Massachusetts is peculiar in its purpose. In most states the street railways are required to pave the space covered by their tracks and to keep it in repair, sweep it, and remove the snow. In lieu of this requirement Massachusetts has provided a tax on the gross earnings of streetrailway companies, as recommended by the special commission of 1898. This varies by gradual steps from 1 per cent for railways whose earnings per mile of track are $\$ 4,000$ or less to 3 per cent for those whose earnings per mile are $\$ 28,000$ or more. On petition of the company or the local government these payments are subject, at threeyear intervals, to revision by the railroad commissioners so as to correspond to the actual average cost of caring for the street surface occupied.
The various taxes and other payments made by the street railway companies of Massachusetts to the public authorities in 1902 were equal to nearly 7 per cent of their gross receipts-a larger proportion than in most other states. Probably about one-fifth of the amount

[^59]paid represents the commutation of the requirement to pave and care for the street surface occupied.
The state laws of Massachusetts do not authorize municipal ownership of street railways. The subway in Boston, ${ }^{1}$ however, was constructed and is owned by the city. It is leased to the Boston Elevated Railway Company for twenty years at a rental equal to $4 \frac{7}{8}$ per cent on the city's investment. The railway company has sought to secure the right to construct and own other subways, but the city has insisted on retaining its control and has defeated the proposed legislation. It is expected that the city will accordingly construct the other proposed subways and lease them.

Michigan.-In the cities of Michigan a vote of twothirds of all the aldermen is required to grant a franchise. ${ }^{2}$ In one or two cases in Detroit an unofficial vote of the people has been taken on franchise questions. Such a vote, according to a letter from the mayor's secretary, "was supposed to have a moral effect upon the aldermen." In fact, a recent ordinance of the city requires that future franchises shall be submitted to popular vote, if demanded by 18 members of the city council or by 5 per cent of the voters; but such a vote is purely advisory.

For interurban railways the consent of two-thirds of the owners of property abutting on the roadbed is required, ${ }^{3}$ but there is no such provision for urban railways.

Corporate charters of street railway companies under the general state law are limited to thirty years, and the charter may be amended or repealed by the legislature. ${ }^{4}$

There is no state restriction on the duration of local franchise grants, but most of the franchises are for the period of thirty years. Several companies, however, report part or all of their franchises as having a shorter duration. In Detroit the policy in recent years has been to grant franchises for track extensions only until the date of expiration of the franchise for the main system.

As to the question of fares the state law merely provides that there shall be no revocation during the term of its franchise of rights once granted a street railway. ${ }^{5}$ About 40 miles of track were constructed by the Detroit Street Railway Company under a franchise granted about 1896 which required that 8 tickets be sold for 25 cents. The older company for a time met the competition of this new railway by a 3 -cent fare. Finally a combination of the two companies was effected and the fare on the older lines was raised again to 5 cents (except at rush hours, when tickets sold at the rate of 6 for 25 cents may be used). The city attempted to fix the fares on all lines at 3 cents, but its right to do so

[^60]was denied by the courts. In several of the smaller cities of Michigan the local franchise ordinances require tickets to be sold at a reduced rate, usually 6 for 25 cents.

In the absence of any state provision in regard to special compensation to cities, the requirements depend wholly on local franchise ordinances. No special payment for franchise privileges, aside from ordinary taxes, is required in Grand Rapids or Saginaw. In Detroit the lines of the Detroit Street Railway Company were not only not required to pay any special taxes on earnings, but they were not even required to pave and maintain the surface between the tracks. Several of the other franchises in Detroit require the payment of from 1 to $2 \frac{1}{2}$ per cent of the gross receipts, the leading lines paying 2 per cent. The total amount received by the city of Detroit from this source in 1902 was $\$ 30,823$.

In 1899 a law was passed authorizing Detroit to construct or acquire and to operate street railways, but this act was held invalid by reason of the clause in the constitution prohibiting the state or its subdivisions from taking part in works of internal improvement. A movement is now on foot to secure an amendment to the constitution which shall permit municipal ownership of street railways. ${ }^{\circ}$

Minnesota.-In the legislation of Minnesota the only provision of importance as to the method of granting franchises is in the new charter of St. Paul, adopted in 1900, which requires a three-fourths vote of each body of the city council.
All corporate charters are limited to fifty years, but with provision for renewal; they may be amended or repealed by the legislature. The general state laws do not limit the duration of local franchises, but the new St. Paul charter restricts the duration of street railway franchises to twenty-five years. Several of the earlier franchises in St. Paul and Minneapolis are perpetual, and most of the others throughout the state are for fifty years.

The general laws of Minnesota contain no provisions as to fares or as to special compensation for franchises. The new charter of St. Paul requires railways hereafter authorized to pay at least 5 per cent of the gross receipts to the city; but nothing is received by the city at present, the existing lines operating under old franchises.
As far back as 1893 the Minnesota legislature enacted a lavv permitting any city or village at the expiration of five years from the time of granting a franchise to any public service corporation, or at the expiration of any five-year period thereafter, to buy out the plant at an appraised valuation. The approving vote of twothirds of the electors voting thereon is required to authorize such a purchase. ${ }^{7}$ No action has yet been taken by any city under this law.

[^61]Missouri.-The state constitution of Missouri prohibits the legislature from granting the right to use the streets of a city without the consent of the local authorities. ${ }^{1}$ A law of 1899 requires, before the granting of a franchise, a petition of the owners of more than half of the frontage on streets which are to be occupied by the street railway; ${ }^{2}$ this provision formerly existed only for certain classes of cities. A general law also permits the local authorities in cities of more than 100,000 inhabitants to require competitive bidding for franchises, but this method has not heretofore been pursued, at least in St. Louis or St. Joseph. ${ }^{3}$
There is no state provision on the subject of duration of corporate charters or franchises. The actual franchises reported vary greatly in duration, even within the city of St. Louis. The most common period is fifty years, but several franchises are for twenty years only; none are perpetual.
Cities of more than 100,000 inhabitants, designated by Missouri laws as first-class cities, are given the continuous right to regulate fares on railways now built or hereafter to be built. ${ }^{1}$ Other classes of cities are not given this power. In St. Joseph the street railway is required to sell 100 tickets for $\$$ t.
The law for cities of the first class permits them to impose, at the time of granting the franchise, taxes on passengers, cars, or gross receipts. Other classes of cities are granted authority to levy license fees on cars. ${ }^{5}$ Various requirements of percentage payments exist in St. Louis franchises. According to the report of the mayor, the ordinary tax receipts from street railway property were supplemented, in the census year, by $\$ 105,858$ from special percentage taxes, and by $\$ 24,750$ from car license fees, at $\$ 25$ per car.
New Jersey.-The general law of New Jersey provides that no company may be permitted to construct street railways without the consent of the local authorities and of the owners of one-half of the street frontage affected. ${ }^{\circ}$
The state law contains no restriction on the subject of duration of franchises. Seventeen companies report that all of their franchises are perpetual, and several others report that a part of their franchises are perpetual. Some companies, however, have franchises limited to periods varying from thirty-five to ninetynine years.
The state laws do not regulate fares, and the prevailing limit fixed by local franchises is 5 cents.
By a state law any city of over 100,000 inhabitants may impose license taxes on street railways for the purpose of regulation, but not for the purpose of taxation or for the purpose of preventing the use of the franchise. This law, however, does not hinder a city from

[^62]making such requirements as it sees fit when it first grants the franchise. In Newark the street railway companies are required to pay 5 per cent of their gross receipts and a license fee of $\$ 10$ per car. The receipts from street railways, aside from ordinary taxes, were $\$ 86,797$ in the census year. In Paterson there is a special payment of $2 \frac{1}{2}$ per cent of the gross receipts, which amounted to $\$ 14,636$ in the census year.

New Yort.-A constitutional amendment in New York, passed in 1875 , provides that no surface or elevated railway may be constructed in the public streets without the consent of the local authorities and of the owners of one-half, in value, of the abutting property. If such consent be refused, an appeal may be taken to the courts, which are required to investigate through three commissioners the public necessity of the railway. ${ }^{7}$ By statute the consent of the owners of two-thirds, in value, of the abutting property is required for constructing a railway in an unincorporated town. ${ }^{8}$ By other laws, originally enacted in 1884 and applying only to New York city, but since extended to all cities of over 50,000 inhabitants, street railway franchises must be sold, by competitive bidding, to the corporation offering the highest percentage of gross receipts. ${ }^{\circ}$ By the New York city charter ${ }^{10}$ it is further provided that no franchise grant of any sort shall be made except on terms deemed satisfactory by the board of estimate and apportionment, a small body composed mainly of executive officers, which has the chief control over the finances. The board is directed to make careful inquiry as to the value of the proposed privileges, and is supposed thas to supplement competition by careful bargaining. A vote of three-fourths of the members of the board of aldermen is also required. In cities of the second class, with from 50,000 to 250,000 inhabitants, the approval of a similar board of estimate and apportionment must be given subsequent to the auction sale.

Under the street railway law there is no general restriction on the duration of charters or franchises, but charters may be amended or repealed at any time by the legislature. By the New York city charter no franchise for any public utility shall be for a longer period than twenty-five years, but it may contain a provision for renewal, for not to exceed twenty-five years, upon a fair revaluation (section 73). In cities of the second class-from 50,000 to 250,000 inhabitants-franchises are limited to fifty years (section 19). The more important franchises in most of the cities of the state, including New York city, are perpetual, having been granted before the passage of restrictive laws. Seventy companies report that all of their franchises are perpetual, and others report that part of their franchises

[^63]are perpetual. There are, however, a considerable number of limited franchises, usually ranging in duration from fifty to ninety-nine years, with a few of nine hundred and ninety-nine years' duration.
A general law, enacted in 1884 and applying to all railways constructed after the passage of the act, limits fares to 5 cents for any distance which can be reached by the cars of a single company within the limits of a single city or village. This is held to require practically unlimited transfer privileges over the lines operated by a single company, including the lines which it holds under lease. ${ }^{1}$ The right of the state legislature to revise fares on street railways constructed after 1884 is expressly reserved by the law. Local franchise ordinances in several small towns have required tickets to be sold at reduced rates, usually 6 for 25 cents, but Syracuse is the only large city in which a fare lower than 5 cents is required. The law of 1884 , which contained the provision for competitive bidding on franchise grants, also provided that in any city of more than 1,200,000 inhabitants, all surface railways thereafter constructed should pay to the city a minimum of 3 per cent of their gross receipts during the first five years and 5 per cent thereafter. Moreover, the general railroad law provides that other cities and villages may, in granting franchises, require anannual percentage payment, not to exceed 3 per cent of the gross receipts. ${ }^{2}$
In New York city a few railway franchises dating back of 1884 require small annual payments to the city, but many of the most important lines are free from such requirements. In the franchises granted since 1884 the minimum percentage required by law has seldom been exceeded through competitive bids, though there are a few instances in which the percentage secured in this way is from one-fourth of 1 per cent to 1 per cent above the statutory minimum, and one in which it is 3 per cent above that minimum. The board of estimate and apportionment has of late farored the policy of demanding a percentage increasing from time to time. Thus the franchises for two extensions on Manhattan Island, granted in 1899, required the payment of $\pm$ per cent of the gross receipts during the first five years, 6 per cent during the next five years, 8 per cent
during the next five during the next five years, and 10 per cent during the remaining ten years of the grant. ${ }^{3}$ New. York city also levies a license fee, usually of $\$ 50$, on cars; but some companies are exempt or have lower rates by the terms of their franchises. The total payments by street railway companies to New York city, aside from ordinary taxes, amounted to $\$ 422,177$ in $1902 .{ }^{*}$
In Rochester the street railway company pays 1 per cent of its gross receipts to the city, the revenue from this source, together with a small car license fee, being

[^64]about $\$ 30,000$ a year. In Buffalo the leading company at present pays 3 per cent of the gross receipts. Formerly one of the leading companies was subject to no such requirement, butit combined with another company which under the plan of competitive bidding had agreed to pay $13 \frac{1}{\text { p }}$ per cent of its receipts to the city, $A$ compromise was made with the city by which 3 per cent should be paid on the receipts of the consolidated system. The total payments to the city from this sonuce in the census year were $\$ 85,851 .{ }^{5}$ In Utica, Binghamton, and Albany no special payment of any importance is made to the city by the street railway companies.
An important state law of $1899^{6}$ requires that the value of "special franchises," including therewith as a single unit the tangible property so far as it occmpies public streets and places, shall be assessed to its full amount by the state board of tax commissioners. The assessment is then reported to the local futhorities, and the ordinary tax is collected on this hasis. Undur this law the assessment of street railway companies, particularly in New York city, has been greatly increased. The constitutionality of the law has been upheld by the New York courts.

The charter of New York city (sections 71 and 73) declares that the rights of the city in its streets and public places are inalienable. Every trumehise for a public service enterprise may provide that att its expiration the plant shall become the property of tho eity, either without payment or at an appraised valuation, which shall not include any allowance for the value of the franchise itself. The city may then either operato the plant directly or lease it for not more than twenty you's, after competitive bidding.
The new subway in New York city is owned by the city and leased to an operating company underconditions more fully set forth on page 135 .
Ohio.-By a general state law of Ohio franchises for: street railways may be granted only with the consent of the owners of more than one-half of the frontage of the streets to be occupied. Moreover, frandhises must be sold by public competitive bidding to the corporation offering to make the lowest fares. ${ }^{7}$
The general law (with an exception for a limited class of cities) restricts the duration of local franchises to twenty-five years, without special provision regarding renewal. ${ }^{7}$ Of the 63 companies reporting on this subject, 41 have all of their franchises limited to twentyfive years, and several others hold part of their system under franchises so limited. A few franchises, dating from an earlier time, are perpetual, and a few others are restricted to other periods of time than the present
statutory limit.

[^65]In 1896 a special act was passed which permitted existing companies in any city to consolidate, and which authorized the city governments in such cases to extend the franchises for fifty years. The terms with regard to fares which should be imposed by the city at the time of such extension were to remain unchanged for twenty years. At the end of the twenty-year period, and again fifteen years later, the city was to have the right to alter the rates of fare. The railway companies of Cincinnati, in whose interest principally the law was passed, consolidated and received an extension of their franchises for fifty years. The act was repealed in 1898 , and it has recently been declared unconstitutional by the superior court of Cincimati. The case is still pending, however, before the state supreme court. ${ }^{1}$ The franchise of the Peoples Railway Company of Cleveland, granted in 1902, but held invalid by the courts, authorized the city to take possession of the railway at any time on payment of 10 per cent more than the actual structural value.

The provision that franchises shall be granted in every case to the corporation offering the lowest fares, together with the general feeling of the people in Ohio on this subject, has resulted in the introduction of important limitations in the matter of fares in a number of recent franchise grants. In Columbus the franchise of the Columbus Railway Company, which, in 1901, was extended for twenty-five years, requires that 7 tickets shall be sold for 25 cents, until such time as the gross receipts of the company may reach $\$ 1,750,000$, when 8 tickets must be sold for 25 cents. The new Central Market Street Railway in the same city is required to sell 7 tickets for 25 cents, and also to pay 2 per cent of its gross receipts to the city. In both cases universal transfers on both cash fares and tickets are required for the lines of the single company, while for a 5 -cent fare the passenger must be given a transfer to the lines of the other company. ${ }^{2}$ In many of the smaller cities of the state local franchise ordinances have required the companies to sell 6 , and in a few cases 7 , tickets for 25 cents.

The subject of street railway fares has been a matter of much agitation in Cleveland during recent years. In 1902 a franchise was granted to the Peoples Railway Company to construct certain lines on which a 3 -cent fare was to be charged. This franchise covered part of a much more extended system which had been planned by the city, and which was to be restricted to the same fare throughout. This franchise was, however, held invalid by the courts because of technical errors. In September, 1903, another franchise was granted to the Peoples Railway Company, also subject to the requirement of a 3-cent fare, but construction has not yet

[^66]begun. The city authorities of Cleveland bad previously sought to compel the two existing companies to reduce their fare to 3 cents, but in 1904, after protracted litigation, the United States Supreme Court held that the city could not modify the terms of the original grants. Pending the final decision of the court. the two companies consolidated and voluntarily began to sell 6 tickets for 25 cents and to give universal transfers. In 1904, however, the consolidated company raised the price of tickets to 11 for 50 cents, and restricted the transfer privilege somewhat. Various proposals for a zone system of charges have been made, but no agreement could be reached between the city and the company. The subject of fares is therefore still an unsettled one in Cleveland. In Cincinnati the extension franchise of 1896, now under litigation, permitted a 5 -cent fare for the first twenty years.
The general law in Ohio authorizes municipalities to levy car license fees, and a recent enactment permits them to agree with any street railway company now paying such fees to substitute therefor a percentage of gross receipts. ${ }^{3}$ In Cleveland a car license fee of $\$ 10$ is imposed, but there is no other requirement of compensation at present. As indicated by the franchise in Columbus, above mentioned, it is feasible under the state law to require a percentage of gross receipts at the time of granting the franchise, notwithstanding the fact that the form of competition provided by law has to do with rates of fare. In Cincinnati the new franchise of 1896 required the railway company to pay 6 per cent of its gross receipts to the city, and the revenue derived from this source is about $\$ 200,000$ a year. No special payment aside from ordinary taxes is received from the street railway companies in Springfield, Canton, Toledo, or other cities from which reports were received.

Oregon.-There is no general law in Oregon regarding the method of granting local franchises. The new charter of Portland, prepared by a local board and adopted by popular vote in 1902, provides that any ordinance granting a franchise or leasing public property for a period of five years or more must, on petition of 15 per cent of the voters, be submitted to popular vote. ${ }^{*}$
The state laws do not place any general restriction on the duration of franchises. All of the franchises reported to the Bureau of the Census are limited, the most common period being thirty years. The new Portland charter (sections 95 and 96 ) restricts all future franchise grants to twenty-five years. At the expiration of this time the city may elect to take over the property at an appraised valuation, which shall not include the value of the franchise itself, or it may reuew the grant to the same corporation or transfer it to any other company

[^67]offering better terms. If the grant is to a new company the grantee must purchase the plant at an appraised valuation.

No general provisions regarding fares appear in the state laws of Oregon. The two companies in Portland are allowed, by their franchise ordinances, to charge 5 cents.
Neither the general laws nor the new charter of Portland contain provisions regarding special compensation for street railway or other franchises. The Portland charter, however, declares that the value of franchises is to be assessed for the general property tax, and it requires all franchise holders to make detailed reports of their business to the city authorities. Shortly before the adoption of the new charter in Portland the city council extended the franchises of the two principal street railway companies for a period of thirty years. In addition to the various requirements regarding the paving of streets and the construction and maintenance of bridges, the city provided that the Portland Railway Company should pay $\$ 1,000$ yearly for the first five years, and that the rate of compensation should increase gradually until it becomes $\$ 5,000$ yearly for the last five years of the grant. .In the case of the City and Suburban Railway Company the rate of compensation was fixed at $\$ 3,000$ yearly for the first five years, and the rate is to increase up to $\$ 12,000$ yearly for the last five years.

The new Portland charter, as above indicated, permits the city to take over a street railway or other public utility at the expiration of its franchise. To do so, however, requires the approval of a popular vote. The question whether the city shall acquire the plant must be submitted to vote, if demanded by petition of, 15 per cent of the electors. If the city takes over the property it may either operate it directly or lease it for not more than twenty-five years, or it may at any later time sell the property and franchise to the highest bidder (sections 95 and 96 ).

Pennsylvania.-The state law contains no provisions regarding the method of granting franchises beyond a requirement that the consent of the local authorities shall be obtained before a street railway is constructed in the public streets or highways. The usual practice of city councils, as reported by the mayors of leading cities, is merely to pass an ordinance on the subject in the same manner as they pass other ordinances.

The state law imposes no restriction as to the duration of charters or franchises, but the constitution gives the legislature the right to amend or repeal the charters of all corporations. Of the 98 companies reporting, 75 have perpetual franchises for all their lines and several others have perpetual franchises for part of their lines. Of the other companies reporting, 9 have franchises for nine hundred and ninety-nine years and only 3 report limits as short as fifty years. All franchises in Philadelphia are perpetual, even those most recently granted.

The state laws do not regulate fares. In most local franchises the restrictions on fares present no peculiar features, although in a considerable number of the smaller cities and towns the local franchise grants have required tickets to be sold, usually at the rate of 6 for 25 cents. The recent franchises for elevated, subway, and surface lines in Yhiladelphia, which in respect tofares closely resemble those for the many earlier lines, merely provide that the fare for a continuous ride shall not exceed 5 cents within the city limits, no provisions regarding transfers being inserted. ${ }^{1}$
As to special compensation the state law merely provides that cities of, the second and third classes may levy license fees on street cars, and that companies in Philadelphia must pay a license fee of $\$ 50$ per car, which may not be increased by the city authorities in case of companies already chartered at the time the statute was passed. ${ }^{2}$ The state itself levies somewhat heary taxes on the stocks and bonds of street railmays and on their gross receipts. In Philadelphia, by virtue of the terms of the various franchise grants rather than by general law, most, if not all, street railway companies are required to pay a tax of 5 per cent upon all dividends in excess of 6 per cent. This provision, for example, is found in the important new franchises granted in 1901. As there is no restriction upon capitalization, this requirement is easily obviated by stock dividends, etc., and hence does not result in much revenue. The car license fees are, however, a somewhat important source of income to the city, amounting to about $\$ 100,000$ in the census year.

When, about 1892, the street railway companies of Philadelphia desired to change from animal power to electric traction, the city seized the opportunity to require them to pave the entirestreet surface in the streets occupied and to maintain the pavement in the future. The same provisions were inserted in the new franchises of surface lines granted in 1901. This requirement constitutes virtually a greater compensation to the city than the percentages on gross receipts required in most cities where the street railway company paves only the space between its tracks. The Philadelphia railways have expended several millions of dollars in paving streets, and their annual expenses for maintenance are quite large. The total payments of the Union Traction Company, of Philadelphia, to the state and local authorities, including the expense of maintaining the pavements, have averaged about 7 per cent of its gross receipts during the past three fiscal years. The direct payments for new paving have been made largely out of capital, and the interest on such expenditure is not included in computing this 7 per cent. ${ }^{3}$
Car licenses or pole licenses of moderate amount

[^68]are required in a few other cities of Pennsylvania, but aside from these there is little or no payment to the local authorities in addition to the ordinary taxes. Thus there are no special payments, aside from such licenses, in Allentown, Easton, Erie, Pittsburg, Reading, and Scranton. In Harrisburg the street railway company is required to pay 3 per cent of its gross receipts, the revenue to the city from this source being about $\$ 2,900$ yearly.

Rhode Island.-By the state constitution of Rhode Island ${ }^{1}$ street railway charters can be granted only by special acts of the state legislature. In some cases the legislature has also granted the right to use streets, without action of the local authorities; but in other instances-as, for example, in the charter of the Rhode Island Suburban Railway Company-the consent of the local governments has been required, and local selfgoverning bodies have been permitted to impose reasonable rules and regulations. ${ }^{2}$

The general state laws are entirely silent as to the duration of franchises. According to the reports of the companies, 6 of the 8 . have perpetual franchises. The Union Railroad Company, which includes a large proportion of the total trackage in the state, was in 1892 granted by the state legislature a twenty-year extension of its franchises, with exclusive authority to operate in Providence. The franchise of the railway company in Woonsocket has been limited by the city council to twenty years.
The Rhode Island legislature in 1898 passed a very peculiar statute. It applies only to those street railway companies which may indicate their written consent thereto, but in case of consent it becomes binding as between the state and such assenting company, and its terms are not subject to amendment or repeal without the consent of the company. The law imposes a tax for state purposes of 1 per cent upon the gross earnings of assenting companies whose dividends do not exceed 8 per cent on the par value of their capital stock. If the dividends exceed 8 per cent an additional amount equal to such excess also goes to the state as a tax. The issue of capital stock requires the approval of the state railroad commissioner. Companies accepting this act are to have their existing franchises and rights guaranteed in perpetuity regardless of the limits prescribed in their present charters or franchises. Cities and towns are specifically denied the authority to require the removal of the tracks of these assenting companies except for police reasons, and in such cases a substitute location must be provided. The companies assenting, however, are bound to continue to make any payment which they are now making to the local governments, even after the expiration of the existing franchise, unless a new agreement shall be made increasing the obligations of

[^69]the railway. This last provision seems quite valueless, since no additional requirement could apparently be exacted by the local authorities except as a condition for the granting of additional privileges. ${ }^{3}$

The law of Rhode Island regarding the issue of transfers is summarized on page 43. There is no general law regarding fares, and the special laws and franchises contain no unusual provisions on this subject.

The state law regarding the Union Railroad.Company requires it at present to pay 5 per cent of its gross re-ceipts-only the receipts within the city itself-to Providence. ${ }^{4}$ This payment in the census year amounted to $\$ 66,195$. In Woonsocket the local franchise requires the payment of 3 per cent of the gross receipts, and the city received $\$ 1,631$ from this source in the census year. ${ }^{4}$

Virginia.-The new constitution of Virginia (1902, section 125), and a statute since passed in accordance therewith, require all future grants of municipal franchises to be made by competitive bidding. The franchise must be awarded to the highest responsible bidder, unless, in the opinion of the majority of the members elected to the city council, the public interests will be better served by awarding it to some other bidder, in which case the reason for doing so must be stated in the body of the ordinance. The city may reject all bids. ${ }^{5}$

By the new constitution and statute ${ }^{6}$ the duration of future franchises, as well as of leases of public property, is restricted to thirty years. The law requires that every franchise shall provide in advance that at the expiration of the thirty-year period the plant shall become the property of the city, either without compensation or on payment of the appraised valuation exclusive of any allowance for the franchise. A considerable number of earlier street railway franchises in Virginia are perpetual, but the greater number are limited to periods ranging from thirty to fifty-six years.

There is no state law on the subject of tares. In Richmond, Norfolk, Danville, and most of the other cities, however, the local franchises require the street railways to sell 6 tickets for 25 cents. The new constitution of the state declares that "the right of the commonwealth, through such instrumentalities as it may select, to fix and regulate the charges of public service corporations shall never be surrendered or abridged " (section 164).
Aside from the requirement of competitive bidding on franchise giants, the state law makes no provision for special compensation to cities. As in other Southern states, however, the local governments are authorized to levy license taxes. In Richmond there are no car licenses, but the franchise of the leading railway system requires 5 per cent of the gross receipts to be

[^70]paid to the city. ${ }^{1}$ The revenue from this source in the census year was $\$ 28,121$. In Norfolk the franchise of the leading company, dating from 1888, restricted the license taxes on cars for ten years to certain rates, but left the license system thereafter to the discretion of the city. The city now levies on aII companies a license tax of 4 per cent of their gross earnings, the revenue from this source in the census year amounting to \$12,671.

Washington.-The state law of Washington merely provides that at least 5 members of a city council must vote for a local franchise. The low-fixed number is perhaps explained by the fact that several of the city councils have only 7 members. The practice in Seattle, apparently adopted on the initiative of the city merely, is to sell street railway franchises by competitive bidding to the person or corporation offering to pay the city the highest percentage of the gross receipts.

The state law limits the charters of corporations to fifty years, and they may be amended or repealed by the legislature. There is no general restriction on the duration of local franchise grants. One perpetual franchise is reported, but most of the franchises are limited to from twenty-five to fifty years.

The general laws of Washington do not regulate fares, but by local franchises they are ordinarily limited to 5 cents.

In Seattle, by the local ordinances, street railways are required to pay 2 per cent of their gross receipts to the city, this minimum being fixed when the franchise is opened to competition. The revenue from this source is approximately $\$ 20,000$ yearly. Spokane and Olympia require no special payment of any importance.
By an act of 1899 municipalities are authorized to construct, purchase, or obtain by condemnation street railways or other public service enterprises, but no detailed provision is made as to the method of acquiring such public ownership. ${ }^{2}$

West Virginia.-There is no general law in West Virginia regarding street railway franchises. Each city is governed by a separate charter. The new charter of Purkersburg requires future franchise grants to be submitted to referendum vote, if demanded by onefifth of the qualified voters. It further provides that franchises shall be sold to the person or corporation offering the highest compensation to the city, or the lowest fares. ${ }^{2}$

Corporate charters of all classes are limited to fifty

[^71]years, but there is no general law restricting the duration of local franchises.

The new charter of Parkersburg limits all fanchises to thirty years. It further declares that no grant for an extension of a street railway hereafter constructed shall be made for a period exceeding the duration of the original franchise. At the expiration of the frunchise, the grantee may be required to sell the property to the city at its appraised valuation independent of its enrning capacity. Several of the franchises reported from West Virginia are perpetual, while others are limited to from twenty to fifty years.
The Parkersburg charter provides that no future franchise shall be granted without an annual payment to the eity, but it contains no further details as to amount or basis of payment. The fumehise recently given by Wheeling for a period of fifty years to the City Railway Company requires the payment of $\$ 300$ per mile of line for the first twenty years, and $\$ 1,000$ per mile for the last thirty years of the grant. This franchise also provides that the street railway shall be operated exclusively by union labor.

Wisconsin.-The general state laws of Wisconsin do not contain any provisions regarding the manner of granting franchises.

Though the state law contains no restriction on the duration of local franchises, most of those reported aro for shorter periods than fifty years, several are for exactly fifty years, and only one is perpotual.

The state law contains no provision regarding fires. In Milwaukee the companies are required by the terms of their franchises to sell 6 tickets for 25 cents or 25 tickets for $\$ 1$, and similar provisions are found in the franchises granted by several other cities.

The general state law regarding street railway companies provides that the local authorities may preseribe the payment of license fees. Neither Milwankeo nor La Crosse, however, requires such payment. Tho law further proxides that in lieu of taxes on proporty, street railway companies shall pay to the local authorities 2 per centi of their gross receipts if the recoipts are less than $\$ 500,000$ per year, and 4 per cont if they ure more than $\$ 500,000 .^{4}$ This constitutes a lighter bux than street railway companies in many other states pay on their property. In La Crosse the company is required by the local franchise to pay 3 per cent of its gross receipts even though they are less than $\$ 500,000$, but in Milwaukee nothing is paid beyond the 4 per cent provided in the state law.

[^72]
## OHAPTER X. <br> STREET RAILWAYS IN EUROPEAN COUNTRIES.

## I.

## UNITED KINGDOM.

Comparism with the United States.-The statistics of street railways, or tramways, as they are called in Great Britain, which are published annually, cover practically only urban lines. In addition to these, there are a few interurban electric railways, built under what is known as the light-railways act, the returns for which are included with those of steam railways.
Table 81 shows for the years 1902,1901 , and 1898 the leading statistics of the tramways of the United Kingdom. The figures include only the surface railways.

Tabla 81.-Trackage, trafte, and financial statistics of tramways in the United Kingdom: 1002, 1901, and 1898.
[House of Commons Prpers," Returns of Street and LondTramways,"1902,pnge 2.]

|  | 1002 | 1901 | 1898 |
| :---: | :---: | :---: | :---: |
| Length of line (flrst main traek), |  |  |  |
| miles. | 11,484 | 1,305 | 1,004 |
| Cupital invested ${ }^{\text {a }}$ | \$168, 597,772 | \$180, 417,445 | 880, 262, 547 |
| Number of Phssengers | 1,394, 452, 983 | 1,198,226,758 | 858,485, 142 |
| Passengers per mile of | 3939, 658 | 918,181 | 800,847 |
| Gross emrnings. | \$32, 50-1, 770 | \$29,009,508 | 822, 191,853 |
| Operating expenses and taxes...... | \%9,46, 179 | \$2, 021,784 | \$17, 1)71, 171 |
| Ratio of operating expenses and |  |  |  |
| taxestogross carnings, percentage. | 72.1 | 75.9 | 76.9 5.935 |
| Number of cars...................... | 7,752 | 7,184 | 5,935 88,777 |
| Number of horses..................... | 2.4, 120 | 34,422 | 38, 777 |
| Number of steam locomotives . . . . . | 888 | 527 | 589 |
| Passenger receipts..................... | \$81, 465, 888 |  |  |
| A verage fare per passenger | \$0.0220 |  |  |
| Car milenge.. | 145, 127, 423 |  |  |
| Pnssengers per car mila............ | 9,61 |  |  |
| Gruss enrnings per onr mile......... | 60. 294 |  |  |
| Operating expenses per ear nile.... | \$0,162 |  |  |

1 Additional tmekage of donble tracked malways, exolusive of sidings and switehes, 852.7 miles
${ }^{2}$ Tneludes expenditure for construction on lines not yet in operation.
${ }^{9}$ Passengers per mile of track, exclusive of sidings and switches, 506, 762
The table indicates that the development is much less marked in the United Kingdom than in the United States. The total length of track in the United Kingdom in 1902 was 2,336.7 miles, exclusive of sidings and switches, or presumably about 2,400 miles if these be included. This is approximately one-ninth of the mileage in the United States. The number of fare passengers carried by the British tramways during 1902 was $1,394,452,983$, as compared with more than $4,774,211,904$ in the United States. To the British statistics, however, should properly be added the number of passen-

[^73]gers carried on the four underground railways in London and on the elevated railway in Liverpool. These aggregated 192,377,288 in 1902, making a grand total of $1,586,830,271$, or one-third of the number in the United States. The passengers carried by the omnibuses in London, where surface railways are not permitted in the central portion of the city, number nearly $300,000,000$ per year.
In judging of the relative importance of street railway traffic in the two countries the number of urban inhabitants must be taken into accoumt. The total population of the United Kingdom in 1901 was $41,607,552$, and the average ņumber of rides on the tram ways, underground, and elevated railways was 38 per capita, as compared with 63 in the United States. But the population living in urban communities of more than 3,000 inhabitants in England and Wales and in urban communities of more than 2,000 inhabitants in Scotland and Ireland numbered $29,144,726$, the proportion of urban to total population being much greater than in the United States. The number of street railway rides per urban inhabitant is thus 54 , as compared with 168 rides per inhabitant of urban communities of more than 4,000 population in the United States. It may be roughly estimated from the statistics of population in incorporated places of from 2,500 to 4,000 inhabitants, that if urban communities of 3,000 to 4,000 were included in the computation of the American ratio it would be reduced to about 160 rides per inhabitant. Such a comparison is necessarily imperfect in many respects, but it gives some idea of the relative development of street railways in the two countries.
The street railway business in the United Kingdom, however, has grown with enormons rapidity during recent years. In 1890 the number of passengers carried on the tramways proper was $526,369,328$, the traffic in 1902 thus being more than two and one-half times as great as in 1890 . During the four years from 1898 to 1902 the length of line (first main track) of the tramways in the United Kingdom increased about 40 per cent, and the number of passengers on the tramways increased more than 60 per cent. This development has been coincident with a rapid substitution of electric for animal and steam traction, the extent of change being indicated only in part by the figures of the table showing the decrease in the number of horses and of
steam locomotives. In 1902, 871 of the $1,48 \pm$ miles of line were operated exclusively by electricity; 384 miles by unimal power; 156 miles by steam; 25 miles by cable; 10 miles by gas motors; and 38 miles by more than one kind of power.

The wide difference between the conditions of street railway operation in Great Britain and in the United States is sharply indicated by the comparison of the ar mileage with the number of passengers. The average number of passengers per car mile on the British tramways in 1902 was 9.61 , while the corresponding ratio in the United States was only 4.26. This difference probably is not due to greater crowding of rars in the British cities, nor probably is it due in any considerable measure to the use of larger cars, although many of the British cars are double decked. The chief reason for the difference in the number of passengers per car mile is the fact that the distances traveled by passengers in the United Kingdom average much less than in the United States.

Because of this difference in the length of journeys it is scarcely proper to compare street railway fares in the two countries. The receipts from passengers in the United Kingdom in 1902 represent an average fare of $\pm .26$ cents. In practically all English cities street railway fares are graded according to the distance traveled. It is unjust to compare either the minimum or the maximum fare in such a case with the uniform fare, regardless of distance, prevailing in American cities. Probably the lowest scale of fares in Great Britain is found in Clasgow. In that city the lowest rate of fare is 1 cent ( $\frac{1}{2}$ penny), the average length of the permissible trips at that charge being reported as 0.58 mile. For 2 cents one may ride an average of 2.29 miles; for 4 rents, an average distance of 4.6 miles; for 6 cents, an average of 6.84 miles. The maximum fare is 7 cents. The average fare for all rides in Glasgow in 1902 was about 1.8 cents. ${ }^{1}$

The average gross receipts per car mile for the British tramways, 22.4 cents, are almost exactly the same as the receipts per car mile in the United States. This fact, in conjunction with the fact that the average fare per passenger is so much lower in the United Kingdom than in this country, is another indication of the relative shortness of the rides in the United Kingdom.

The ratio of operating expenses to operating receipts for the tramways of the United Kingdom in 1902 was 79.1 per cent. The British statistics include taxes with operating expenses. If taxes be so included in the statistics for the United States, the ratio of operating expenses to operating earnings becomes 62.8 per cent.

Municipal ownership.-All of the street railways in Great Britain, up to a few years ago, were operated by

[^74]private corporations, most of which had been organized under an act of 1870 , which limited the duration of franchises for the use of the streets to twenty -one years. This act permitted the cities at the expiration of the grants to take over the railways on payment of thoir appraised value, exclusive of any allowance for the franchise. The shortness of the franchise term doubtless served to hamper the development of the husiness, as very few of the companies with limited frumehises were willing to introduce electric traction, although electricity had already proved its advantages in the United States. Some of the municipalities, however, granted extensions of franchises on condition of installing electric traction. Many of theso emrly frunchises have expired during recent years, and in most cases the cities have acquired the plants and have adoptod the policy of direct municipal operation. The cities doing so, in most instances, undertook at onee a thorough renovation of the system and the introduction of electric power.

In 1902, of the tramway systems in the United Kingdom 118 with 885.5 miles of track were ownod by the local authorities, as compared with 115 tramways having 598.5 miles of track owned by private corporations. A few of the publicly owned railways are now operatod by private companies under lease, but much tho greater number of them are operated by the local authorities directly. The London county council operates patt of: the lines which it owns and leases others, while there is a considerable amount of trackage in London that is owned by private corporations. The leading system in Manchester is owned and operated by a private corporation, but the city operates the other line. In Birmingham the city owns most of the track, but leases it to a company. Nearly all of the remaining cities of nore than 200,000 inhabitants in England and Scothund operate their own railways. There aro about 15 private companies, including those which hold municipal plimes under lease, whose annual earnings exceed $: 225,000$ each, while about 25 municipal plants report earnings exceeding that sum.

It is scarcely feasible to pronounce a final judgment as to the success of municipal ownership in Great Britain. Because of the restrictions placed upon private corporations which prevent them from adopting improved methods, a comparison of the results of pablic and private operation in any general way is mis. leading.

Individual cities.-Table 82 presents the trathe and financial statistics of tramways in the leading citios of the United Kingdom for 1902 . The population of the cities is indicated, but in some instances the milways serve also suburban towns, so that the comparison between the population and the trackage and traffic is not altogether exact.

Table 82.-Traffic and financial statistics of tramways in Leading cities of the united KINGDOM: 1902.
[Compiled from Returns of street and Road Tramways, House of Commons Papers, 1902.]

${ }^{1}$ Exclusive of two or three submbn lines.
${ }^{2}$ Exclusive of eldevated railway, which carried 10,4tin, 726 passengers in 1902.
${ }^{3}$ Includes some omnibus traffer ${ }^{4}$ Exclusive of omnibus lines and of underground railways, the latter carrying 181,910,562 passengers in 1902 .
${ }_{5}$ Includes rental paid tocounty eouneil; total item of yentai, including offices and buildixgs owned by private persons. 8472,852.

This table emphasizes the wide difference between the amount of trackage in British cities and in cities of corresponding population in the United States. A rough estimate of the track mileage may be obtained by adding from 60 to 75 per cent to the figures showing length of line. The greatest proportion of trackage to population is found in Dublin, where some suburban lines are included, and in Manchester, Liverpooi, Bradford, and Glasgow. The greater number of the large cities in the United Kingdom (aside from London) have between 0.05 and 0.15 miles of line per thousand inhabitants, while, for the leading American cities, the corresponding figures range from about 0.20 to 0.60 .

The number of passengers carried is also decidedly less in proportion to the population served in the United Kingdom than in this country. For most of the cities covered by the table the range is between 75 and 160 rides per capita yearly, as compared with from 200 to 265 in American cities of similar size. The traffic is most highly developed in Glasgow, where the average number: of rides per inhabitant is 222 yearly.

In comparing the various tramway euterprises from the standpoint of the ratio of operating expenses to operating earnings, it should be noted that the sums paid by certain private corporations as rental for tracks leased from the municipalities are included with other operating expenses. Thus the North Metropolitan Tramway Company pays for the lines which it leases from the London county council a rental so great, that the net earnings of the company are less than 2 per cent of its gross receipts. The differences in the power used likewise affect the financial results materially. Generally speaking, those cities which have introduced
electric traction on an extensive scale seem to show favorable operating results. In Glasgow, which was the first city in Great Britain to undertake municipal operation of street railways, the ratio of operating expenses, which include a considerable amount for taxes, to operating earnings is $47 . \pi$ per cent. It is impossible here to enter into the merits of the discussion which has been waged as to the correctness of the accounting methods in connection with municipal street railway operation in this or other British cities. The question as to the finmeial success of public operation in Great Britain is a disputed one, both in that country and in our own. It is difficult to escape the conclusion, however, that many of the municipal railways are operated efficiently and economically.

The streets in central London are for the most part so narrow and crowded that the operation of surface cars upon fixed tracks would be practically impossible. The more flexible movements of the omibus give it an advantage, and the trammays are confined to the outlying parts of the city. The limitations on the duration of franchises, together with the uncertainty as to the effect of the competition of new underground railways, have prevented the introduction of electric traction on the London surface tramways. The four underground railways in London furnish a more important means of transportation than the surface tramways, the arerage ride being much longer on the underground roads. The two steam subways have been in operation for many years, while the two electric subways bave only recently been opened. The latter have proven a great success, and plans are on foot for the conversion of the steam underground roads to electric, as well as for the
construction of extensive new electric lines. The Central London Railway, one of the new electric underground roads, popularly known as the "Tuppenny tube" because of its uniform fare of 2 pence, carried $45,305,110$ passengers in 1902. The elevated railway in Liverpool is also operated by electricity. It carried 10,466,726 passengers in 1902.

## II.

GRRMANY. ${ }^{1}$
Comparison with United States.-Table 83 shows for the Kingdom of Prussia, and for the German Empire as a whole, the leading statistics of street railway operation for the year 1901. The statistics, which are secured through a private association, omit about 5 per cent of the trackage operated by companies which make no reports.

Table 83.-Truckage, traffic, and financial statistics of street railways in Germany and Prussia: 1901.
[Returns of Union of German Street und Lipht Railway Administrations in Zeitschrift für Kleinbahnen, February, 1903.]

|  | Germany. | Prussia. |
| :---: | :---: | :---: |
| Length of line (first maint track), miles 1 | 1,867 | 1,316 |
| Capital investment |  | \$115, 045, 154 |
| Capital per mile of line. |  | , 877, 786 |
| Number of passengers. | 1,191,457,000 | 709,950,090 |
| Car mileage. | 3217, 171, 429 | 4140,359,006 |
| Fassengers per car mile | 5.49 | 5.70 |
| Gross eurnings | 3\$29,535,800 | 4\$18, 70̄2, 258 |
| Operating expenses, excluding taxes | 6\$17,850,000 | 6 $\$ 11,424,000$ |
| Ratio of expenses to oarnings, percentag | 60.4 | 60.9 |
| Gross earnings per car mile .... | 80.186 | \$0. 134 |
| Operating expenses per car mile | 80.082 | \$0.081 |
| Passenger eamings per passenger | \$0.024 | \$0.022 |

${ }^{1}$ A coording to govermment retums for March 31, 1902, 2,030 milesin Germany and 1,479 miles in Prussia, respectively,
${ }^{2}$ Based on government retums covering 1,479 miles.
3 On 1,815 miles only.
4 On 1,283 miles only
${ }^{5}$ On 1,815 miles only, the expenses for about 4 per cent of which are estimated.
mated. 1,083 miles only, the expenses for about 4 per cent of which are esti-
The length of line (first main track) in the German Empire was 1,867 miles in 1901, or about one-ninth the length of line in the United States. The government figures for March 31, 1902, however, report 2,030 miles of line. Since the street railways of Germany are chiefly confined to cities of considerable size, a very large proportion of the lines are double tracked. It is probable that the trackage in Germany is between onesixth and one-serenth as large as that in the United States.

The number of passengers carried by the German street railways in 1901 was $1,191,457,000$, or about onefourth as many as in the United States. The population of Germany in 1900 was $56,367,178$, the average, number of street railway rides per inhabitant being 21 . A somewhat larger proportion of the German people live in cities than is the case in this country. In 1896 the population liring in urban communities of more than 2,000 inhabitants was 49.9 per cent of the entire

[^75]population. If to the urban population in places of more than 4,000 inhabitants in the United States be added the population of incorporated places of from 2,500 to 4,000 inhabitants we have a total equal to 39.8 per cent of the aggregate population. It is probable that the inhabitants of German urban communities of 2,000 inhabitants and over, as a whole, take on an average about one-fourth as many rides as the inhabitants of urban communities of the same size in the United States. Such comparisons are, however, necessarily very unsatisfactory, because of the difference in method of computing urban population and in its distribution among places of different size, as well as because of differences in the density of population within urban boundaries, and other reasons.

The number of passengers per mile of track is considerably greater in Germany than in the United States and the number of passengers per car mile (5.49) is also greater. The average size of the German cars is less than that of the American cars, and it is believed that the majority of them are not double decked. The large number of passengers per car mile probably means, therefore, that the average length of ride is much less in Germany than in this country. For this reason the fares on the German street railways, which average 2.4 cents per passenger, can not properly be compared closely with American fares.
The financial results of the operation of the German street railways are very favorable. The operating expenses per car mile are much less than in the United States, a fact largely due to the low level of wages. The capitalization of the German street railways is also much less per mile than in the United States.

The street railway business has been very rapidly developed in Germany during the past few years, as the result of the introduction of electric traction. Prior to that time the trackage had been almost wholly confined to a few large cities. Development was doubtless hindered in some measure by the limitations on the duration of the franchises, but the leading German cities wisely showed a disposition to extend grants on condition of the substitution of electric for animal power. At the end of 1901 only 3 per cent of the entire trackage of street railways was operated by animal power exelusively. About 6 per cent of the trackage was still operated by steam, although on some of this track electricity was also used in part. The rapid development of railways has been materially fostered by the mannfacturing companies in the electric business, as well as by twe or three large investment companies, whose chief object has been the establishment of street railways in various towns. The General Local Street Railway Company, for example, owns 125 miles of track in 11 different places. Siemens \& Halske and Schuckert \& Company, mauufacturing electric concerns which have been combined recently, own several different
street railways. Such manufacturing companies are also largely interested in the stock of street railway companies which they do not own entirely.

Municipal ownership.-During the past few years there has been a marked tendency toward municipal ownership of street railways in Germany. The length of lines owned by municipalities was 315 miles in March, 1902 , an increase of nearly one-fourth above the amount so owned in March, 1901. The municipalities which own street railways operate them directly in most cases, though in a few instances they are leased. The total number of municipal plants in 1902 was 34 , and the most important cities in which they existed were Cologne, Düsseldorf, Munich, Frankfort, Mannheim, Aix la Chapelle, Mülhausen, and Halle. The city of Berlin owns one of the less important systems, about 11 miles in length. The large city of Nuremberg has also recently bought one line from a private company, and the
same is true of Dresden, but the leading systems in both these eities are still under private ownership.

Very few of the street railway systems covered by the above table do an interurban business of any importance, although the electric lines reach fairly well the immediate suburbs of the great cities. Germany has a considerable number of light steam railways and some of these are now beginning to install clectric traction, about 6 per cent of the "light railways" (Kleinbahnen) now using electric motors in whole or in part. These light railways, unlike American interurban lines, are not intended primarily for passenger traffic. They serve largely for the local transportation of agricultural products. The total length of line for railways of this class was 4,153 miles in 1902.

Indiouldual cities.-Table 54 shows, for the most important cities of Germany, the detailed statistics of street railways.

Table 84.-TRACKagF, TRAFFIC, AND FLNANCLAL STATISTICS OF STREET RAILWAYS in THE LEADING CITIES OF GERMANY: 1901.
[Compiled from Zeitschrift für Kleimbahnen, Febraury, 1903.]

| CITY, | Population nerved. | Length of line (miles). | Lemgth of track (miles). | Length of track per 1,000 populat tion (miles). | Number of passengers carried. | Number of rides per inhabitant. | $\begin{gathered} \text { Car } \\ \text { mileage. } \end{gathered}$ | Passengexs perenar mile. | Grasy earnings. | Operating expenses, exeluding tixes. | Ratio of experises to operating earnings (percentage). | Passenger carisings per passerger (cents). | Capital invested. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Berlin | 2,528,000 | 217.8 | 485.5 | 0.179 | 829, 082,096 | 180.5 | 50,840,000 | 0.6 | 37, 813,300 | 构, 078, 685 | 6-4.9 | 2.3 | \$29, 916, 458 |
| Breslau | 423,000 | 26,9 | 83.7 | . 151 | 31,878,644 | 75.4 | $5,072,000$ | 6.3 | 708,385 | 435, 300 | 61.9 | 2.1 | 3,186, 316 |
| Dusseldorf | 1214,000 | 40.3 | 66, 6 | . 811 | 21, 176,768 | 100.4 | 3,517,000 | 0.1 | 515,270 | 405,740 | 78.7 | 2.2 |  |
| Nuremberg ............. | 261,000 | 16.2 | 31.4 | , 120 | 17, 772, 740 | 68.0 | 3,343, 000 | 5.3 | 348, 985 | 208,725 | 52, 0 | 2.2 | 1,409,400 |
| Hamburg and Altona. | 867,000 | 92.0 | 174.8 | . 202 | 108,345,360 | 724.9 | 20,590,000 | 5.3 | 2, 857,410 | 1,774, 240 | 62.1 | 2.6 | 13, 118,822 |
| Hanover and Linden.. | 286,000 | 99.3 | 181,2 | . 685 | 26,404,834 | 92.3 | 5,427, 300 | 4.9 | 869, 176 | 667, 6330 | 65.3 | 2.6 | 9,947, 246 |
| Leipzig | 455, 000 | 68.1 | 181.8 | . 290 | 65, 098,043 | 148.1 | 12,969, 000 | 5.0 | 1,432, 046 | 886, 5150 | 61.9 | 2.2 | 8,098,931 |
| Frankfort | 288, 000 | 26.8 | 58.4 | . 185 | 50, 422, 445 | 175.1 | 7,426,000 | 6.8 | 1,090, 515 | 676, 77 j | 62.1 | 2.1 | 2,310,590 |
| Munich. | 500,000 | 29.5 | 67. 5 | . 185 | 52,540,250 | 105.2 | 7,348, 000 | 7.2 | $1,153,110$ | 782, 8102 | 63.6 | 2.2 | 2,517,601 |
| Cologne ................. | 372,000 | 34, 7 | 66, 5 | .179 | 30, 970,673 | 83.3 | 4,146,000 | 7.5 | 782, 484 | 491, 581 | 62.8 | 2.5 | $2,500,601$ |

${ }^{1}$ As stuted in Zeitsehrift für Kleinbuhnen, includes total aren served.

The German cities, almost without exception, show a much smaller proportion of track to population than the American cities. In Berlin, for example, the length of track per thousand of population is 0.172 mile, as compared with 0.37 in New York. The Hanover and Düsseldorf systems include a large amount of interurban trackage and can not properly be compared with those in other cities. The lower ratio of trackage to population served is, in considerable measure, attributable to the fact that the German cities are very closely built, a large proportion of the people living in large tenement houses. This condition has, indeed, been caused in part by the inadequacy of transportation facilities, but it is due partly to other causes of an historical character. There is a comparative absence of suburbs and of thinly settled outlying districts within the limits of the leading cities,

The number of passengers carried per mile of track is very large in most of these cities, exceeding the number in cities of corresponding population in the United States. The number of rides per iuhabitant, on the other hand, is, in most instances, considerably smaller than in American cities of the same size. The greatest
patronage of street railways is found in the wealthy eity of Frankfort, where an average of 175 rides is taken yearly by each inhabitant. The number of passengers per car mile is considerably larger in most German cities tham in cities of corresponding size in the United States, chiefly because of the fact that the average ride is materially shorter than in this country. The capital invested per mile of track is much less than the net capital liabilities per mile of track in the large cities of America. In Berlin, for instance, the capital per mile of track is $\$ 68,695$, as compared with $\$ 259,542$ for the surface railways of New York city. The German city governments exercise the closest supervision over the issue of securities by railway companies as well as over fares and conditions of service.
The average rate of fare in the German cities covered by Table 84 ranges from 2.1 cents to 2.6 cents. To some extent, the German street railways still follow the practice of charging fares according to distance, buth the tendency is distinctly toward the substitution of a uniform fare, at least within the limits of the leading municipality served. Thus in Berlin the uniform fare within the city limits is 10 pfennigs, or 2.38 cents.

Even where the system of charging according to distance exists in Germany, it often happens that much the greater proportion of the rides taken are for distances represented by the lowest rate of fare. Thus, on the railway system which serves Hamburg and the adjacent city of Altona, the minimum fare is 10 pfennigs. This covers any two of the established zones, the zones varying in length from about 0.6 mile in the central part of the city to 1.9 miles in the outskirts. For each two additional zones, an extra charge of 5 pfennigs is made, the maximum fare being 30 pfennigs, or a little over 7 cents. In 1900, 70.8 per cent of the passengers on this railway paid the 10 -pfennig fare only, and 26 per cent paid 15 pfennigs, while only a little more than 3 per cent of the passengers paid higher fares. ${ }^{1}$

In Chapter IX reference has been made to certain interesting provisions of the street railway franchises in Berlin and Hamburg. Somewhat similar requirements as to compensation to the local authorities for the privileges conferred exist in various other German cities.

## III.

FRANCE.
Table 85 presents a summary of the available statisties for French street railways in 1901, and also shows the statistics for the department of the Seine, which includes Paris, and for several of the leading cities of the country.
The French official statistics recognize three groups of tramwars. The first group, officially designated as "tramways for passengers and freight," comprises 1,82 miles of line and is not included in the table. The

[^76]railways of this group are mostly operated by steam and correspond roughly to American narrow gatge steam railways. Railways of the second group are officially designated as "tramways for passengers, baggage, and express," and are similar to American interurban lines. The total length of first main track of this class of railways is only 156.5 miles. The groater partio of their business is the carrying of passengers. Somewhat more than half of these companies use steam powor, mad most of the remainder use electric power with the overhead trolley. The group of street railways proper, " tramways for passengers only," is mostly confined to tho large cities and their immediato suburbs. The total length of line for both groups is $1,173.3$ miles, or about one-fourteenth of the mileage in the United States. The population of France is about half that of the United States, and the ratio of urban to rural population is roughly the same as in the United States. Nearly onefourth of the total length of line in France lies in the department of the Seine.

The French street railways report a cost por mile of road of $\$ 97,000$, which is much less than the empitalization of American railways. Moreover, it should be remembered that the greater part of the trackage in France is located in the larger cities whore the cost is higher than in small towns.

The total receipts of the French tramways are $\$ 16,963,000$, or about one-fifteenth of the receipts of American street and electric railways. The receipts of the Paris companies are greater than those of all the other companies combined, notwithstanding tho fate that the omnibuses in Paris carry nomrly as many passengers as the tramways. The receipts per mile of line for France as a whole, $\$ 14,460$, are slightly less than in the United States, where they avorage $\$ 15,108$.

Table 85.-Trackage, traffic, and financlal statistics of stredet ratlways in mranem ani) in LEADING FRENCH CITIES: 1901.

"lopulation of ofty mamed only.

The ratio of expenses to receipts on French tramways for passengers only is 81.2 per cent, apparently a much higher ratio than in the United States. The reports do not show clearly what is covered by the term "expenses," and it is quite probable that they include
taxes, and perhaps interest on bonds as well; in which case comparison of the ratio mentioned with that of operating expenses to operating earnings on American railways would be wholly misleading. In the department of the Seine, the ratio of expenses to recoiptes is
larger still, and the companies in that department complain that their business is scarcely profitable. This is probably due largely to the fact that most of the traffic in the densely populated center of Paris is carried by omnibuses, the street car lines being in the main confined to the outlying districts. Moreover, up to 1901, fully half of the street car lines in Paris were still operated by horsepower, while on most of the others the expensive accumulator system was employed. Paris, indeed, shows probably a greater variety of methods of traction than any other city in the world. The underground trolley is used on a small amount of track; compressed air, ordinary steam locomotives, and locomotives operating with superheated steam without fire are also employed. The more important tramways of Paris belong to the same company which operates the omnibuses. Many new street railway lines were constructed in anticipation of the Exposition of 1900. The subway system of Paris, which is owned by the city, but operated by a private company, is not included in the statistics of tramways. The first line running nearly straight from one end of the city to the other, following the line of the Champs Elysees, was opened in 1899. Other lines are being rapidly constructed. This system is operated by electricity on the multipleunit plan. It has proved highly profitable, and has cut deeply into the receipts of the tramways.

Recent statistics of the number of passengers carried in Paris are not available. In 1899, the surface tramways in that city carried $173,866,68 \pm$ passengers. (This figure does not include one company of minor importance.) The number of passengers carried by the omnibus lines was $137,004,054$, while the electric subway, which was in operation only part of the year, carried $15,887,873$ passengers, making a grand total of 326,758,611. ${ }^{1}$ The population of Paris proper in 1901 was $2,71 \pm, 068$. The traffic of the tramways and omnibuses is therefore much less in proportion to population in Paris than in the leading cities of the United States. It should be added, however, that in Paris, as in many other continental cities, there is an immense number of cabs with fares which are but a small fraction of those charged in American cities. A considerable share of the traffic which would here patronize the street cars is carried in cabs in Europe.
The development of street railways in the other leading cities of France is also very much inferior to that in cities of corresponding size in the United States. Most of the tramways outside of Paris, however, are now operated by electricity and very rapid development is taking place. According to L'Industrie Electrique, there were in France, at the beginning of 1903, 1,995 kilometers of lino operated by electricity, and 3,004

[^77]electric motor cars, as compared with 487.5 kilometers of line and 759 motor cars in 1899 . These figures presumably include the trackage of the tramways for passengers and freight which are not covered by the preceding tables. ${ }^{2}$

## IV.

## AUSTRIA. ${ }^{3}$

The following statement presents statistics relating to the street railway business in Austria for the year 1900:


The most extensive electric system is in Vienna and its environs, which had 37 miles of electric road in 1900, with additional lines under construction. The number of passengers carried in 1900 was $29,382,521$, the receipts, $\$ 823,410$, and the expenses $\$ 644,854$. As in the case of the statistics for the country as a whole, it is not clear what is included in the item "expenditures," but they apparently include taxes. Vienna has a population of about $1,200,000$.

Altogether there are 22 electric railways in Austria, practically all doing an exclusively urban business as distinguished from an interuban business. Private ownership prevails.

## V.

MUNGARY. ${ }^{4}$
The following statement shows for 1900 statistics of the Hungarian street railways, whicl are practically all clectric lines operated by private compmies:


Budapest, the capital of Hungary, stands very high among European cities in its street railway enterprise. The total number of passengers carried by the railways in this city in 1900 was $69,875,654$. There were 68 miles of line, practically all electric. The leading company has a system 37 miles in length, in which it has invested $\$ 7,475,000$; the receipts in 1900 were $\$ 1,748,000$;

[^78]expenditures, $\$ 876,000$, showing a ratio of operating expenses to receipts of only 50.1 per cent. Budapest was the first city in the world to use the underground trolley system, her first lines dating from 1889. There is also a subway railroad in this city.

## VI.

## netherlands. ${ }^{1}$

In addition to the strictly urban railways in the Netherlands there are numerous steam tramways connecting towns, similar to those in France and Italy. Their statistics are not separable from those of the animal power and electric roads in the cities. The chief business of these interurban lines is the carrying of passengers. The total length of line of all street railways and tramways in 1901 was 983.2 miles; the number of passengers, $65,982,000$; and the gross receipts $\$ 2,839,700$. Private ownership of street ralways prevails in the Netherlands.

In Amsterdam there were, in 1899, 21 miles of street railway, partly operated by horses; in 1901 there were 1, 422 horse cars and 1,135 electric cars. In Rotterdam there were, in 1899,78 miles of tramways, but this trackage apparently includes some of an interurban character. In The Hague there were, in 1899, 21 miles, including steam, animal, and electric traction.

> VII.

## BELGIUM. ${ }^{2}$

In 1901 tramways were found in only 5 Belgian cities, and in only 2 of these, Liege and Verviers, were they operated by electrictraction. All the lines are operated by private companies. In Brussels steam traction is used to some extent.
The following statement shows for 1900 the length of line and number of passengers carried in the 4 cities making reports:

| cITY. | Length of line (miles) | Passengers. |
| :---: | :---: | :---: |
| Brussels. |  |  |
| ILege.... | 18.00 | $10,154,000$ $7,792,000$ |
| Verviers... | . 62 | 383,000 |
|  | 7,50 | 2, 492,000 |

VIII.

## SWITZERLAND. ${ }^{3}$

The statistics of Swiss street railways do not include the various cable and rack and pinion railways found in the mountains.

[^79]The following statement shows the chief statistics of the Swiss railways for 1890:


In 1899 electrie traction was employed on 23 of the 27 systems reporting, and horses were omployed on of of the systems.

The most extensive street railway system is found in Geneva, which has about 13 miles of line, with $6,814,316$ passengers in 1899. In Busel there mre 7.4 milew of street railway line, and the number of passengers was $7,474,920$ in the same year.
IX.

IMALY. ${ }^{1}$
The only available statistics regurding Italim stronb railways cover those operated by mechanical traction, but not those operated by animal power of which n number exist. They include a considemble number of interurban tramways, operated by stom, which do primarily a passenger business, but also somo froight business. The first of these interurban tramwars was established in 1878. They aro operated for the most part on the public highways.

The total length of line (first main track) of the strent railways and interurban tramways operated by mechanical traction in 1900 was 1,930 miles, of which 105 miles only were operated by electricity, pratically all tho rest being operated by stam. In Romo and its immediate environs thero were 30 miles. In the eity limits of Milan there were 53 miles, of which 34 wore oprorated by electricity. The streot railways of Italy tro ordinarily owned by private companies, huti those in Milan are owned by the city and leased, on vory lavorable terms, to an operating company.

## X.

SPAIN."

In Spain, as in Italy, there are a considerable number of so-called tramways (tranvia) which opernte between cities and towns, and use chietly steam as the motive power. Street railways proper aro found in a number of cities and operate chietly by animal traction, though electric traction is found in Madrid, Valencin, and two other cities.

The total length of the street railways and trmmways in 1900 was 347 miles, of which 23 miles were in Madrid.

[^80]
[^0]:    ${ }^{1}$ For fuller discussion of the subject of transfers, see page 41.
    ${ }^{2}$ Report of Interstate Commerce Commission on Statistics of Railways, 1902.

[^1]:    ${ }^{1}$ Report of F. H. Shepard, transportation expert of the New York state board of railroad commissioners, Street Railway Journal,

[^2]:    ${ }^{2}$ Report of B. J. Arnold on the Chicago Transportation Problem, 1902 , page 49.

[^3]:    ${ }^{1}$ Wheatly, "The Passenger Traffic Problem of Greater New York," Street Railway Journal, January 10, 1903.

[^4]:    ${ }^{1}$ Report of F. H. Shepard, Street Railway Journal, Jannary 31,

[^5]:    ${ }^{2}$ Street Railway Journal, Tol. XXII, 1908, page 1084.

[^6]:    ${ }^{1}$ Report of F. H. Shepard, Street Railway Journal, January 31, 1903.
    ${ }^{2}$ Report of B. J. Amold to the Chicago city council.
    ${ }^{3}$ Wheatly, "The Philadelphia Rapid Transit System," Street Railway Journal, April 4, 1903.

[^7]:    ${ }^{4}$ Wheatly, Street Railway Journal, January 17, 1903.

[^8]:    ${ }^{1}$ Wheatly, Street Railway Journal, January 10, 1903.

[^9]:    ${ }^{1}$ Report of the Board of Rapid Transit Railroad Commissioners, 1900-1901.

[^10]:    ${ }^{1}$ The Report of the Massachusetts Railroad Commissioners for 1903 contains an interesting discussion of the subject.

[^11]:    ${ }^{1}$ Chicago Union Traction Company 28 . City of Chicago, 65 Northwestern Reporter, pages 451 and 470 , October 25, 1902.

[^12]:    ${ }^{1}$ Public Laws of Rhode Island, 1902, chapter 965.

[^13]:    ${ }^{1}$ Strictly speaking, the net capitalization should be computed by deducting the par value of the securities of other street railwaya held, but this figure was not called for in the schedule.

[^14]:    ${ }^{1}$ See Statistics of Railways in the United States, 1902, pages 15, 17 , and 54 .

[^15]:    1 See Report on Chicago Transportation Problem, 1902, nage 192. The cost of macadamizing is put at $\$ 3,450$ per mile.

[^16]:    ${ }^{1}$ Report on the Chicago Transportation Problem, 1902, page 158.

[^17]:    ${ }^{1}$ Companies operating only part of the year are excluded merely in order that the table may represent the same companies for which statistics of operation and income are elsewhere presented. Obviously, the fact that a railway has been only recently constructed and has not operated a full year does not ordinarily affect its capitalization.

[^18]:    ${ }^{1}$ For further description of the practice in this state see Chapter IX, Part I.

[^19]:    ${ }^{1}$ The clesignation of this item in the tables and text is that adopted by the Street Railway Accountants' Association. "The Interstate Commerce Commission designates the corresponding item "net earnings and income."

[^20]:    ${ }^{1}$ A presentation of the leading requirements of laws and franchises regarding special payments for franchise privileges will be chound in Part I, Ohapter IX.
    fonts for franchise privileges will be
    ,

[^21]:    1 Exelusive of reports for 18 companies which failen to furnish this information.

    Includes statesnud territories having less thans compmines, in order that the perations of individual companies may not be disclosed. These companies are distributed as follows: Arizona, 1; District of Columbia, 2 ( 8 reports); Idano, 1 ; New Mexico 1.

[^22]:    ${ }^{1}$ Exclusive of reports for 18 companies which failed to furnish this information.

[^23]:    ${ }^{1}$ Less than one-tenth of 1 per cent.

[^24]:    ${ }^{1}$ Report of Interstate Commerce Commission on Statistics of Railways, 1902, page 91.
    ${ }^{2}$ 'I Ibid., page 81 . and renewal, see page 57.

[^25]:    ${ }^{1}$ Compiled from Street Railway Investor's Guide.
    ${ }^{2}$ Compiled from Reports of Massachusetts Railroad Commissioners, 1889 and 1894.
    ${ }^{8}$ Compiled from the Reports of the New York Railroad Commissioners, 1802, 1899, 1902,

[^26]:    ${ }^{1}$ See Twelfth Census, Vol. VII, page cvi.

[^27]:    ${ }^{\text {'The Brooklyn and Boston companies which operate elevated as }}$ well as surface tracks are included in the table.

[^28]:    ${ }^{1}$ For fuller description of these methods see Twelfth Census Report on Employees and Wages, 1903, pages xxiv-xxviii.

[^29]:    ${ }^{1}$ The Connecticut figures, however, are not exact, as several companies failed to make the distinction.

[^30]:    ${ }^{1}$ Statistics of the Railways of the United States, 1902, page 64.

[^31]:    ${ }^{1}$ Railroad Gazette, January 22, 1904.

[^32]:    ${ }^{1}$ See, e. g., editorial in Railroad Gazette; January 22, 1904.

[^33]:    ${ }^{2}$ Quoted in Street Railway Journal, August 23, 1902; compare Railroad Gazette, January 22, 1904.

[^34]:    ${ }^{1}$ See discussion of tramsfers, page 41.

[^35]:    ${ }^{\text {F }}$ See further on this anbject, pages $54,58,60,65$, and 80 . Table 39 shows the number of nonoperating lessor companies in each state and their financial transactions.

[^36]:    ${ }^{1}$ The name of this company has since been changed to New York City Street Railway Company.

[^37]:    ${ }^{2}$ Brsed largely on the monograph, The Street Railways of Philadelphia, by F. W. Spiers, published by Johns Hopkins University.

[^38]:    ${ }^{1}$ Report of the special committee appointed to investigate the relations between cities and towns and street railway companies, 1898. This report presents, among other valuable matters, a summary of the legislation regarding street railways in the various states and of the franchise provisions in the leading cities. It is frequently referred to in the following discussion, being cited, for convenience, as "Massachusetts Report."

[^39]:    ${ }^{1}$ See G. Myers, in "Municipal Affairs," March, 1900, page 150 ff. ${ }^{2}$ For the Metropolitan Crosstown Railway. See Report of the Comptroller of the City of New York, 1902; Myers, loc. cit., page 162.

[^40]:    ${ }^{8}$ Myers, loc. cit., page 155.

[^41]:    ${ }^{1}$ Central Trust Company v. Citizens Street Railway Company, 82 Fed. Rep., I.

[^42]:    ${ }^{1}$ See, for example, the New Jersey law referred to on page 143.

[^43]:    ${ }^{2}$ Acts of Massachusetts, 1894, chapters 462, 472.

[^44]:    ${ }^{1}$ Massachusetts Report, pages 134 and 135.

[^45]:    ${ }^{2}$ Massachusetts Report, page 38.

[^46]:    ${ }^{1}$ Massachusetts Report, pages 162 to 183.

[^47]:    ${ }^{2}$ Massachusetts Report, page 30 to 3 .

[^48]:    ${ }^{1}$ California Statutes and Amendments to Codes, 1901, page 265; 1903, page 90.
    ${ }^{2}$ [bid., 1899 , page 242 ff .

[^49]:    ${ }^{3}$ San Francisco Charter, article 2, chapter 2.
    ${ }^{4}$ Civil Code, section 501.
    ${ }^{5}$ Statutes of 1901 and 1903, above cited.

[^50]:    ${ }^{1}$ San Francisco Charter, article 12.
    ${ }^{2}$ Mills's Annotated Code, 1891, section 4, page 408; Session Laws of Colorado, 1901, chapter 46.
    ${ }^{\text {a }}$ General Statutes of Connecticut, 1902, chapter 217.

[^51]:    ${ }^{4}$ Code of Georgia, section 2, page 180.
    ${ }^{5}$ Commercial and Financial Chronicle, Vol. 74, page 377.
    ${ }^{6}$ Myers's Authorized Statutes, 1898, chapter 66 and section 321; Laws of Mlinois, 1899 , page 331 .

[^52]:    ${ }^{1}$ See Myers's Authorized Statutes, 1898, chapter 66; Laws of Illinois, 1897, page 282; Laws of 1899, page 331 .

[^53]:    ${ }^{2}$ See Part I, Chapter III, page 43.
    ${ }^{3}$ Laws of Illinois, 1903 , page 285.
    ${ }^{4}$ Laws of Indiana, 1899, page 131.

[^54]:    ${ }^{1}$ Laws of Indiana, 1899, chapters 150 and 180.
    ${ }^{2}$ Laws of 1897, chapter 132.
    ${ }^{3}$ Indianapolis vis. Navin, 151 Ind., 139.
    ${ }^{4}$ Central Trust Company vs. Citizens' Street Railway Company, 82 Fed. Rep., 1.
    ${ }_{5}$ Burns's Annotated Indiana, Statutes, 1901, sections 3830, 3963, 4117.

[^55]:    ${ }^{8}$ Code of Iowa, sections 779 and 956.
    ${ }^{7}$ Code, sections 767 and 955 .
    ${ }^{8}$ Laws of Louisiana, 1896, chapter 45, section 87; 1902, chapter 188.

[^56]:    ${ }^{1}$ Revised Statutes, 1003, chapter 53; Massachusetts Report, page 96.
    page 96 Laws of Maryland, 1898, chapter 123, section 37.

[^57]:    ${ }^{3}$ See Massachusetts Report, pages 96 and 114.
    ${ }^{4}$ Acts of 1898, chapter 578.
    ${ }^{3}$ Acts of 1902, chapter 399.

[^58]:    ${ }^{1}$ Acts of Massachusetts, 1894, chapter 462.

[^59]:    ${ }^{2}$ Acts of 1897 , chapter 500.

[^60]:    ${ }_{2}{ }^{3}$ For description of this subway, see page 37.
    ${ }^{2}$ Compiled Laws of Michigan, section 3111 .
    ${ }^{3}$ Public Acts of 1901 , chapter 238.
    ${ }^{4}$ Compiled Laws, section 6436.
    ${ }^{5}$ Ibid., section 6447.

[^61]:    ${ }^{6}$ Proceedings of Detroit Conference of National Municipal League, 1903, page 136.
    ${ }_{7}$ Statutes of Minnesota, 1894, section 2592.

[^62]:    ${ }^{1}$ Article xit, section 20.
    2 Laws of Missouri, 1899, page 105.
    ${ }^{3}$ Revised Statutes, 1899 , section 5438.
    4 Ibid., 1899, section 5439.
    ${ }^{5}$ Ibid., 1899, sections 5438, 5508, 5857, and 5978.
    ${ }^{6}$ General Statutes of New Jersey, 1895, pages 3231 and 3247.

[^63]:    7 See Constitution of 1895, article iii, section 18.
    8 Railroad Law of New York, section 91 .
    ${ }^{9}$ Railroad Law, section 93 ; charter of second-class cities, Laws of 1898, chapter 182, section 19.
    ${ }^{10}$ Laws of 1901, chapter 466, section 74.

[^64]:    ${ }_{2}^{1}$ Railroad Law, section 101; see also page 42.
    ${ }^{2}$ Ibid., section 95 , as amended.
    : Myers, in Municipal Affairs, March, 1900, pages 155 and 157.
    4 Annual Report of Comptroller of New York, 1902.

[^65]:    ${ }_{6}^{5}$ Letter from Mayor; see also Massachusetts Report, page 115.
    ${ }^{6}$ Laws of 1899 , chapter 712.
    ${ }^{7}$ Revised Statutes of Ohio, sections 2501 and 2502; repeated in New General Municipal Code, Laws of Ohio, special session, 1902 ,
    pages 31 and 32 .

[^66]:    ${ }^{1}$ See street railway section of Commercial and Financial Chronicle, November 14, 1903, page 1918.
    ${ }^{2}$ ' Annual Report of City Clerk of Columbus, 1901, pages 22, 23, 43, and 44.

[^67]:    ${ }^{8}$ Laws of Ohio, 1902, page 502.
    ${ }^{4}$ Charter of Portland, section 108.

[^68]:    ${ }^{1}$ In regard to transfers on existing lines in Philadelphia, see page 42.
    ${ }_{2}$ Public Laws of Pennsylvania, 1868, chapter 849; 1901, chapter 20, article 19, section 3; 1001, chapter 224.
    ${ }^{3}$ See Massachusetts Report, pages 128 and 129.

[^69]:    ${ }^{1}$ Article IX of Amendments, section 1.
    ${ }^{2}$ Acts and Resolves of Rhode Island, May, 1899, page 30.

[^70]:    ${ }^{3}$ Public Laws of Rhode Island, 1898, chapter 580.
    ${ }^{4}$ Massachusetts Report, page 130.
    ${ }_{5}$ Acts of Assembly, extra session, 1902-3, pages 426, 427.
    ${ }^{6}$ Ibid., page 425.

[^71]:    - See Massachusetts Report, page 132.
    ${ }^{3}$ Laws of Washington, 1899 , chapter 128 .
    ${ }^{3}$ Acts of West Virginia, 1903, chapter 66, section 84.

[^72]:    ${ }^{4}$ Laws of Wisconsin, 1899, chapter 354, amending earlier statutes

[^73]:    ${ }^{1}$ House of Commons Papers, "Returns of Street and Road Tramways," 1902.

[^74]:    1 see paper of Fobert Donald, Street Railway Journal, January 3,
    dob.

[^75]:    ${ }^{1}$ Statistics from Zeitschrift für Kleinbahnen, February, 1903.

[^76]:    "Vellguth, "The Street Railway Company of Hamburg," Street Railway Journal, January 4, 1902.

[^77]:    ${ }^{1}$ Annuaire de la Ville de Paris, 1900, page 447.

[^78]:    ${ }^{2}$ Street Railway Journal, November 21, 1903.
    ${ }^{3}$ Statistik der Electrischen Eisenbahnen, Drahtseilbahnen, und Tram ways mit Pferdebetrieb, 1900.
    ${ }_{4}$ Ungarisches Statistisches Jahrbuch, 1900, page 217.

[^79]:    1 Statistiek van het Vervoer op de Spoorwegen en Tramwegen, 1901; Jaarcijfers voor het Koninkrijk der Nederlanden, 1900, page
    219 .
    ${ }^{3}$ Annuaire Statistique de la Belge, 1901, page 385.
    ${ }^{3}$ Statistisches Jahrbuch der Schweiz, 1901, page 120.

[^80]:    ${ }^{4}$ Annuario Statistico Italiono, 1900.
    ${ }^{5}$ Estadistica de las Obrap Publicas, 1901, page 375.

