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Of this issue of the Street Railway Journal, 8500 copies are printed. Total circulation for 1906 to date, 179,800 copies, an average of 8173 copies per week.

Conduct of Trainmen When Off Duty

If the present tendency of the employment departments of street railway companies continues, street railway employees, especially the motormen and conductors, and those that come in direct contact with the people, will, as a class, be regarded as far above the average workman so far as personality is con-

cerned. Electric railway companies are beginning to realize the importance of having reliable and trustworthy men on cars, and in many places such men are required to sign agreements to abstain from all bad habits. Moreover, some companies take means to see to it that the conduct of the men, both when off duty as well as when on the cars, is not in violation of the agreement signed.

The rules of a great many companies now prohibit absolutely the use of intoxicating liquors while on duty, and only a moderate use of it at all other times. The habit of chewing tobacco is also discouraged. No one will dispute the right of a company to prohibit the use of intoxicating liquor while on duty, but some may think the company is assuming a little too much right when it undertakes to control a man's actions at times when he is not at work, especially when he is not in uniform. We believe, however, that a company is perfectly justified in doing so. When a man is employed by a railway company he is known as a part of an organization, and his actions when off duty, as well as when on, will influence public opinion with regard to the organization as a whole. Even if a man were able to drop his identity completely when on the car, there are reasons why the company has right to concern itself with a man's conduct at all times. In the first place, a drinking man is likely to go on duty when partly under the influence of liquor. Again, a man cannot be out all night and have full use of his mental faculties the next day. The responsibility resting on both motormen and conductors is too great to permit of a man acting except in the best of condition. A man with dulled faculties may operate a car under ordinary conditions continuously without accident, but he cannot be on the alert to avoid accidents from unlooked for causes. An accident out of the ordinary nature may occur for which he cannot be held strictly accountable, yet another man with a clear brain could have avoided it. It is the alert man that should be on cars, and it is safe to presume that he cannot be gotten from the ranks of those that dissipate when off duty.

So far as conductors alone are concerned, their responsibility with regard to the lives of the passengers is less than that of the motorman. But there is more call for honesty in their vocation. Honesty usually goes hand in hand with several other traits. Moreover, a man may, to a great extent, be judged by the company he keeps. As an employing company has no certain means of judging whether or not a man is honest, it has the right to form its opinion from the general conduct of the man, and from the class of men with which he associates when off duty. When a company insists on general moral behavior and discharges any man whose actions, when either on or off duty, are such as to throw reflection on the organization to which he belongs, it most assuredly is pursuing the right course and is not overstepping its prerogatives as an employer.

Boiler-Room Lighting

It is not an easy matter to determine the precise relation between the quality of illumination in a boiler room and the operating economy of the plant concerned, but, even if no mathematical expression lies close at hand, there is not the least doubt that good lighting pays in the fireroom quite as much as it does in any other part of the installation. Only a short-sighted policy will refuse to take account of factors which cannot be reduced to figures, but which really bear in no uncertain way upon the results which can be obtained from a given equipment.

Of late there has been a pretty general recognition of the fact that good lighting is essential to first-class work in the boiler room, but in many plants very little has been done to improve the existing conditions, except to substitute enclosed arcs for the open type without globes, or to scatter a few incandescents around in a promiscuous fashion. In some of the later isolated plants the boiler rooms are models of first-class lighting, but in far too many railway plants the question has received only the most hap-hazard attention.

The average boiler room is not very favorably supplied with natural light, even if the designer of the building chanced to put half a dozen windows or so in the boiler room walls. The presence of coal dust makes it difficult to keep the windows clean for any length of time, and the black painted boilers are of very little use as reflecting surfaces. The ordinary practice of hanging a 16-cp lamp here and there, without reference to much of anything except the steam gage, is scarcely to be commended on the score of effectiveness. As far as general illumination is concerned, there is no reason why boiler fronts should not be painted a more cheerful color than black, although perhaps this is the best color for all around service, on account of the presence of coal dust and the comfort which a black surface affords the eye.

In some cases a lamp hung in front of the steam gage and water columns of each boiler, with a reflector behind it, arranged to throw all the light upon these two appliances, supplies all the special illumination needed. General illumination, however, is important to secure, as well as special. There are often weighing scales, feed pumps, injectors, sump pumps, heaters, and damper regulators in the boiler room, and a good general illumination should be provided for these, with facilities for carrying a flexible lamp or two to any point when a brilliant lighting of any part is needed for inspection or temporary repairs. Very few boiler rooms are equipped with plug-socket facilities. It is hard to say just what the intensity of general illumination in a boiler room should be, but with an allowance of from 2.5 sq. ft. to 4 sq. ft. of floor area per candle power, the results ought to be satisfactory. The use of enamelled tile or even white-painted bricks in a boiler room is certain to be helpful, and under such conditions an allowance of 5 sq. ft. or 6 sq. ft. per candle power should be sufficient. With overhead coal bunkers and mechanical stokers, the higher intensities should be applied, particularly to afford easy examination of all moving parts. Cleanliness is a prime factor in the efficiency of boiler room operation, and it is rarely the case that a dirty boiler room is found to be well lighted. The moral effect of an ample light supply is excellent, and it stimulates more frequent cleaning of windows, tiling, lamp bulbs, and obscure corners in general. The whole idea should be to make the boiler room a comfortable place in which to work, in the matter of illumination. The best work cannot be done in anything but a well-lighted enclosure.

Discussion of Departmental Subjects at Street Railway Associations

We consider it our duty in the editorial columns of this paper to bring to the attention of our readers all important improvements which have been introduced to better street railway conditions and practice, as well as to make suggestions which may conduce to these ends. With this in mind, we wish to call attention to the radical departure, instituted about six months ago by the New York State Street Railway Association, in conducting departmental meetings, and to the value of such a plan for any technical organization which holds meetings sufficiently often so that this method can be adopted. The time has passed, or has practically passed, upon all except the very smallest roads, when one man has direct charge of all of the work of street railway company. The manager, president, superintendent, or whatever his title may be, who is giving attention to the subject of traffic and schedules, is not, as a rule, also the one who is most familiar with the company's repair-shop practice; and the master mechanic, in turn, is not, as a rule, conversant with the methods which the company follows in its track construction or the operation of its power house. If the meetings of an association are attended exclusively by the operating managers, it is natural that the subjects relating to this department should receive special attention, and if the engineering and mechanical departments are also represented, the time is usually too short to cover all of the branches of railway work. The work of the national association has wisely been divided into several branches, so that these topics can properly be considered at separate meetings at about the same time. But as this plan presents difficulties in the case of State associations, the New York body has very sensibly, it seems to us, followed the plan of quarterly meetings, at which each meeting is devoted entirely to some important branch of railway operation. Thus, the last quarterly meeting of the New York Association was given up to discussion of methods of constructing the traffic department, while that held at Schenectady in January was devoted to a consideration of mechanical subjects.

In this connection we believe that repair-shop topics are being neglected in association work more than their importance deserves. If one consults the disbursement sheet of the average street railway and notices the percentage of expenditures due to repairs of equipment, the effect of this factor on the total operating expenses of the line can easily be seen. It is so large as to justify a thorough discussion of the subject. Not only this, but our experience indicates that repair-shop practice differs widely between different roads. There is an infinite variety of methods of doing the same thing. Certain of these ways must be better than the others, and the sooner those in whose shops the more costly methods are in vogue learn the more desirable ways, the sooner the expense of maintenance of their equipment will be decreased. All of the best methods are not followed in any one shop, however; some are found in one shop and some in another. There is no better way of waking shop superintendents up to the fact that they are doing some things by time-taking and expensive methods and acquainting them with better schemes than by free discussions in meetings. By "free" discussion, we mean discussions on the cost of apparatus and methods, discussions which can be backed up by figures from the private note-books of those participating in debate, discussions not only of what has been done but of what that experience has taught and

what the speaker is planning to do. In some cases, undoubtedly, figures of this kind will have to be given in confidence, but we believe that there will be less of a tendency toward secrecy in matters of this kind than there has been, as the advantages of publicity become more evident.

There is a variety of subjects which could be discussed in this way. For example, cost and methods of inspection, car cleaning, brake rigging, commutator repairs, field and armature repairs, motor lubrication, brake-shoes, babbitting methods, trolley wheels, brushes and brush holders. It is true, that these subjects are of direct interest to only a limited number of those who usually attend an association meeting, but the same is true of almost any traffic question which might be discussed, and indirectly, as we have already pointed out, the information which will be brought out is of great importance to any road.

The Auto-Omnibus in Cities

A great deal of interest has been manifested in this country during the past year in the gasoline-motor car for railway work. Its possible influence on railway development in sparsely settled districts has been discussed with a great deal of care, and papers have been presented upon the subject before engineering bodies. But there has been a dearth of interest and information in regard to the auto-'bus, which abroad is attracting more attention from street railway managers than the auto-car which runs on rails. No one can read the foreign technical papers, or, still more, can visit many of the European cities, without being impressed with the tremendous activity which is being shown in this branch of transportation. London at present seems almost to have gone mad on the subject. Omnibus transportation has always been a prominent feature of the British capital, but the motor 'buses are now replacing the horse 'buses at a rapid rate. New companies are being floated for the manufacture and operation of new lines of motor 'buses and there seems to be little doubt in the mind of the average Londoner that the horse 'bus is doomed. They are being replaced by motor 'buses as fast as the latter can be secured from the various manufacturers. There is a difference of opinion as to the best motive power between gasoline, gasoline-electric and steam, but there seems to be little doubt that the motor 'bus has come to stay. The earlier 'buses were equipped with motors of about 20 hp, but the later machines have a capacity of from 40 hp to 50 hp, and are much better in every way than those first installed. Their speed is about twice as fast as the old horse 'bus, breakdowns are getting less and less frequent, and all London seems gaily to have adopted the new method of transportation. It is estimated that there are in the neighborhood of 400 motor 'buses now in operation in London. The same condition of affairs, although in a somewhat less degree, exists in other European cities. In Berlin, for instance, there are now some fifty auto 'buses, but the street railway company and 'bus company have ordered some 200 more. In Paris the development has been prevented by the local franchise conditions, but the General Omnibus Company, tired of waiting upon the city to settle the question of its franchise extension, has boldly decided to undertake the exploitation of several lines.

Of course, the life of the motor omnibus is an unknown quantity, and no one knows how much to allow for deprecia-

tion. The tires were originally a very expensive item and are still very costly, except that most of the operating companies in London are now getting contracts with manufacturers to supply and mend tires at so much a car-mile (generally 4 cents), and in this way they are able to know exactly the cost. Provision is also made for depreciation in practically all of the prospectuses issued by the new companies, and in most cases the allowance for it is as high as 20 per cent of the first cost of the vehicle, but whether this is sufficient or not remains to be seen. It is certain, however, that the 'buses have had an effect upon street railway traffic, and even upon the receipts of the underground lines, with both of which they can compete to a fairly successful extent in point of speed.

Of course, the conditions affecting street railway and 'bus operation in London are particularly favorable to the former, and would not find a duplicate in this country. In the first place, the street railway systems operate under tremendous restrictions so far as speed, franchises, type of construction and taxes are concerned. The memorable remark of Sydney Smith on taxation in England from birth to death, applies with especial force to British tramway undertakings. At the same time, and in marked contrast to this policy, omnibus undertakings have been particularly free from onerous conditions. Up to within recently, and we presume that the rules are still in force, anyone could start a 'bus line by paying a very small license fee and posting within the vehicle the rates of fare charged between different points. These posted rates of fare could be changed at will and this privilege was freely exercised by the proprietors of the 'bus lines in London during the coronation celebration, as those who were in London at that time will distinctly remember. Little capital is therefore required to operate a 'bus line, although the older companies naturally do what they can to put a newcomer out of business.

These same conditions would not apply in America, because the street railways already have a strong footing and are supplying good service, and because, in the larger cities at least, we imagine that franchises would be required for 'bus operation, with restrictions comparable, as they should be, with those for operating street cars. We have no fear, therefore, in regard to the effect of motor 'bus competition on street railways in this country or even a foreign city which is well equipped with electric tramways, as the cost of operation per car mile of the latter must certainly be considerably lower than that of motor 'buses, except where a very limited service is run.

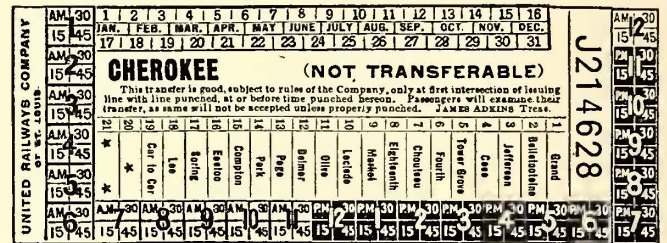
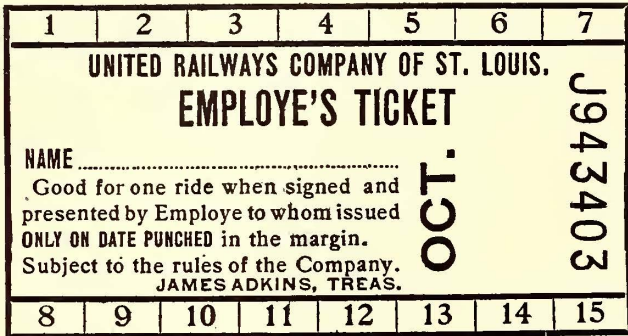
On the other hand, there are undoubtedly situations in this country where it might prove profitable to operate 'bus lines. In almost every large city, for instance, there are a number of prominent streets on which tracks are not permitted, attractive places in parks not reached directly by street cars, racing grounds and similar places that require transportation. Conditions of this kind are usually concomitant with patronage from the more prosperous classes, who, for the extra facilities offered, would be willing to pay more than the customary nickel. But even under these favorable circumstances we believe that the traffic in sight would have to be fairly continuous to be profitable. The European experience has also shown that it is necessary to carry passengers on two decks to make operation pay, unless high fares are charged.

THE PRINTING DEPARTMENT OF THE UNITED RAILWAYS OF ST. LOUIS

It is quite unusual for a street railway system to print its transfers, stationery, miscellaneous notices and in fact do all its own job press work. About one year ago, however, a printing department for turning out such work was established in connection with the purchasing department of the United Railways, St. Louis, and put in charge of J. B. Price, the purchasing agent. It was started not with the idea of turning out work at a less cost than that at which it could be obtained when printed by outside concerns, but largely to avoid the inconvenience and delay attendant when having the

Stock paper for transfers is cut to 11¾ ins. x 18 ins. These are placed on the feed board of the machine several hundred at a time and the feeding is automatic. If for any reason more than one sheet or a torn sheet is fed into the machine an automatic mechanism throws off the power. Each impression of the machine prints eighteen transfers, the printing, numbering and perforating all being done in one operation. The machine has five speeds, varying from 5700 to 6970 impressions per hour. The transfers after being printed are mounted on a back of special board composed of three colors of paper pressed together. After being stitched and cut the pads are packed in wooden boxes each holding 1000 transfers. A slip with the packer's identification mark is placed in each box and the boxes are held until needed at the several division car houses.

Twelve different colors of paper are employed to distin-



TWO SPECIMENS OF THE WORK DONE IN THE PRIVATE PRINTING PLANT OF THE UNITED RAILWAYS, OF ST. LOUIS

work done outside and to obtain neater and more accurate job work. With regard to printing transfers the lessened inconvenience was of special importance. In order to guard against delays in shipment of new orders it was necessary, previous to the establishment of the department, to keep on hand a large supply of each kind of transfer, and even with the greatest of attention the supply of one or more styles often fell so low as to cause great inconvenience. All the work turned out by the department is especially noticeable because of its neat and clean appearance.

The press room occupies the basement of one of the office buildings on the corner of Park and Vandeventer Avenues. Several of the machines installed in it are shown in the accompanying reproduction. The equipment consists of a Harris automatic two-color 15-in. x 18-in. press for printing transfers; a 34-in. Holyoke paper cutter, a No. 4 New Jersey stitcher, a 12-in. x 18-in. Golden job press direct connected to a driving motor, a Chandler & Price 14½-in. x 22-in. job press, imposing stone, type and other necessary apparatus. With the exception of the Golding job press, all of these machines are driven from a 10-hp motor through line shafting. The printing of the transfers alone requires considerable work. Practically all of the lines of the city terminate in the downtown district, and as universal transfers are given, the consumption of these is enormous; in fact, it amounts to between 200,000 and 300,000 per day. The Harris press mentioned, however, has a capacity of 125,000 transfers per hour, so that the demand is easily supplied.

guish the transfers of the several lines. The paper is of special manufacture and is ordered in 5000 lots of each color, which makes necessary the carrying of considerable stock on hand. On the railway system eighteen different kinds of transfers are employed, but by printing six of the different colors of



A VIEW OF THE PRESS ROOM

paper in both red as well as black ink all the transfers are given a distinctive appearance with but twelve kinds of paper.

Matter such as workmen's reports, delay reports, passes and other small forms are printed on the transfer press. Passes are printed eighteen on a single sheet as are transfers. They are also numbered in the same manner. Other forms are printed two on a sheet. When it is not necessary to number the forms, as when turning out delay reports, the automatic numbering device is unlocked and rolled back from the

press proper and only this portion of the machine is operated. When two forms are printed on a sheet the machine has a capacity of 1400 per hour.

The printing of transfers and small forms is, however, a small part of the work done in the department. Letter-heads and blank reports for the different departments, special notices and miscellaneous work of various kinds is turned out in large quantities. In all there are about three hundred different forms used by the several departments and many of these are electrotyped. Others which are used frequently are kept set up in type.

A very close record is kept of the costs of every piece of work. Each order is given a job number and an order blank is made out by the purchasing agent and sent to the foreman

of the printing department. When the job is completed the order, with the sample of the work, is returned to the purchasing agent. Employees in the department make out a daily report of the time spent on each job. These reports, to-

expense. The bales are covered with burlap and sealed, the seals remaining unbroken until the bales are opened in the paper mills just before throwing the contents into the pulp mills. The sales of baled paper amount to about 150,000 lbs. a year. As 60 per cent. of this is made up of canceled transfers it may be seen that this method of disposition nets a considerable revenue. The company has recently placed an order for one additional 15 x 18 two-color Harris automatic press with numbering heads, dating heads and perforating attachments. It has also purchased dating heads for the present press. In addition to this the company has purchased a duplicate of its present No. 4 New Jersey wire stitcher.

THE NEW SUMMER TRAFFIC SCHEDULE OF THE CLEVELAND & SOUTHWESTERN TRACTION COMPANY

The Cleveland & Southwestern Traction Company has arranged an unusually efficient service for the summer season. The new schedule calls for twelve limited cars daily between Cleveland and Oberlin, giving a half-hourly service between these points; every other car a limited. Four of the limited run through to Norwalk, and hourly cars for Wellington connect with the limited at Oberlin, giving these points better than hourly headway. The southern division to Wooster will have hourly local cars and half-hour cars to Berea, with four limiteds through to Wooster in addition. The company is

G-29.

UNITED RAILWAYS COMPANY OF ST. LOUIS. PRINTING DEPARTMENT. EMPLOYEE'S DAILY REPORT.

Name _____ 19__

Name	Job No.	KIND OF WORK.
7 1/2	15	
8	30	
	45	
	60	
	75	
	90	
9	105	
	120	
	135	
	150	
10	165	
	180	
	195	
	210	
11	225	
	240	
	255	
12	270	
1		
	285	
	300	
	315	
2	330	
	345	
	360	
	375	
	390	
3	405	
	420	
	435	
	450	
4	465	
	480	
	495	
5	510	
	525	
	540	

EMPLOYEE'S DAILY REPORT OF
OF WORK DONE

COST.		REMARKS.
Stock.		
Composition.		
Press Work.		
Cutting.		
Straightening.		
Stepping.		
Peeking.		
Ink.		
Blocking.		
Total.	\$	

COST SHEET

Job No. _____

UNITED RAILWAYS COMPANY
OF ST. LOUIS.

Order on Printing Department.

Return to Purchasing Agent, properly filled out, with Sample when Job is completed.

Form No. _____ 190__

Quantity _____

Department _____

Stock _____

Ink _____

Blocked Yes _____ No _____

Start numbering _____ and _____

Additional Information _____

Foreman Printing Department—
Please proceed with the above work and have same ready for delivery
on _____

Purchasing Agent—

ORDER ON PRINTING DEPARTMENT

gether with reports of stock used on each job, enable the cost of every piece of work to be accurately computed. Twice each month the storekeeper sends in a report of the number of transfers of each kind on hand, the number used and the stock on hand. The rate at which the transfers are being used is then computed and an estimate is made as to when the stock of paper on hand will run out. This assures orders for stock being placed several weeks before it is exhausted. The fact that the paper is of special grade, and its manufacture requires considerable time, necessitates this precautionary measure.

It was the former custom of the road to chop or to burn canceled transfers and tickets. Chopping them proved an almost endless job and likewise when burned a great deal of time was consumed in the operation. During the last two years canceled transfers and tickets have been the means of quite a little revenue, instead of being a burden. They are now baled with other waste paper and sold to the paper mills. Baling presses are located in the basement of the office, and this work is done by the office porters at practically no extra

receiving fifteen unusually fine cars from the Niles Car & Manufacturing Company, Niles, Ohio.

THE CLEVELAND LEASING PLAN

The directors of the Cleveland Electric Railway have again expressed their willingness to lease the property to the city, providing they can secure a reasonable offer for the stock as a basis upon which to carry out the leasing plan. At the present time, however, there is little possibility of the city and the company agreeing on a figure. Some time ago E. W. Bemis, acting for the city, and Secretary H. J. Davies, acting for the company, made careful investigation as to the company's finances and franchises, with a view to determining the present value of the stock. The reports of these two men have just been turned in, and, while the details are not announced for publication, it is stated that they could not agree on figures, due largely to a difference of opinion between the city and the company as to the life of the existing franchises.

INFLUENCES DETERMINING STREET RAILWAY TRAFFIC IN GERMAN CITIES

BY WILHELM MATTERS DORF

A study of traffic statistics to determine whether there are any general natural laws between the amount of city traffic and its determining factors, such as population, length of track, etc., can be undertaken satisfactorily only when every part of a system is examined in detail. There is no doubt that under present conditions an investigation of this kind is of the utmost importance, because most city street railway systems have now reached the point where any further extension of their lines or increase in their car mileage must be carefully considered. In the present article it is proposed, first, to consider the relations between the traffic and the population of a city; second, those between the traffic and its determining operating factors; third, those between operation and population; fourth, the relation of car-kilometers run to passengers carried.

Of course, all of these points may be summarily dismissed by saying that traffic increases with the population, that it may be taken for granted that the length of the lines, the car mileage and the income will also increase, but that every one of them is so liable to the influence of varying local conditions that any generalization is nothing but speculation and theory, and therefore without practical value. The fol-

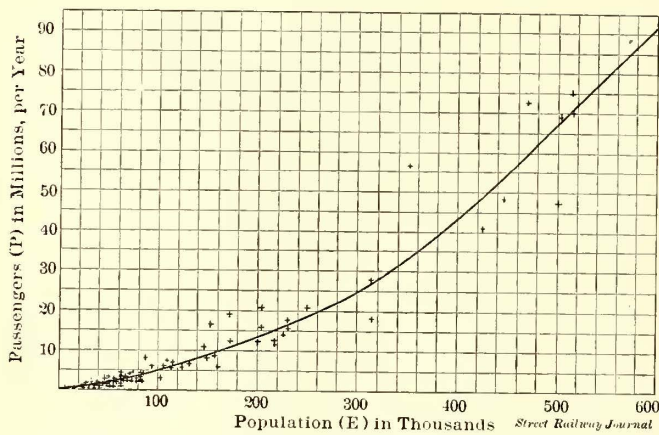


FIG. 1.—CURVE SHOWING RELATION OF PASSENGERS TO POPULATION IN SMALL CITIES

lowing discussion, however, will attempt to prove by a comparison of all the evidence that by properly selecting and arranging the available material certain definite conclusions can be clearly derived.

Until the publication of the extensive statistics contained in the 1905 supplement of the Zeitschrift für Kleinbahnen, the writer was unable to secure thoroughly reliable data on the street railways in Germany. These figures are for 1903, and, unfortunately, it is not possible to get the population statistics for the same period to use in connection with them, so that those for 1900 are employed. Interurban roads and the few remaining horse railways are omitted from consideration because their traffic and operating conditions differ so widely from those of city railways. The population served by a complete railway system was determined by adding the population of the city and that of the suburban towns reached by its lines. The length of line is the length of route, that is, 1 km of street containing a single or double track is reckoned as 1 km. To facilitate the plotting of curves and derivation of formulæ, the following letters were adopted to represent the different factors:

- E—Population.
- B—Length of line in kilometers.
- W—Car-kilometers per year.
- P—Number of passengers per year.

From this it follows, for example, that P/E equals the rides per capita, W/E the car-kilometers per capita, W/B the car density, P/W the passengers per car-kilometer, etc. In the accompanying diagrams circles are used to denote all traffic systems serving populations of over 100,000 and crosses for those of less than 100,000. The curves in each of the figures

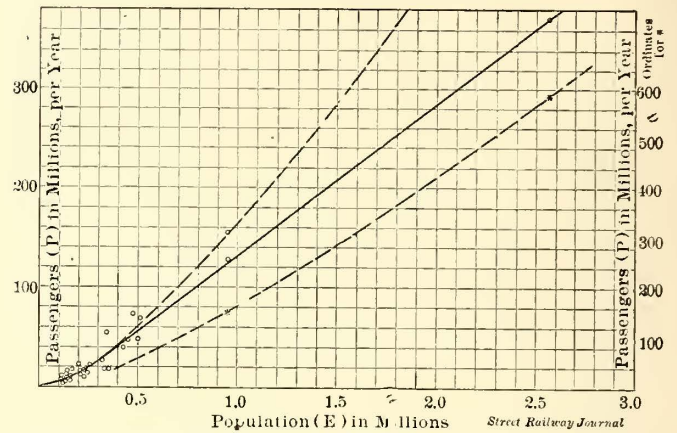


FIG. 2.—CURVES SHOWING RELATION OF PASSENGERS TO POPULATION IN LARGE CITIES

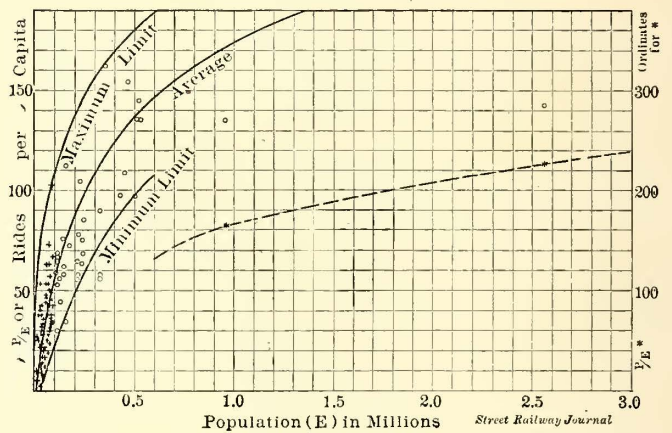


FIG. 3.—CURVES SHOWING RELATION OF RIDES PER CAPITA TO POPULATION

show averages and (with one exception to be noted later) were not mathematically developed, so that exact mathematical relations between them are not to be expected.

RELATION OF TRAFFIC TO POPULATION

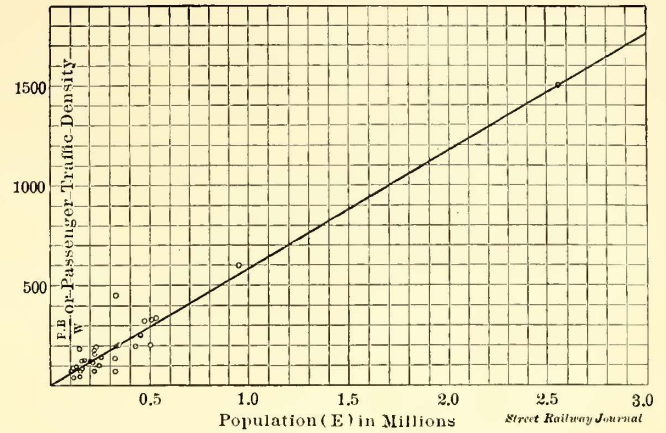
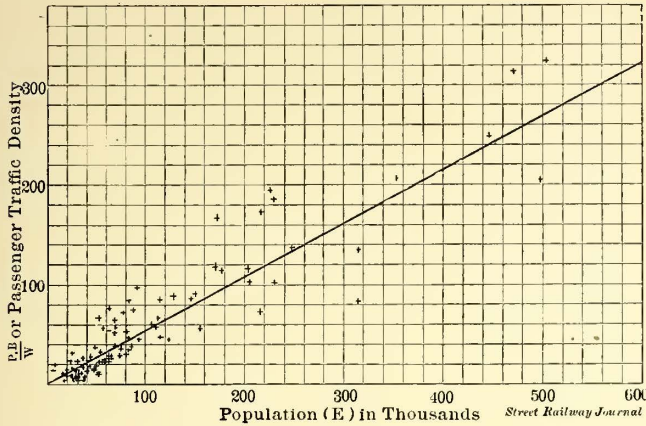
Figs. 1 and 2 were prepared to show the relation of traffic to population. The average curve shows that up to 500,000 the traffic increases as the square of the population, but above that only in direct proportion. This average curve corresponds to the following values:

Population	Annual Fares
50,000	2,000,000
100,000	5,000,000
200,000	14,000,000
300,000	25,000,000
400,000	43,000,000
500,000	67,000,000

Only two systems vary widely from these figures, namely, Munich, with 48,000,000 passengers for a population of 500,000; and Frankfort-on-Main with 57,000,000 passengers for only 350,000 people. Up to 80,000 population it will be noted that the values are very close. Outside of these two systems

that of Wiesbaden, with 8,850,000 passengers for a population of 86,000, is also noticeable, the increase over the average being due to heavy tourist and through line traffic. Similar conditions may be prevalent in Bremen. Danzig falls below the average, showing only 5,500,000 fares for a population of 160,000, and Nürnberg and Barmen-Elberfeld with only 18,500,000 fares for a population of 316,000. In the latter case the longitudinal configuration of a small valley gives more play to competition from the local State Railway and sus-

that the increase is less marked. Hamburg and Berlin again prove apparent exceptions, but if all the transportation means are taken the figure for Berlin is 581/2.56, or 227, and for Hamburg 155.5/.95, or 163.6. These values approximate to those given in the average curve of Fig. 3. The curve for Berlin and Hamburg is represented by the broken line that is given at one-half scale. The limiting or extreme values are denoted by the lines drawn outside the average. Among the higher values are those of Frankfort-on-Main, Bremen



FIGS. 4 AND 5.—CURVES SHOWING RELATION OF PASSENGER TRAFFIC DENSITY TO POPULATION

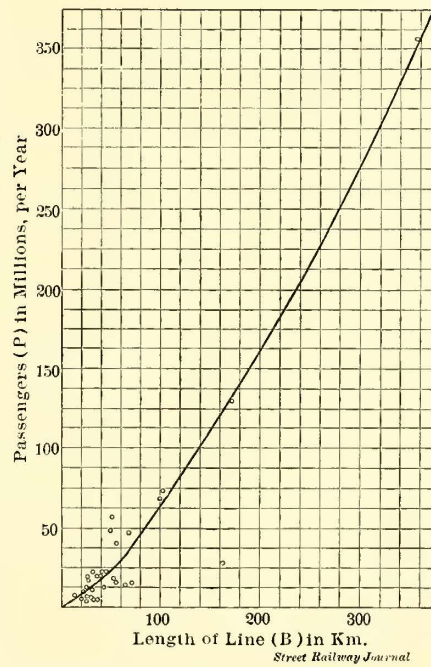
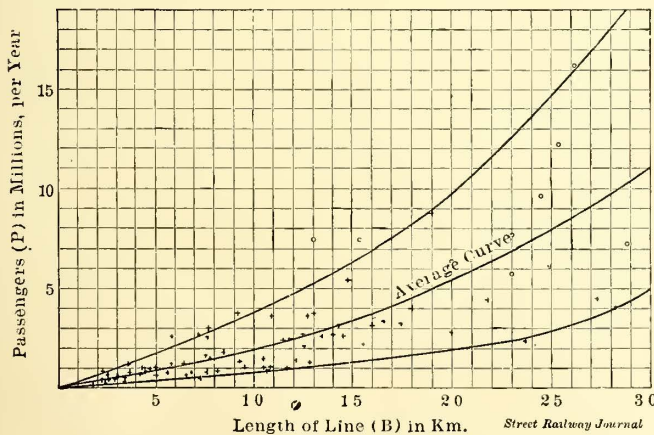
pendent railway, which seriously affect the street railway traffic, but the traffic on these roads is not included in making this curve.

Other conditions affect the higher values of the curve. In cities of more than 500,000 the traffic diverted by omnibuses, elevated railways and suburban lines becomes quite a factor. If, in the case of Berlin, we consider all of the means of transportation, the total fares during 1903 amount to 581,000,000. For Hamburg-Altona, the addition of the local steamer transportation and the Hamburg-Altona-Blankenese line would give for 1905 approximately 155,500,000 fares, of which 128,500,000 are handled by the street railway. These values for

and Wiesbaden, while Munich, Barmen-Elberfeld, Nürnberg and Danzig will again be found among the lower values.

The variations in car density (W/B), according to the population, were discussed by the writer in a previous article

in the STREET RAILWAY JOURNAL for April 5, 1902. The curves showing this relation start from the origin or 0 point, as in Fig. 3, without, however, developing so clearly defined a law. The striking similarity of the curve, however, to that in Fig. 3 suggests the thought that the two relations P/E (rides per capita) and W/B (car density) stand in directly opposite relation. Hence a value may be developed which shows the number of passengers carried per unit



FIGS. 6 AND 7.—CURVES SHOWING RELATION OF PASSENGERS TO LENGTH OF LINE

Berlin and Hamburg are given in half scale in Fig. 2, by the ordinates at the right and are indicated by asterisks. They show that it is probable that even in cities of over 500,000 the fares increase as the square of the population. Owing to the lack of values, the course of the upper part of the curve can only be assumed, as shown by the broken line in Fig. 2.

If the number of rides per capita (P/E) should be plotted with population as abscissae, the curve shown in Fig. 3 is obtained. From this the following law is clearly derived, namely, the number of rides per capita increases rapidly from 0 to about 54 at 100,000 population, but for populations above

of car density, namely PB/W , which may be called "passenger traffic density." The relation of this value to population is shown in Figs. 4 and 5. The average curve in each case is plainly a straight line directly from the origin. The tangent of the angle which this line makes with the axis of abscissae is about .55, while the extreme outside limits are about 1 to 1.1. An exceptional value of PB/W is that for Hanover, which shows 453 for a population of 315,000,—evidence that on this system an unusual condition exists in that the length of the line in comparison with the population is far beyond the average. For the line showing the average value

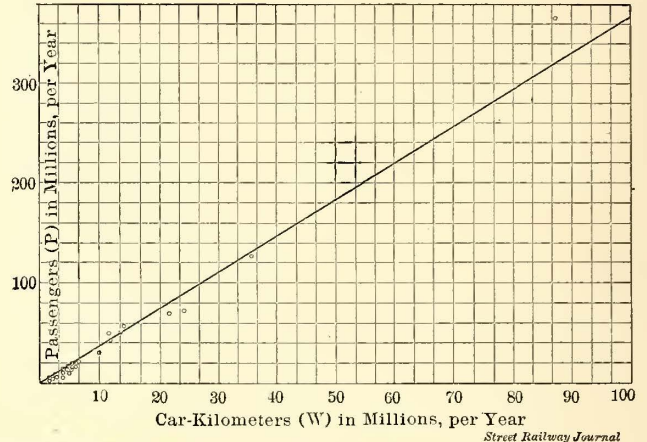
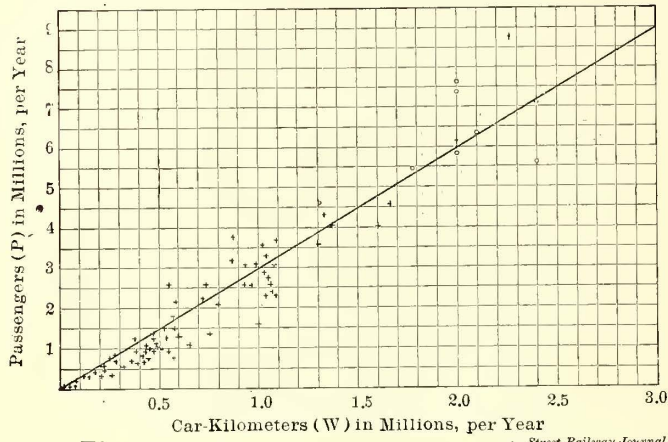
$$\tan \alpha = \text{constant} = PB/WE$$

from which it follows that, other condition being equal, the rides per capita increase in the same ratio as the car-traffic density.

RELATIONS BETWEEN TRAFFIC AND OPERATION

Having examined the relations of the traffic and popula-

rise is rather slow, but it increases from that length up to 30 km, and above the latter becomes very steep. The average curve shows for a length of 10 km only 2,000,000 passengers, while for 30 km the number is 11,000,000, or 366 passengers per running meter; while for 350 km there are nearly 350,000,000 passengers, or 1000 per running meter. Strongly



FIGS. 8 AND 9.—CURVES SHOWING RELATION OF PASSENGERS TO CAR-KILOMETERS

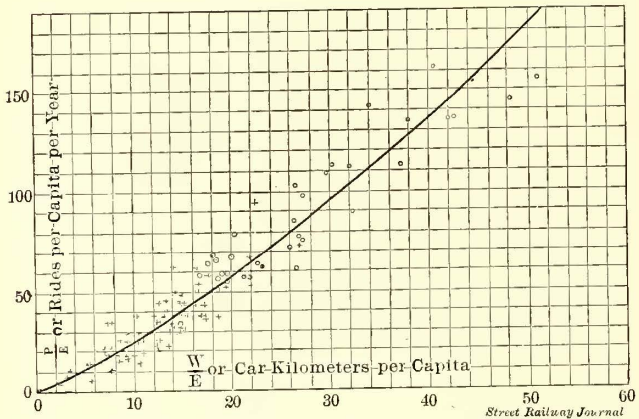


FIG. 10.—CURVES SHOWING RELATION OF RIDES PER CAPITA PER YEAR TO CAR-KILOMETERS PER CAPITA

deviating values are presented by Frankfort-on-Main, with 1110 passengers per meter for a line 51 km long, with 57,000,000 trips; Hanover, with 174 passengers per meter for 162 km and 28,000,000 passengers, as well as Munich and Chemnitz, which also show variations above and below the average.

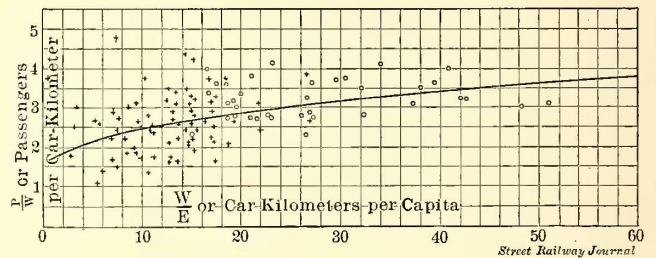


FIG. 11.—CURVE SHOWING RELATION OF PASSENGERS PER CAR-KILOMETER TO CAR-KILOMETERS PER CAPITA

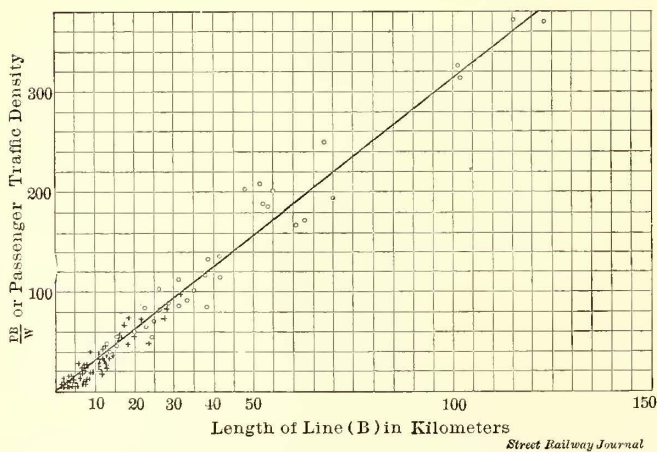


FIG. 12.—CURVE SHOWING RELATION OF PASSENGER TRAFFIC DENSITY TO LENGTH OF LINE

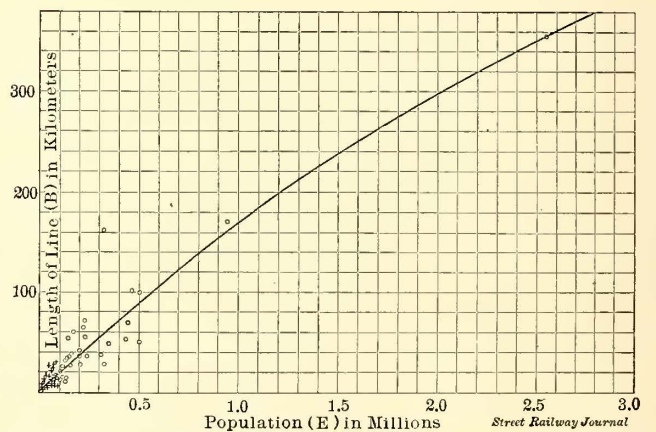


FIG. 13.—CURVE SHOWING RELATION OF LENGTH OF LINE TO POPULATION

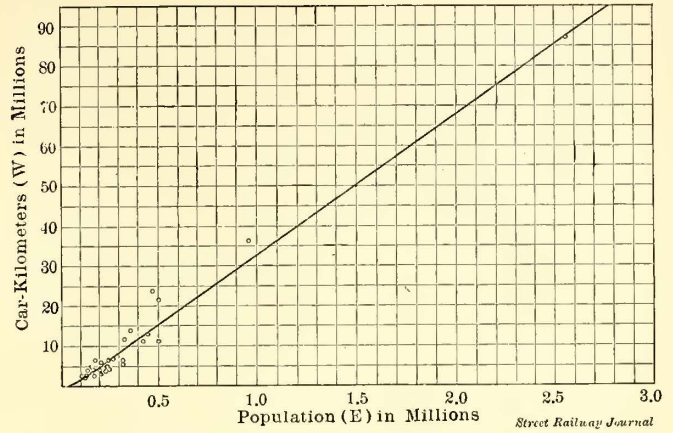
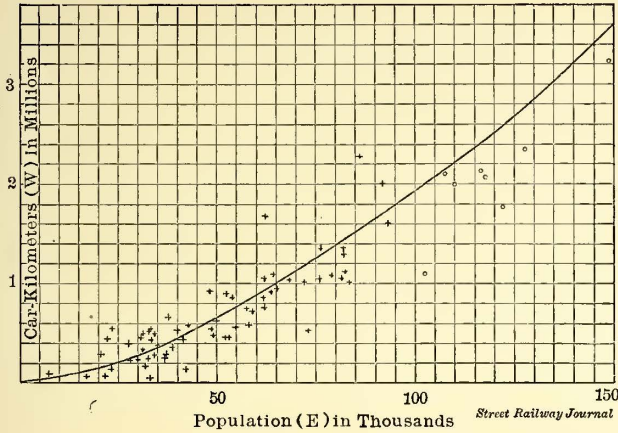
tion, the question comes up as to the effect of the operating conditions on the traffic. Naturally, the operation of a line may be carried on not only to satisfy the ordinary traffic demands, but may increase it by improvements in service. Despite the many variable conditions, the fundamental factors may be taken to be length of line and the annual car-kilometers. The relation between the passengers carried and the length of line are shown in Figs. 6 and 7. Up to 10 km, the

From this it appears that the passengers per meter have a certain relation to the length of the line, but no definite average was obtainable.

In Figs. 8 and 9 are shown the relation between passenger traffic and car-kilometers. The first part of the curve, or that near the origin, looks like a straight line without any startling deviations. The tangent of the angle which this straight line forms with the axis of abscissae is a measure for the "space-

use" or percentage use of the car, the exact value of which could be found by dividing the passenger-kilometers by the capacity-kilometers*. This value cannot be exactly determined. According to Fig. 6, the value P/W, or passengers per car-kilometer, is 3 for less than 3,000,000 car-kilometers per year and 3.5 for a greater number. It is interesting to note that a more exact value for P/W can be found if the ordinates and abscissae are divided by the population, or, in other words, if we determine the relation of rides per capita to car kilometers per capita. This has been done in Fig. 10, in which all

symmetrically around this mathematically determined curve. Certain cities, like Plauen, Freiburg and Guben, are far above the average, although they did not attract attention in Fig. 10 on account of their low car-kilometers per capita. Another remarkable feature shown in Fig. 11 is the sharp demarkation in car-kilometers per capita for systems serving communities below and above 100,000 population. This line of demarkation appears at about 18 car-kilometers per capita. For higher values of W/E, not enough points are obtainable to prove whether, after reaching a certain maximum, the car-kilo-



FIGS. 14 AND 15.—CURVES SHOWING RELATION OF CAR-KILOMETERS TO POPULATION

the values group themselves near the average curve, which is presented. This curve shows that relation P/E is proportional to $(\frac{W}{E})^2$ and the gradual increase of P/W. It also indicates that the value P/W is between 2.3 and 4.2 in cities of over 100,000 and between 1.4 and 3.77 in smaller cities. Higher values for small cities are shown by Plauen with 4.74 and Freiburg with 4.4. In general, Dresden, with 50 car-kilometers per capita, shows the greatest service, then Leipzig with 40 and Frankfort-on-Main, which,

meters per capita decrease with increasing population, as might be supposed from the extreme value which corresponds to Leipzig.

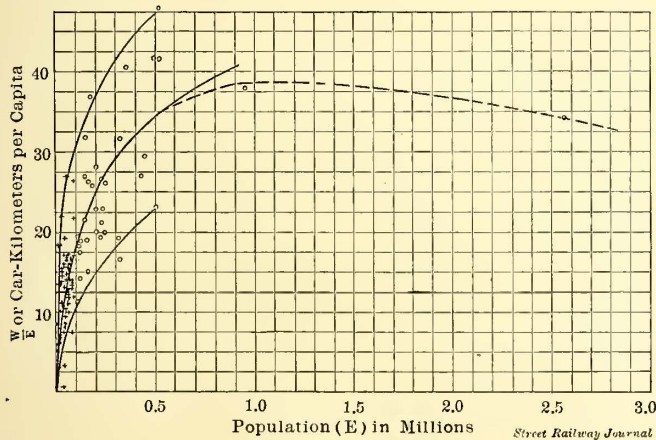


FIG. 16.—CURVES SHOWING RELATION OF CAR-KILOMETERS PER CAPITA TO POPULATION

with a space use of 4 rides per car-kilometer, shows the absolutely highest rides per capita.

An examination of the slow and steady increase of the passengers per car-kilometer (P/W), in relation to the car-kilometers per capita, shows that the curve follows no precise law, see Fig. 11. If, however, the average curve is determined mathematically from Fig. 10, and combined with the values in Fig. 11, all of the values derived would group themselves

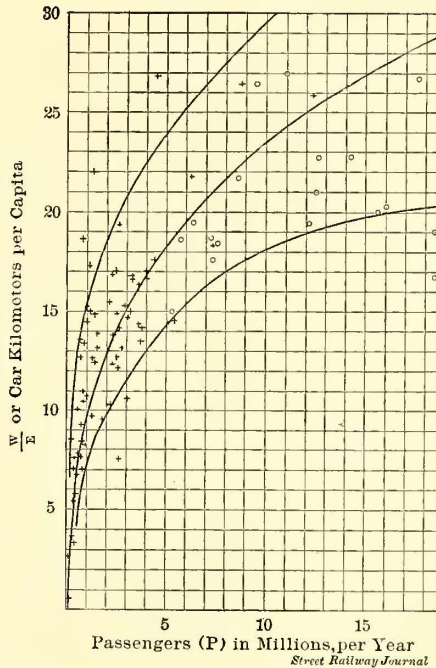


FIG. 17.—CURVES SHOWING RELATION OF CAR-KILOMETERS PER CAPITA TO PASSENGERS CARRIED IN SMALL CITIES

line. In fact, Fig. 12 shows the direct or linear dependence of the passenger density on the length of the road. Corresponding to the somewhat less use of the cars on smaller systems the values for roads up to about 12 km fall below the average.

DEPENDENCE OF TRAFFIC ON POPULATION

From the foregoing investigation of the effect of the population on traffic, as well as on the length of line and car-kilometers, it is safe to assume that certain relations exist between these various factors. According to Fig. 13, the curve repre-

* The term "capacity-kilometers" is used instead of seat-miles (or seat-kilometers), so as to include the space which can be used in the cars by standing passengers. In Germany the number of passengers who are allowed to stand is limited by law.

senting length of road in relation to population starts from the origin as a straight line, but after reaching a population of 500,000 the length of road increases less rapidly than the population. The car kilometers run also increase with the population, as shown in Figs. 14 and 15, but not directly. At first the increase is slow, but steadily grows in a higher ratio until 500,000 population is reached, but above that the increase apparently is linear. The car-kilometers per capita, according to Fig. 16, rise rapidly from the origin, but their rate of increase gradually decreases. The form of the curve is similar to that of Fig. 3, and for populations over 500,000 the car kilometers per capita appear to diminish. The fact that the curves just named all show a change at a point close to populations of over 500,000 is a further proof that in a traffic study of the larger cities, all transportation means should be considered. Unfortunately, it was impossible in this case to secure the necessary data.

The dependence of the car-kilometers per capita on the length of the line (see Fig. 16) shows the same general course as Figs. 14 and 15, since the length of the line, starting from the origin, increases in proportion to the population.

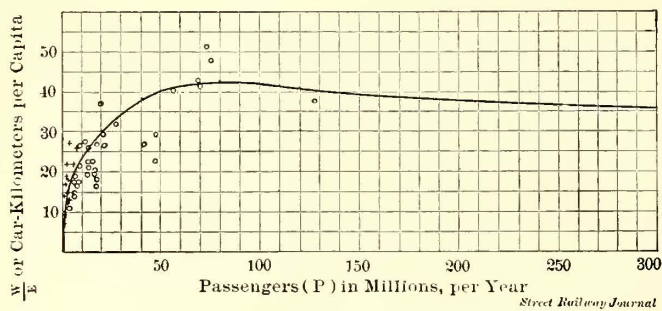


FIG. 18.—CURVE SHOWING RELATION OF CAR-KILOMETERS PER CAPITA TO PASSENGERS CARRIED IN LARGE CITIES

The value for Hanover naturally will be found far from the average.

RELATION OF TRAFFIC TO POPULATION

One more point remains to be considered, namely, the ratio between the car-kilometers per capita and the passengers carried. As shown in Figs. 17 and 18, this line after a rapid rise from the origin and reaching a definite maximum at 75,000,000 passengers, begins to droop, due possibly to the non-inclusion of other means of transit in the largest cities. Far away from the average curve will be found Munich, whose value for W/E is 23 with about 50,000,000 passengers. Above the curve will also be found Leipzig, Wiesbaden and Hirschberg; below it, Barmen, Elberfeld and Plauen.

SYSTEMS OTHER THAN ELECTRIC

To determine the effect of motive power, a number of horse and steam systems were considered. The examination showed that there is no fundamental difference between cities thus equipped and others of like size using electricity, although there are some exceptions, like Flensburg and Naumburg. Flensburg shows a traffic of about 1-10 the average curve of Figs. 1 and 3. The length of the line is also only $\frac{1}{4}$ of the normal value of Fig. 13, and accordingly the car density is abnormally high, but the passenger density of 2.5 and the average passengers per car kilometer 1.1 abnormally low. The income per car kilometer is 23.3 pfg., due to the high fare of 21.5 pfg. per passenger. In the case of Naumburg, the fare is also high (13 pfg. per passenger), so that the income per car kilometer reaches the extraordinary figure of 65 pfg.

CONCLUSIONS

Briefly recapitulated, the conclusions to be derived from the foregoing considerations are as follows:

The number of passengers carried and the car-kilometers run increase as the square of the population, while the length of the system and the passenger density increase directly with the population.

Rides per capita and car-kilometers per capita, car density or car-kilometers per kilometer of track, and income per car-kilometer tend to reach a point of saturation.

The number of passengers and of car-kilometers run increase as the square of the length of line, while the passenger density increases directly with the length of line.

The passengers carried increase directly with the car-kilometers.

The car-kilometers per capita increase to a saturation point, in relation to passengers carried, and then decrease.

In relation to car kilometers per capita, there is a quadratic increase in the rides per capita up to a certain point, of average passengers per car and of income per car-kilometer.

The income per car-kilometer varies directly with the average passengers per car.

The changes effected by the use of horse or steam power instead of electric power is small on lines with little traffic or of short length, as higher fares are usually charged, so that the car-kilometer income is often higher than on other roads with electric operation.

How the foregoing fundamental rules may be applied in practically financing and operating questions need not be especially considered in this article. It may be enough to state that the establishment of such rules does not reduce the necessity of properly combining the various factors in a study of a particular case. It may, however, be of some assistance in such an examination.

COLOMBIAN CITIES TO BE CONNECTED BY TROLLEY SYSTEM

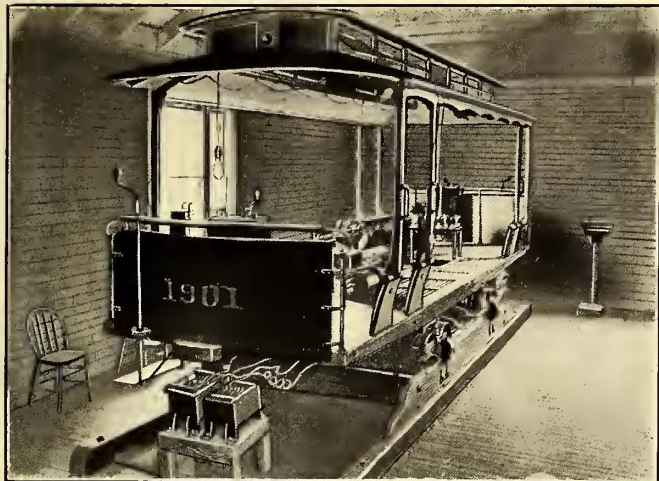
Consul P. P. Demers, of Barranquilla, announces that a Colombian Government concession has been given Francisco E. Baena, president of the Barranquilla tramway, prolonging for thirty-nine years a previous concession for the building and operating of an extensive tramway. The new concession includes the obligation to put into service modern cars, substitute electric traction for that of animals, and to extend the lines to Soledad and Sabanalarga. Barranquilla has about 50,000 inhabitants, having gained 30,000 in the last twenty years. Soledad and Sabanalarga are respectively six and thirty-six miles distant from Barranquilla, between which there is extensive cart and mule-back traffic over hot sandy roads. The tram company has also been granted an electric-light franchise. The concession is of interest, it being the intention of Mr. Baena to develop the enterprise with American capital and equip the whole service with American cars and machinery. Copies of the concession can be seen at the Bureau of Manufactures in Washington.

The Twenty-Second Street or Oakland branch of the San Francisco, Oakland & San José Railroad (Key Route) was opened for regular traffic on May 16th. A 20-minute schedule was inaugurated, the same as in force on the Berkeley and Piedmont lines. The terminus of the new line is at Broadway and Twenty-Second Street, only eight blocks from the center of Oakland's business section. A new \$12,000 depot will be erected at the terminus. It will be in the form of an arcade, into which the trains will run under cover. The building will be finished by July 1st. Several new cars have been added to the Key Route's equipment, so as to take care of the Oakland traffic.

EMPLOYEES' TRAINING SCHOOL AT NEW ORLEANS

The New Orleans Railway & Light Company maintains a separate instruction department and training school for the purpose of educating and breaking in new men. The department is in charge of August Lais, chief instructor.

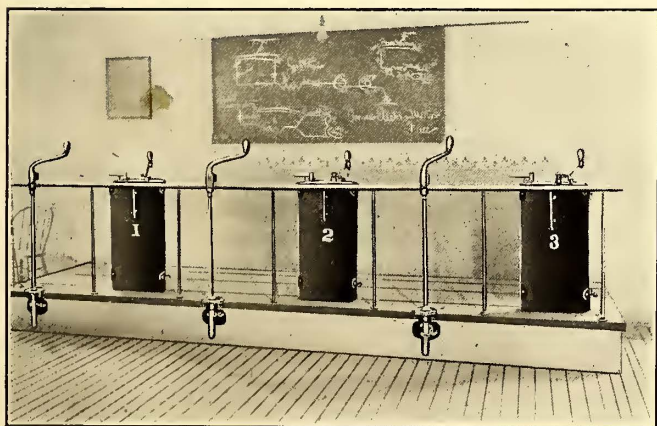
The equipment in the training school consists of a skeleton car fitted complete with all the regular brakes, controllers,



SKELETON CAR IN INSTRUCTION SCHOOL AT NEW ORLEANS

electrical equipment, and other parts. There is also, at one side of the room, a raised platform provided with dummy controllers and hand brakes, with the use of which the new men receive their first instructions as to their duties.

Men applying for positions as motormen are required to pass a physical examination. If they pass this examination they are put on the dummy controllers and brakes in the training school, to become familiar with the apparatus used in starting and stopping a car. They are then put on the skeleton car in the school, after which they are sent to the station to which they have been assigned by the superintendent. They are then put on the various lines running out of that station



DUMMY CONTROLLERS AND BRAKES, INSTRUCTION SCHOOL AT NEW ORLEANS

in charge of motormen who are selected to instruct applicants, and remain at this work for eight to ten days. After they have been reported as competent to operate a car, they are returned to the instruction department for final instructions and examinations. The instructions consist of lessons in operating methods and locating troubles on all parts of the car. The examination is intended to show the new man's knowledge of the rules and regulations of the company, copies of which are furnished to the men when they are assigned to a station.

After the men have been found competent they are sent to the claim agent, who examines them as to their ability in making out accident reports. They are then returned to superintendents for final approval or rejection.

Men applying for position as conductor are not required to pass physical examination. The preliminary examination of conductors consists of tests of their ability in reading, writing



GENERAL VIEW OF INSTRUCTION SCHOOL AT NEW ORLEANS

and arithmetic. If found satisfactory, the applicants are sent to the various stations as assigned by the superintendent, and are instructed by competent conductors for from five to seven days, after which they are returned to the instruction department for final instructions and examination as to the rules and regulations of the company, with which they are furnished copies when first assigned to a station. When found competent, they are sent to the claim agent, who examines them as to their ability in making out accident reports, after which they are returned to the superintendent for approval or rejection.



The Westinghouse Machine Co. of East Pittsburg, Pa., has recently received an order from the Portsmouth Street Railway & Lighting Co. to install in its plant at Portsmouth, Ohio, a 500-kw turbine. The turbine is to be of the multiple-expansion parallel-flow type, and direct connected to a 500-kw, 60-cycle, two-phase, 220-volt Westinghouse generator. Two 400-kw Westinghouse-Parsons turbines are already operating at this plant, serving the entire city with light and power. The plant was built entirely for turbine machinery. Superheated steam and high vacuum are used, condensing water being obtainable from an artificial lake which has been constructed upon the property. A rotary converter in the plant serves the nearby traction lines with 500-volt direct current, but the main power is transmitted over high tension a. c. lines into the city and outlying districts.



The Swedish Government recently introduced a bill authorizing a grant for the purchase of waterfalls belonging to private persons, with a view to utilizing them for supplying power to electric State railways. It is further proposed to empower the Government to expend a sum not exceeding 5,000,000 kroner (\$1,350,000) to purchase waterfalls which may be considered necessary for working the State railways in the immediate future, and the purchase of which cannot be delayed without detriment to the State.

SCHEDULES

The last set of questions included in the Question Box referred to forms of schedules, methods of determining schedule efficiency and the general subject of suiting the service to changeable conditions of traffic. The communications received in response to this canvass have been compiled under the heading of "Schedules," and are given herewith. It is believed the answers contain a number of valuable suggestions. The questions on this topic, which are given below, were sent out as four separate queries, but as the questions are more or less interrelated, all the responses from each contributor under the various heads are grouped as one communication.

In what form do you make up your schedules for operating purposes? (Please send copies of typical schedules with full information.

How do you determine if your schedule is suitable for the traffic on any particular line? Do you obtain records of passengers carried per car at different intervals, and if so, how do you obtain these records and are readings taken at different points along the line? Ideas and suggestions on the theory and practice of making schedules are wanted and needed.

What methods do you take to inform crews regarding the details of the schedules, and how do you insure that employees know and understand the schedules?

What steps do you take for suiting the schedules to the weather and other changeable influences? For instance, suppose a given schedule has been decided upon for a park line for a pleasant Saturday afternoon and it begins to rain early in the afternoon. What is your system for calling in the cars that are not needed, in order to save useless mileage? In other words, how do you bend the service given to suit the probable traffic, and how do you secure flexibility and promptness in changing quickly from one schedule to another?

The accompanying portion of our schedule (No. 104-A) of the time table for the Seventh Street Division of the Cap-

For instance, the trains numbered from 325 up are what we call "trippers." The time tables are arranged to give "tripper" service from 6.58 in the morning until 12 o'clock at night, and these "trippers" are so run that they do not throw the first twenty-four trains more than two or three minutes off of the regular schedule. Should something extraordinary take place at 10 o'clock in the morning, we would have these "trippers" continued until that hour or a little later, as the occasion might require, and in that case we would have the table posted for that occasion. These time tables are posted (in blue print form) at the office of the division superintendents, from which the trains start. The conductor is given his "day-book" (as we call it), or manifest, in the morning, and he goes at once to the time table and copies from it the running time of his train for that day. Any changes made during the day is called to the conductor's attention, and he again goes to the time table to ascertain what particular schedule is in use at the particular time.

Each conductor keeps on his day-book a complete record of each half trip, showing the total number of passengers carried on each half trip. There are on the street a number of inspectors, and if they notice that cars are over-crowded at any particular hour of the day, they call the superintendent's attention to the fact. The conductor's day-books are then consulted, and a list is prepared, showing the number of passengers carried during the hours in question. From this we determine if the schedule is taking care of the traffic or not; if not, we revise the time table.

The condition of the weather, except for summer excursions and pleasant Sunday afternoons, does not effect our regular schedules. For the bright Sunday afternoons and evenings during the excursion traffic we have special time tables. Should a storm come up the special time table is put

SEVENTH ST. DIVISION

LEAVING CAR BARN.

A.M.

P.M.

	1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8	
301	5-04	6-24	7-36	8-49	10-01	11-13	12-31	1-43		301	2-55	4-10	5-25	6-42	7-54	9-06	10-18	11-30
325		6-27	7-39							302	2-57 ²	4-12 ²	5-27 ²	6-45	7-57	9-09	10-22	11-34
302	5-12	6-30	7-41 ²	8-52	10-04	11-16	12-34	1-46		325	3-00	4-15	5-30	6-48	8-00	9-12		
303			7-44	8-55	10-07	11-19	12-37	1-49		303	3-02 ²	4-17 ²						
304	5-20	6-33	7-46	8-58	10-10	11-22	12-40	1-52		304	3-05	4-20	5-33	6-51	8-03	9-15	10-26	11-38
305	5-00	6-36	7-48	9-01	10-13	11-25	12-43	1-55		305	3-07 ²	4-22 ²	5-36	6-54	8-06	9-18	10-30	11-42
326		6-39	7-50							306	3-10	4-25	5-39	6-57	8-09	9-21	10-34	11-46
306	5-08	6-42	7-52	9-04	10-16	11-29	12-46	1-58		326	3-12 ²	4-27 ²	5-42	7-00	8-12	9-24		
307			7-54	9-07	10-19	11-32	12-49	2-01		307	3-15	4-30						
						MEALS												
330	6-12	7-24	8-36	9-43	11-01	12-13	1-31	2-43		321	3-37	5-12	6-26	7-42	8-54	10-06	11-18	12-30
322	6-16	7-30	8-41	9-52	11-04	12-22	1-34	2-46		322	4-00	5-15	6-30	7-45	8-57	10-09	11-22	12-48
323			8-43 ²	9-55	11-07	12-25	1-37	2-49		330	4-02 ²	5-17 ²	6-34	7-48	9-00	10-12		
324	6-20	7-33	8-46	9-58	11-10	12-28	1-40	2-52		323	4-05	5-20	MEALS					
										324	4-07 ²	5-22 ²	6-38	7-51	9-03	10-15	11-26	1-00

(Note.—On the original the figures indicating "leaving time for boundary only" are shown in red.)

PORTION OF SCHEDULE NO. 104A, INDICATING TYPICAL FORM OF SCHEDULES USED BY CAPITAL TRACTION COMPANY, OF WASHINGTON, D. C.

ital Traction Company is perhaps a typical one for our daily work. We have a number of such time tables to cover week days, Sundays, and any special occasions that may arise, all based on the regular schedule, which is the one reproduced.

to one side and the regular schedule adhered to. Our trains are operated from different car houses, and division superintendents, should the occasion require, can promptly reduce the number of trains on the street, or with reasonable notice,

say a few hours, to secure the men, can put out additional trains. D. S. Carll, Ch. Engineer and Superintendent, Capital Traction Company, Washington.

A copy of our schedule, No. 962, is sent herewith as a sample of the form used on our city lines, and of No. 1045 for the Flint Division, as sample of our interurban schedule. In schedule No. 962 the numbers of the runs, the starting and quitting time of the crews, and the amount of time on each

time must include at least one relief for meal; all runs eight hours and over are "full paid," and all less than eight, and over six, are "shortpaid;" all runs are numbered and assigned in rotation, except the "short paid" runs, which are numbered in accordance with the amount of time in them, i. e., the longest "short paid" run is the next to the lowest "full paid" run, etc. The suburban schedules are made out on the same general plan as are steam road schedules. The time of cars or "trains" at every switch, and siding is given and cars or

SCHEDULE NO. 962, DETROIT UNITED RAILWAY TIME SCHEDULE, STEUBENS LINE. IN EFFECT. Table with columns for Run No., On, Off, and Time of Run. Includes handwritten notes and numbers.

SCHEDULE NO. 962, INDICATING TYPICAL FORM OF CITY SCHEDULE USED BY DETROIT UNITED RAILWAY

run are shown on the right-hand side of the sheet. Each crew finds the number corresponding to the number of its run, picks out the parts of it from the body of the schedule and copies them down, and if there are more than two ends to the line, as in this case, noting the destination of the car. The motorman is held responsible for putting up the correct sign in front, while the conductor attends to the signs on the side. The latter signs are carried in the vestibule when not in use. The route of each car is shown, across the page, from the time it is taken out until it returns to the car house, and when a crew is to be relieved, a space is left so that the num-

"trains" are handled by a despatcher, who holds the same relative position as the steam road train despatcher.

The suitability of a schedule is determined by the division superintendent or road foreman, in conjunction with the general superintendent and superintendent of schedules. The division superintendent makes out a synopsis of what he thinks is necessary and shows his "passenger book," in which the passengers carried on each single trip during the busy hours, say, 5 a. m. to 9 a. m., 11 a. m. to 2 p. m., and 4 p. m. to 8 p. m., are recorded daily by the night car house foreman, who obtains the figures from the conductors' trip lists. Fur-



SCHEDULE No. 1046.

Detroit United Railway.

FLINT DIVISION IN EFFECT JANUARY 20, 1906. STANDARD TIME.



SCHEDULE NO. 1045, NORTH BOUND and SOUTH BOUND. Table with columns for Mile, Dept., Arr. Mile, and various time points.

Regular Schedules Meeting Points and Time of Regular Trains at Meeting Points are underscored. The Company reserves the right to vary herefrom as circumstances may require.

Light faced type indicates A. M. Heavy faced type indicates P. M.

This Schedule is intended for the information of the Employees, not for the Public, nor as an advertisement of the time of Cars.

SCHEDULE NO. 1045, INDICATING TYPICAL FORM OF INTERURBAN SCHEDULE USED BY DETROIT UNITED RAILWAY

ber of the relieving crew may be inserted. In making its schedules, the Detroit United Railway is governed by certain restrictions which have a bearing on the way the runs are divided. Some of these limiting restrictions are as follows: Approximately nine hours, with a leeway of half a round trip, constitute a day's work on all week days, this work to be completed within 12 1/2 hours; 12 hours may be used for a day's work on Sundays and holidays from May 1 to Oct. 15, inclusive, when necessary to accommodate the travel, but this

ther than this, if the line be one across the city, so that each single trip will have practically two loads, men are sometimes placed at junction or other suitable points, who take both the register reading and the number of passengers actually on car. At circuses, race tracks and similar affairs, a man is usually placed at the point where passengers alight, to take records. These are usually obtained from the register readings, as often three or four cars are discharging their loads at the same time. This record is used in determining the

number of cars required to take the crowd home again. Of course, allowance must be made in these cases for local passengers.

The men when practising or learning on the division to which they have been assigned, are supposed to learn how to read the schedules, and the division superintendent satisfies himself on this point when the men are turned in as competent to run a car. Conductors and motormen on interurban lines are obliged to carry with them at all times a copy of the entire schedule of their road, and to prove to the de-

Our schedules are prepared in printed form, corresponding substantially with steam railroad practice. On the ordinary interurban service cars are operated hourly, and an extra section is put on as extra travel requires. We run extra sections in preference to extra cars on shorter headway, because the people are accustomed to the regular hours of operation, and make their plans accordingly. Trains are operated according to printed schedules furnished to each trainman, and under established rules similar to steam railroad practice. Train movements other than those scheduled are made only under special train orders from the dispatchers.

Theodore Stebbins, Gen. Mgr.,
Dayton, Springfield & Urbana Elec. Ry.

FLINT DIVISION, SCHEDULE No. 1045

In effect January 9th, 1906

Car House	Run No.	Time On	Time Off	Train Numbers	Hours On
Rochester . . .	1	6:22	2:30	6-13-20	8:08
	2	6:26	3:30	2-5-12-21	9:04
	3	2:30	10:35	12-10-25-27-34-35	6:05
	4	2:30	12:35	20-20-36-7-41	10:05
	5	3:30	1:30	21-28-37-42-43	10:00
	6	7:26	2:30	4-7-10-11-18	7:04
Romeo	7	6:00	4:00	3-10-7-14-15-22	10:30
	8	4:00	1:00	23-30-31-38-39-40	9:00
Flint	9	6:55	6:48	Specials	10:53

* Change cars at Six Mile Road at 11:30 P.M.
† Change cars at Ortonville at 11:30 P.M.
‡ Change cars at Big Beaver at 9:00 A.M.

TYPICAL NOTICE, INDICATING METHOD OF POSTING ASSIGNMENTS TO RUNS ON DETROIT UNITED RAILWAY. THE NOTICES ARE POSTED IN TYPEWRITTEN FORM

spatcher, as well as to the division superintendent, that they thoroughly understand their schedules before being allowed to take out a run. It is not considered necessary for them to know such details as speed, headway of cars, number of cars operated, etc.

The division superintendent has authority to put on additional cars for a trip or two if he considers it necessary. He reports these additional cars each day to the superintendent of schedules and mileage. If they are found to be permanently desirable, they are incorporated in the old schedule, or a new schedule containing these additions, and such other changes as may have appeared advantageous, is made up. Also if there should be a tripper car or so which does not appear to carry as many people as it should, the division superintendent has the power to change its time, or to leave it off altogether, but he must keep the superintendent of schedules and mileage advised. Several schedules are prepared on each division for week days, Saturdays and Sundays for summer and winter, and also for special holidays, races, etc. From these various schedules one can be picked which can be substituted for another if desirable. This change can take place at the noon relief, or the division superintendent, with the assistance of his car house foreman, can copy on slips that portion of the new schedule which is assigned to each crew and distribute the slips to the crews as they arrive at the car house. Again, on Sundays in summer, when the travel is usually very heavy, especially in the afternoon and evening, the schedules on some of the heavy divisions are made so that the men going to work in the morning are relieved, commencing about 11 a. m., and report back to the car house, commencing about 1 p. m. These men take out cars and fill in between the regular service, and can be pulled off when desired by the division superintendent. The length of time required to change from one schedule to another is equal to the length of time required to make one round trip on the division. Of course, if the change is from a small to a larger schedule, it will be necessary to have the additional crews required, either on hand, or at least to know that they will be on hand, when needed.

Harry Bullen, Gen. Supt.,
Detroit United Railway.

To determine schedule efficiency, a record of the number of passengers carried on each half trip is periodically taken from day cards and recorded on a day-card report. This

CONNECTICUT RAILWAY & LIGHTING CO.
DAY CARD REPORT.

Fair +	Snow †	Cloudy ::	Rain Δ	Small Car X	Large Car *			
WEATHER								
December 05	4	7	5	6	7	8		
	M	T	W	T	F	S		
	4	5	6	7	8	9		
						Average		
DESTINATION OF CAR	Time	NUMBER OF PASSENGERS						
Southport	4:30	40	37	25	41	30	36	* 348
Ash Creek	4:40	27	28	19	20	28	31	* 25.5
Fairfield	4:45	27	35	41	19	25	29	* 29.3
Westport	4:50	56	50	44	56	34	38	* 46.3
Ash Creek	5:00	22	21	19	17	27	40	* 24.3
Ash Creek	5:05	19	25	43	13	11	15	* 20.8
Southport	5:10	45	44	41	45	56	64	* 49.1
Ash Creek	5:20	4	30	31	29	23	49	* 27.6
Fairfield	5:25	46	12	23	43	36	53	* 35.5
Westport	5:30	47	48	52	55	46	51	* 49.8

SECTION OF TYPICAL DAY CARD REPORT USED BY THE CONNECTICUT RAILWAY & LIGHTING COMPANY FOR DETERMINING SCHEDULE EFFICIENCY

report also indicates the weather conditions and type of car. The exchange of passengers at transfer points often makes the day card readings of little value in detecting crowded conditions, and in such cases records are taken at various points along the line by street inspectors and switch boys. A copy of typical day-card report is reproduced in this connection.

R. H. Smith, Supt.,
Connecticut Ry. & Lighting Co.

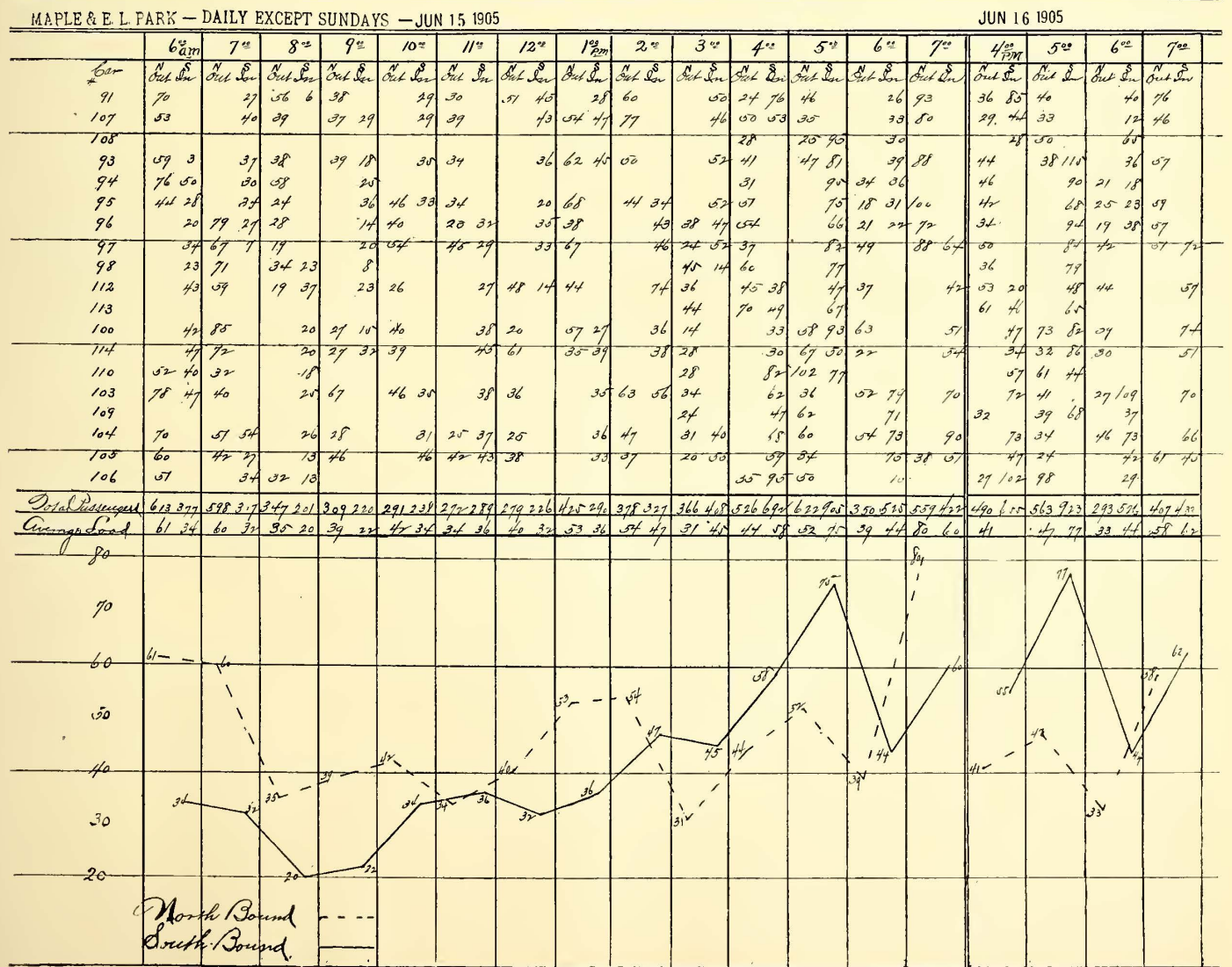
The movements of cars on the Los Angeles Railway are controlled by the dispatcher system, each terminal being in communication with the office over private telephone. This requires the constant attendance of two men. Schedules are made out for the operation of the cars, but the dispatchers vary these whenever the situation demands that it should be done. Herewith is fac simile copy of our schedules for our Pico Heights line, as posted in the car house for the information of the men. Sheet marked "No. 1" is the terminal time for this line during week days, showing additional time cars are kept in service on Saturday nights. Sheet marked "No. 2" is division of this into working runs, and also shows the running schedule for guidance of the motormen from time point to time point. These two sheets are kept in frames, side by side. Similar sheets are marked out for the Sunday schedule and for the wet weather schedule. The Temple Block time, underscored (in the original in red ink), is the

Sico Heights Line Daily except Sundays.

Schedule No. 222 DAILY EXCEPT SUNDAYS				Barn			PICO HEIGHTS LINE AT PICO HEIGHTS														SATURDAY NIGHTS				Barn				
Car Run	Barn Out	Time	Time	In	Out	Time	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		
1	5:30	5:30	5:10	5:20	5:30	5:45	1:00																						9:00

(Note—On the original the figures in columns headed "Car Run," "Barn Out" and "Barn In," the words "Saturday Nights," and all lettering and special notes are shown in red)

SHEET NO. 1, INDICATING FORM FOR POSTING TERMINAL TIMES, USED BY LOS ANGELES RAILWAY COMPANY



(Note—On the original all figures in the columns headed "S," also the curve shown as solid black in the reproduction are shown in red.)

SHEET NO. 3, INDICATING METHOD OF EXHIBITING AMOUNT OF TRAVEL AT CERTAIN HOURS, AND SYSTEM OF PLOTTING THIS INFORMATION IN CURVES TO DETERMINE SCHEDULE EFFICIENCY, LOS ANGELES RAILWAY COMPANY

time the reliefs are made. The figures (in the original in red ink), in the center of the schedule marked "in" and "out," indicate the time each particular car goes into the car house and the time it pulls out of the car house.

We do not check a line at any point with a special view as to whether or not the schedule is sufficient for the travel. Instead, we take conductors' reports from time to time for several days and group them together by hours, giving us the maximum load and the minimum load during the hour, and then make a diagram, copy of which is reproduced, marked "No. 3," showing the fluctuation of the average load. Knowing the capacity of the cars, it is very easy to ascertain

CAR BOARD FOR ANNOUNCING ASSIGNMENT OF CARS TO RUNS, LOS ANGELES RAILWAY COMPANY

whether there is sufficient service. In addition to this, we take the car sheets in the despatchers' office and examine for delays caused from overload. This information is used in determining the time to be allowed for the round trip, as well as the headway on the line. After the schedule has been made out on the proper sheet, it is inclosed in the frame (all sheets and all frames being identical in size) and posted in the regular place, where this information can always be found for the particular line. Photograph of part of frames for the week-day time is reproduced in this connection. There is a shelf below these frames for the convenience of the man. At each car house there is a large frame holding all of the working runs for that division, made out on type-written sheets in consecutive order, as to the working run numbers. For illustration, we will assume that a new man is assigned by his foreman to working run No. 180. It will be noted that this means car on car run No. 5, on the Pico Heights line, out of the house at 5:40 a. m. The "S" immediately following the "out" time indicates the direction the car is to go, i. e., it is to go south, to the outer terminal of the line. Relief at 11:33 a. m. Then the man takes car on car run No. 3 at the regular relief point at 3:03 p. m., and pulls it into the car house at 8:05 p. m., and on Saturday he pulls it in at 9:13 p. m. When a man is assigned to this run, if he does not know the line it is on, he immediately goes to the large frame and looks up working run No. 180, to locate the line; then he will go to the frame for that line and copy the terminal time. The motorman will also go to this frame and copy the running schedule from point to point. Then to get their car, the crew will walk over to the car board (shown in one of the engravings), and look for the car on run No. 5, Pico Heights line, which is No. 375, on track 13; then for car on car run No. 3, which is No. 373, as that is the afternoon car for this run. This car the crew take at the relief point on the road. Thus the crew have no difficulty in locating their car in the car house. The Sunday time for the division is kept apart from the week-day time in another part of the trainmen's room. Wet weather Sunday time is kept under cover and is only put out when necessity requires. We do not take any measures to know that the men understand any specific schedules. While a man is on as a student he is carefully in-

structed in all the details of our system of information, and when he is finally "turned in" the student instructor gives him a thorough examination as to his knowledge in this respect. When the man is turned over to the division foreman,

PICO HEIGHTS LINE, DAILY EXCEPT SUNDAYS, RELIEF POINT AT TEMPLE BLOCK.

DAY RUNS						
Working Run	Car Run	On	Off	On	Off	Working Time
171	7	5:50 S	10:45 In			
	11			11:57	5:57	10:55
172	8	5:55 S	10:33			
	5			11:33	5:33	10:38
173	9	5:45 N	10:39			
	6			11:39	5:37	10:52
SWING RUNS						
177	1	5:20 S	11:15	(Sat. Out 3:36 N	8:56 In	
	16				7:44 In	10:03
178	2	5:30 S	11:21	(Sat. 2:51	7:56 In	10:56
	1			(Sat. 3:21	8:23 In	10:54
179	3	5:35 S	11:27			
	8					
EXTRA SWING RUNS						
185	4			(Sat. Out 4:00 N	8:08 In	2:56
					6:56 In	
186	7			(Sat. Out 4:12 N	8:21 In	2:56
					7:08 In	
NIGHT RUNS						
189	1	11:15	2:51			
	14			6:09	1:01	10:28
190	2	11:21	2:57			
	6			5:37	1:23	11:22
191	3	11:27	3:03			
	9			5:49	1:34	11:21

ROUTES LEAVING AND RETURNING TO CAR HOUSE.

Leaving Car House:

- A.M. North bound cars, out via 5th and Spring and Temple Block
- A.M. South bound cars, out via 2nd and Broadway.
- P.M. North bound cars, out via 5th and Broadway to Temple Block.

Returning to Car House:

- From Temple Block, in via 5th and Main.
- From Pico Heights, in via 2nd and Broadway.

PICO HEIGHTS LINE, DAILY, EXCEPT SUNDAYS

	6 A.M. to 10 A.M.	10 A.M. and 6:30 P.M. to 8 P.M.	4 P.M. to 6:30 P.M.	8 P.M. to 12:30 A.M.
Terminus:				
to Normandie.....	5	5	5	4
to Pico and Figueroa..	11	11	11	9
to 7th and Broadway..	10	10	9	8
to Temple Block.....	9	9	9	9
Lay over.....	1	1	1	1
	36	36	35	31
Temple Block:				
to 7th and Broadway..	9	9	9	9
to Pico and Figueroa..	10	10	10	8
to Normandie.....	10	11	11	9
to Terminus.....	4	4	5	4
Lay over.....	1	2	2	2
	34	36	37	32

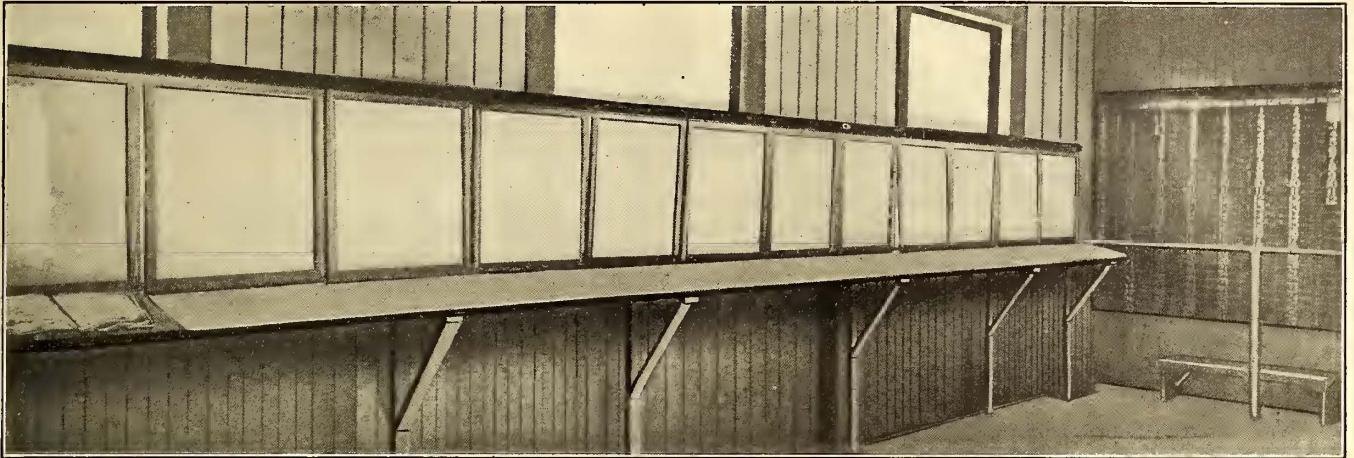
SHEET NO. 2, INDICATING METHOD OF SHOWING DIVISION OF SHEET NO. 1 INTO WORKING RUNS, LOS ANGELES RAILWAY COMPANY

the latter also gives him careful instructions along the same lines. As the information posted is very full, there is no reason for ignorance, except lack of time to secure the information. We rarely have any trouble on account of the men not understanding the schedules.

As our cars are handled by the despatcher system, we are constantly in touch with the men and can reduce our service very quickly. Thus, the Pico Heights line, as shown on the schedule noted, is operated through to the park on Sundays.

If it should rain in the afternoon, the dispatcher would merely call in the extra cars. If it should become stormy, and we wish to reduce the service on that or other lines still further, the dispatcher would be so instructed and enough early "in" cars would be pulled off to reduce the service to the desired

are taken off and the 30-minute time is run with single cars. During fair time we run cars every 15 minutes to the Fair Grounds, four and five together. As soon as the travel is over or the weather is bad these extra cars are taken off and the 15-minute time is run by a single car. In other words,



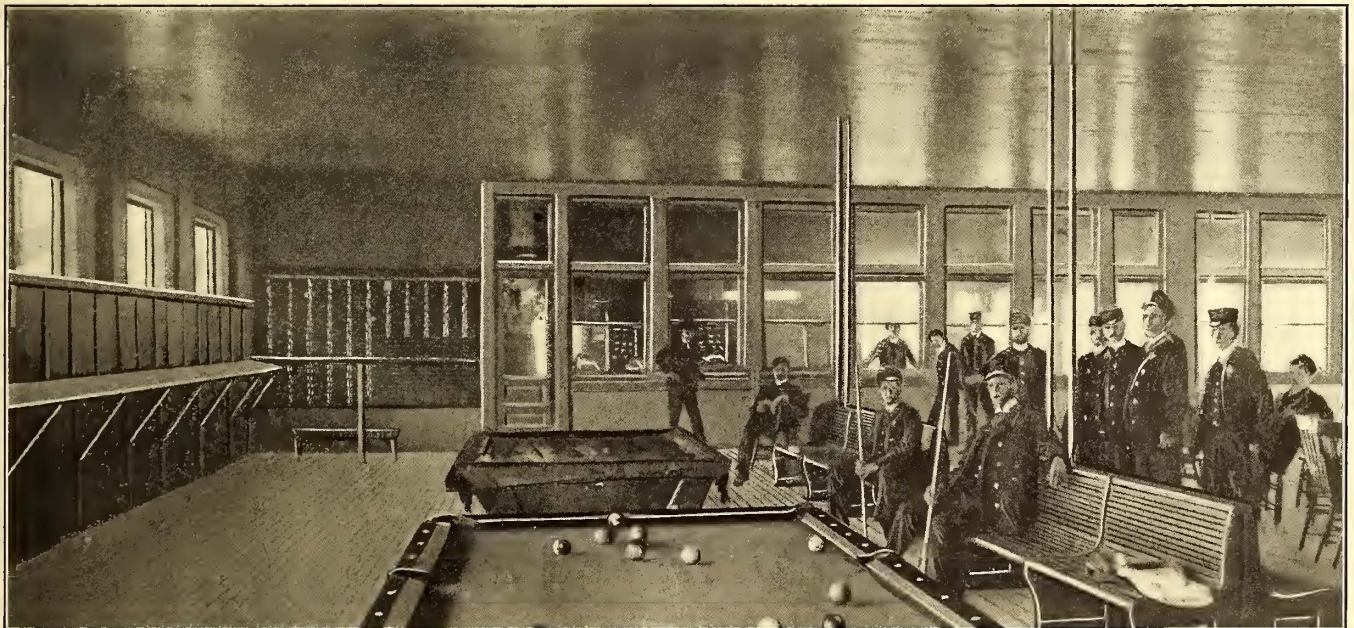
VIEW INDICATING CONVENIENT ARRANGEMENT OF FRAMES FOR HOLDING SCHEDULES AND SHELF FOR USE OF MEN, LOS ANGELES RAILWAY COMPANY

headway. On account of our always being in communication with the men, ten minutes after an order is given for a reduction in the service, a number of cars are on their way to the car house. One of the engravings is a general view of the trainmen's room at one of our division headquarters. The foreman's office is in the background. This photo gives an excellent idea of the convenient arrangement between the foreman's office, car board and the frames where the schedules are kept, showing how little walking is necessary for a

we increase the number of cars on each run, instead of changing the scheduled intervals between the runs.

L. H. Mountney, Supt.,
L. M. & W. Pass. Ry., Milton, Pa.

Schedules on the West Pennsylvania Railways are made up when entirely new time tables are desired, by means of a large board on which is plotted the sidings and time points on the line. The time divisions are indicated in two-minute periods



VIEW IN TRAINMEN'S ROOM, SHOWING CONVENIENT ARRANGEMENT OF FOREMAN'S OFFICE, CAR BOARD AND FRAMES FOR HOLDING THE SCHEDULES, LOS ANGELES RAILWAY COMPANY

man to secure all the necessary information after he is assigned to his run.

J. J. Akin, Supt.,
Los Angeles Ry. Co.

When running extra cars to our park our schedule calls for 30-minute time, through the summer months. This schedule is run with double or triple cars or as many headers as may be necessary to accommodate the crowd. If it should happen to rain, in the afternoon or evening, the cars that are doubled up

by lines drawn across this diagram. Pins and colored strings are used to indicate each particular run, and from this graphic layout the schedule is transferred in the form shown herewith to tracing cloth. Blue prints from this tracing are posted in advance at the various car houses, and a copy is given to each crew. Schedules for the public are put up in folder form and are freely distributed. Wall cards, such as in use on steam railroads, are placed in various hotels and public places. Schedules are made up from information ob-

tained in several different ways. Records of passengers carried per car at different intervals are easily secured, as our fares are registered in five-cent zones, and the number of passengers in any particular fare limit within a specified time are obtainable. Travel curves are plotted at various times, showing graphically the passengers per hour, and during what

or, in case of continued heavy rain, all trippers may be run in. Car hours are thus reduced to a minimum. On interurban lines operating under single-track conditions, extra cars are operated as second sections of regular cars on a 30-minute headway. Telephones are installed at each siding, and if weather conditions arise which reduce travel, the extra cars

P.M. North															A.M. UNIONTOWN GREENSBURGH, SCHED.															A.M. South															P.M.														
TRAIN NUMBERS															2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48																																												
UNIONTOWN															UNIONTOWN																																												
BEESONS															BEESONS																																												
LEMONT															LEMONT																																												
MT BRADDOCK															MT BRADDOCK																																												
DUNBAR															DUNBAR																																												
FAYETTE															FAYETTE																																												
NEW HAVEN															NEW HAVEN																																												
CONNELLSVILLE															CONNELLSVILLE																																												
MURPHY															MURPHY																																												
SCOTSDALE															SCOTSDALE																																												
ALVERTON															ALVERTON																																												
STONER															STONER																																												
TARR															TARR																																												
RUFFSDALE															RUFFSDALE																																												
HUNKER															HUNKER																																												
YOUNGWOOD															YOUNGWOOD																																												
FOSTERVILLE															FOSTERVILLE																																												
GREENSBURGH															GREENSBURGH																																												

Run No. 1, N. Haven Barn 5:25 P.M. Trains 3-14-23-34-43 to Connelisville Relieved by Run No. 9 Trains 43-54-63-74 Run No. 10 to 10:00 Run No. 10B-9:00

2 5:25 " 5:30 " 2-11-22-31-42 " " " 10 42-51-62-71 " 2-10:00 " 8-9:30 " 14-9:00

3 " " 5:35 " 5-8-17-20-29-32-41 " " " 11 " 41-44-53-56-65-68-77 " 3-9:00 " 9-9:00 " 15-9:00

4 " " 5:40 " 4-13-16-25-28-37-40 " " " 12 " 40-49-52-61-64-73-76 " 4-9:00 " 10-9:00 " 16-9:00

5 Uniontown " 5:45 " 7-13-27-30 " to Uniontown " " " 13 " 47-58-67-70-79-82 " 5-10:00 " 11-9:00

6 " " 5:50 " 9-12-24-24-33-36 " " " 14 " 45-48-57-60-69-72 " 6-9:00 " 12-9:00

7 Scottsdale " 5:55 " 1-10-19-39 " to Scottsdale " " " 15 " 39-50-72-75-84-87-90 " 7-9:00 " 13-9:00

8 Iron Bridge " 6:00 " 6-15-26-35-46 " " " " 16 " 46-55-66-71-80-83-92 " 8-9:00 " 14-9:00

Passing Pts

SECTION OF SCHEDULE INDICATING TYPICAL FORM OF SCHEDULE USED BY WEST PENN RAILWAYS

hours and days travel is the heaviest. From these two sources, together with actual inspection by transportation representatives and reliable information obtained from responsible patrons of the company, the company is able to decide whether or not the service is sufficient, and vice versa, whether or not too many cars are being run in relation to the travel. The posting of schedules and the instruction of despatchers and inspectors form the method of acquainting the crews with the details of the schedule, as it is one of the despatchers' and inspectors' duties to explain all the details to the road men.

are pulled off. On this system, where main line cars run at 30-minute intervals, and portions of the main line track are used at a number of places by side line cars, a change of schedule would be a complex matter. Therefore, the steady adherence to regular schedule and the operation of extra cars as second sections has been found the most desirable.

J. W. Brown, Supt. Transportation, West Penn Railways Company.

On this system our largest park is located on a double-track

Sample of printed time table used by the Columbus, Delaware & Marion Railway Company is shown in the accompanying illustration. This table is for the guidance and in-

THE COLUMBUS, DELAWARE & MARION RAILWAY COMPANY

READ UP.										READ DOWN.													
221	219	217	215	213	211	209 (U.S. Mail)	207	205	203	201	No. of Train												
1:25	12:25	11:25	10:25	9:25	8:25	7:25	6:45	6:15	5:45	5:15	202	204	206	208	210	212	214	216 (U.S. Mail)	218	220	222		
										Ar	COLUMBUS Lve.												
										SUMMIT ST. AND MOCK ROAD													
										NORTH COLUMBUS													
										CLINTONVILLE													

SECTION OF TIME TABLE, INDICATING FORM USED BY COLUMBUS, DELAWARE & MARION RAILWAY COMPANY

line, and all park runs are operated as extras. The crews are given running time only, and the starters order park cars out or hold them back as the crowds gather or fall off. When the weather is bad or travel is light, the crews receive orders when arriving at the park or at the other terminal to pull in at the car house, which is located half way between the city terminal and the park. Every other car may be taken off,

formation of employees in the operation of trains, and shows the movement of all trains on the line except work trains. The heavy figures indicate meeting points. The train numbers of trains passed at regular meeting points are inserted in small type over the figures indicating time. On the back of the time sheet are printed twenty-eight special rules governing the movement of trains. As to keeping employees informed

regarding schedules, the writer believes a monthly conference with the men will always assure a thorough understanding of not only the schedules, but other instructions issued. The proposition submitted in question B4 is one that would be taken care of by extra service. This is best handled by having the traffic manager personally on the ground to watch conditions. If this is impossible, a reliable representative in whose judgment the manager has confidence, can regulate the service with but little useless mileage.

A. L. Neereamer, Traffic Mgr.,
Columbus, Delaware & Marion Ry. Co.

We submit copy of time table for our Albany Division, which shows the form used for interurban and local lines on the Schenectady Railway. The tables are posted on printed forms, ruled to give spaces for showing stations, run numbers, relief and distribution of time, assignment of runs, running time between points, summary and special instructions. In order to determine a proper schedule for use on our various

trip consuming two hours. If this is not sufficient to handle the traffic, the line is increased to a 10-minute line, or a 7½-minute line, as occasion requires. Just as soon as we find the travel dropping off, the extra cars are pulled out of the service, again throwing the line back to the regular schedule. This same practice is followed out on all lines, throwing in cars and pulling them out, as the service demands.

E. J. Ryon, Supt.,
Schenectady Ry.

We make up our schedules according to previous results, based on earnings per car and per car mile. We obtain these statistics through the accounting office, from the conductors' reports; also from the inspectors, who make suggestions as to when trippers should be put in service to relieve overloaded cars. Schedules are made up and posted at the different stations. These show the time of leaving stations, also the time of meeting on switches. Schedules are posted some time in advance of the date when they go into effect, and

SCHENECTADY RAILWAY COMPANY.

Local Time Table No. _____

Albany LINE

Effective January 10, 1906

STATIONS	RELIEF AND DISTRIBUTION OF TIME																									
	ASSIGNMENT OF RUNS																									
Station	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	Run	CREW	Operate Run No.	From	To	Hours	TOTAL HOURS	
St. E. Market	30	31	31	35	34	36	33																			A
Church St	115		500		300		210													B	30	11 30	12 30	6 00	10 00	
Leah St			500																							

RUNNING TIME		SUMMARY		SPECIAL RULES	
Church St. and Leah St.	12	Average Speed with Layover	2.300	Red ink denotes Sunday time and relief. Runs shown in light ink.	
Church St. and Albany St.	2	" " without Layover	2.200		
Albany St. and Church St.	11	Mileage Round Trip	30.68		
Leah St. and Church St.	2	Total Mileage	1046.15		
Leah St. and Albany St.	2	Hours Round Trip	2		
Albany St. and Church St.	2	Total Hours	116.70		
Albany St. and Church St.	1	Total Number Trips	107		
Albany St. and Church St.	2	First Car Lv. Schenectady	11 00 00		
Albany St. and Church St.	11	" " Lv. Albany	5 45 00		
		" " Lv. Albany			
		Last Car Lv. Schenectady	12 00 00		
		" " Lv. Albany	1 00 00		
		" " Lv. Albany			

(Note—On the original the small figures above larger figures in the same square are shown in red, and indicate Sunday time and relief.)
FORM OF SCHEDULES FOR CITY AND INTERURBAN LINES USED BY THE SCHENECTADY RAILWAY COMPANY

lines, it is our practice to check loads carried at different points on each line during the full period that cars are operated. Our schedules are then arranged to fit the travel under normal conditions, and we run a sufficient number of cars to comfortably handle the traffic. Schedules are posted at the stations and are sufficiently clear for employees to read and understand them.

It is our practice to swell our schedules by increasing the number of cars to meet heavy travel which can not be taken care of by the regular cars. The necessity of putting out extra cars to take care of increased travel is determined by careful vigilance. Anticipating heavy travel on Saturdays, Sundays or holidays, extra crews are held at the car houses subject to call. When the travel on any one line becomes so heavy that it cannot be properly taken care of by our regular cars running on that line, the inspector increases the headway by calling out extra cars from the station, either increasing the line by even headway or running cars in sections, according to the conditions which must be met. As an illustration, when operating a 20-minute headway on our Albany Division, anticipating an increased travel on a Saturday afternoon or Sunday, we call out extra cars from the station, changing the line from a 20-minute service to a 15-minute service, the round

motormen and conductors are required to make themselves familiar with the schedule. Any information they desire in regard to the same is secured from the despatcher. We operate our regular schedules with extras at intervals as frequent as traffic warrants. In case of bad weather, the road inspectors notify despatcher by telephone to withdraw extra service or such part of it as they think should be withdrawn. Cars once having left the terminal and passed the inspectors are required to go to the end of the line.

F. J. Gerdon, Supt. Treas.,
Utica & Mohawk Valley Ry. Co.

The chart on following page shows type of our schedules used in daily operation, this particular line being one of our best. The block numbers written over the top of the terminal indicate the division of running times on the schedule, as outlined hereafter. The small table on the right of the schedule gives the time the crews are relieved, the character of their run, and the run number. The top line, which reads run No. 77, runs on 161 block a. m., and goes to 194 block at night, which shows that this is a swing run, 194 block being a run on another line. Where the blocks are given a. m. and noon, as run No 19, a.m. 162 block, noon 165, this indicates a straight-day.

Run No. 51, noon 162 block, night 165 block indicates a late-straight, or a straight-from-noon. The small table on the left of the schedule shows the leaving time of the cars from the car house on Sunday, these leaving times being somewhat later than the first cars leave on week days. The time-point schedule on the left of the schedule shows the time given to run between various points. Notes are made on the schedules where special instructions are given concerning various details. The mileage table, as indicated on the schedule, is for the use of the operating and auditing departments. On the schedule proper, the leaving time from the car house is placed under the terminal to which the car goes on its first trip from the car house. For instance, 161 block goes from the car house to ferry, leaving the car house at 5:55 a. m. If, on the other hand, this car should be scheduled from the car house to N. C. Hill at 5:55 a. m., the leaving time would be placed under the terminal North

the ferry and Merchantville, and between Merchantville and the ferry. The cross-section paper is ruled ten lines to the inch, and this makes ten passengers to the inch, that is, if the point is on the twenty-sixth line from the base it indicates that there were twenty-six passengers on that trip. The space enclosed by the dotted black lines (shown as red on the original) indicates the number of passengers carried between Merchantville and Moorestown and Moorestown and Merchantville. This travel is counted from the base line the same as in the other case. We do not plot out car miles on this study. A 10-minute headway is maintained on the line from the ferry to Merchantville, and a 30-minute headway between Moorestown and Merchantville. The time of the trips is placed under the base lines.

In explanation of the double row of time figures, would say that the leaving times 5:37, 5:47, 5:57 and 6:07 are the leaving times from Merchantville, the figure 5:20, which is placed

N . C . H I L L

SUNDAY - LEAVING			
TIME	FROM	TO	BAWN
161	6.55	7.08	7.37
162	6.05	6.18	6.47
163	7.15	7.28	7.57
164	6.25	6.38	7.07
165	7.35	7.48	8.17
166	5.45	5.58	6.27

TIME-POINTS-TO-N.C.HILL	
FERRY	MINS
5 ¹⁴ AND STATE	10
STATE-ST. BRIDGE	13
BEIDEMAN	25
LAY-OVER	4

TIME-POINTS-TO-FERRY	
BEIDEMAN	MINS
STATE-ST. BRIDGE	12
5 ¹⁴ AND STATE	15
FERRY	25
LAY-OVER	6

NOTE
 CREWS - MUST - RUN
 STRICTLY - TO - TIME
 POINTS - PASS - 8³⁰ AND STATE

161		162		163		164		165		166	
FERRY	N.C.HILL	FERRY	N.C.HILL	FERRY	N.C.HILL	FERRY	N.C.HILL	FERRY	N.C.HILL	FERRY	N.C.HILL
5 ⁵⁵		5 ⁵⁵		5 ⁵⁵		5 ⁵⁵		5 ⁵⁵		5 ⁵⁵	
6 ⁰⁰	6 ³³	6 ⁰⁰	6 ³³	6 ⁰⁰	6 ³³	6 ⁰⁰	6 ³³	6 ⁰⁰	6 ³³	6 ⁰⁰	6 ³³
7 ⁰⁰	7 ³³	7 ⁰⁰	7 ³³	7 ⁰⁰	7 ³³	7 ⁰⁰	7 ³³	7 ⁰⁰	7 ³³	7 ⁰⁰	7 ³³
8 ⁰⁰	8 ³³	8 ⁰⁰	8 ³³	8 ⁰⁰	8 ³³	8 ⁰⁰	8 ³³	8 ⁰⁰	8 ³³	8 ⁰⁰	8 ³³
9 ⁰⁰	9 ³³	9 ⁰⁰	9 ³³	9 ⁰⁰	9 ³³	9 ⁰⁰	9 ³³	9 ⁰⁰	9 ³³	9 ⁰⁰	9 ³³
10 ⁰⁰	10 ³³	10 ⁰⁰	10 ³³	10 ⁰⁰	10 ³³	10 ⁰⁰	10 ³³	10 ⁰⁰	10 ³³	10 ⁰⁰	10 ³³
11 ⁰⁰	11 ³³	11 ⁰⁰	11 ³³	11 ⁰⁰	11 ³³	11 ⁰⁰	11 ³³	11 ⁰⁰	11 ³³	11 ⁰⁰	11 ³³
12 ⁰⁰	12 ³³	12 ⁰⁰	12 ³³	12 ⁰⁰	12 ³³	12 ⁰⁰	12 ³³	12 ⁰⁰	12 ³³	12 ⁰⁰	12 ³³
1	1 ³³	1	1 ³³	1	1 ³³	1	1 ³³	1	1 ³³	1	1 ³³
2	2 ³³	2	2 ³³	2	2 ³³	2	2 ³³	2	2 ³³	2	2 ³³
3	3 ³³	3	3 ³³	3	3 ³³	3	3 ³³	3	3 ³³	3	3 ³³
4	4 ³³	4	4 ³³	4	4 ³³	4	4 ³³	4	4 ³³	4	4 ³³
5	5 ³³	5	5 ³³	5	5 ³³	5	5 ³³	5	5 ³³	5	5 ³³
6	6 ³³	6	6 ³³	6	6 ³³	6	6 ³³	6	6 ³³	6	6 ³³
7	7 ³³	7	7 ³³	7	7 ³³	7	7 ³³	7	7 ³³	7	7 ³³
8	8 ³³	8	8 ³³	8	8 ³³	8	8 ³³	8	8 ³³	8	8 ³³
9	9 ³³	9	9 ³³	9	9 ³³	9	9 ³³	9	9 ³³	9	9 ³³
10	10 ³³	10	10 ³³	10	10 ³³	10	10 ³³	10	10 ³³	10	10 ³³
11	11 ³³	11	11 ³³	11	11 ³³	11	11 ³³	11	11 ³³	11	11 ³³
12	12 ³³	12	12 ³³	12	12 ³³	12	12 ³³	12	12 ³³	12	12 ³³
1	1 ³³	1	1 ³³	1	1 ³³	1	1 ³³	1	1 ³³	1	1 ³³

RELEASE-AT-FERRY		
Block	NOON	NIGHT
161	12.02	6.02
162	11.12	5.12
163	11.22	5.22
164	11.32	5.32
165	11.42	5.42
166	11.52	5.52

CREWS			
RUN	A.M.	NOON	NIGHT
77	161		194
19	162	165	
18	163	166	
20	164	161	
76	165		162
74	166		163
51		162	165
50		163	166
53		164	161
58		211	164

NOTE
 RUN - N^o 77 - TAKE 164
 BLOCK - SAT^o SUN. NIGHT

MILEAGE		
BLOCK	DAILY	SUNDAY
161	130.84	124.00
162	130.84	124.00
163	130.84	118.72
164	130.84	124.00
165	130.84	118.72
166	130.84	130.84
TOTAL	785.04	740.52

SUNDAY
 FIRST-CAR-FROM-N.C.HILL-SUN. 6.27 AM.
 FERRY - " 5.50 AM.

FORM OF SCHEDULE USED BY PUBLIC SERVICE CORPORATION, SOUTH JERSEY DIVISION

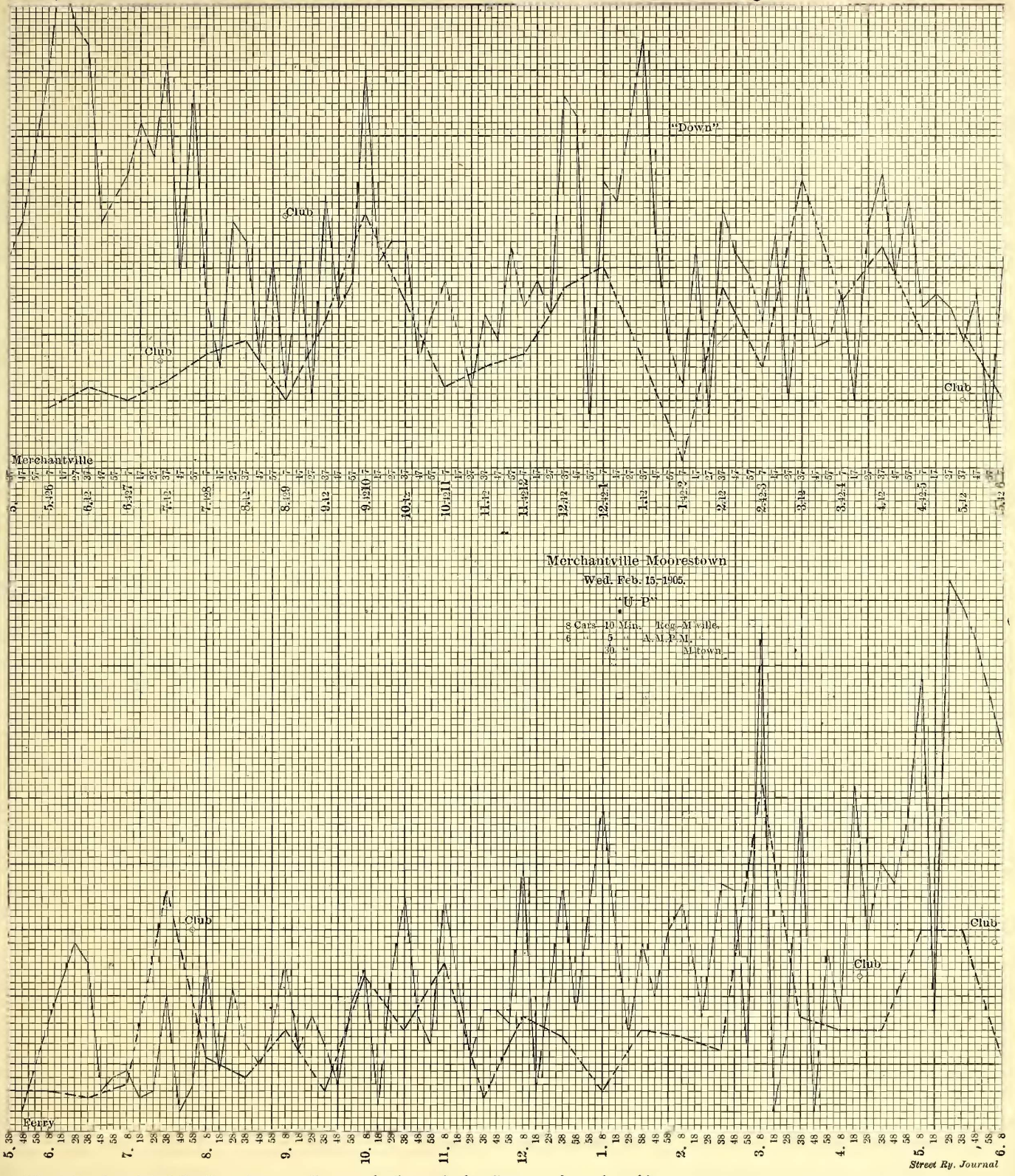
Cramer Hill. The same rule applies to cars going to the car house after ending day's work, the arriving time at car house being placed in the bottom of the column indicating from which terminal the car finished the run. The schedules for our various lines are made out in a similar form, with the leaving time as indicated above.

We determine our schedules from studies made on cross section paper, taking the information from our conductor's coupons or day cards. This gives an accurate statement for each trip going in either direction. Sample of one of these cross section studies accompanies this article. This is a study of our main line running from Ferry to Merchantville and Moorestown. The distance to Merchantville is 5 miles, and to Moorestown is 12 miles. The fare from the ferry to Merchantville is 5 cents, and to Moorestown is 10 cents. The study marked "up" shows the trips from ferry to Moorestown and Merchantville. The study marked "down" shows the trips from Moorestown and Merchantville to the ferry. The space enclosed between the solid black line and the base line indicates the number of passengers carried per trip between

under the figure 6:07, is the leaving time from Moorestown. This car is due at Cove Road at 6:07. This point is the end of the single-fare district. By looking at the chart on the division marked "down," and taking the point directly over the time 5:42, the space enclosed between the dotted line and the base line will give the number of passengers carried on this 5:42 trip from Moorestown to Merchantville, and then following from the base line directly over 6:07, the space enclosed by the black line will give the number of passengers carried from Merchantville to the Ferry. We do not have any regular time to make up these studies. If we find any particular line is carrying more people than usual, or the receipts are dropping off, we then make out a chart study to determine at what hours of the day the changes are taking place, and then arrange our schedules accordingly. For the lines on which extra service is run, and on which such extra service would be interfered with by the condition of the weather, we do not change our regular schedule. Our lines are all run, with the exception of Moorestown and Riverton, on a 10-minute headway. If extra service is required, we

operate an independent schedule, making the headway every 5 minutes. These tripper cars are subject to despatcher's orders, and can be taken off, subject to the conditions of

been sent out, if travel stops, the cars are immediately sent to the car house. In cases where park travel is light and extra cars are run during the rush, these extras lay over until the



(Note—On the original the lines shown on the reproduction as broken lines are drawn in red.)

METHOD OF MAKING STUDIES OF TRAFFIC CONDITIONS FOR DETERMINING SCHEDULE EFFICIENCY USED BY PUBLIC SERVICE CORPORATION, SOUTH JERSEY DIVISION

travel, without interfering with the regular schedules. We make similar chart studies for this tripper service. In operating cars for park service, our main line is not interfered with. We place as many cars on the street as we think are necessary to handle the traffic. In case of storm after these cars have

park is closed, when they are run out one or two trips, as travel warrants, subject always to the despatcher's orders. Whenever new schedules are prepared, notice is posted to cover the details.

F. A. Hewett, Supt. Trans.,
Public Service Co., So. Jersey Div., Camden.

The form in which schedules on the Madison & Interurban Traction lines are posted is indicated herewith. We have simplified the form as much as possible, believing that by so doing our employees can more readily understand and operate by it without confusion. In cities the size of ours, the condi-

chart is extended to indicate the reliefs for "supper," "night," and the times at which cars arrive at the car house. We aim to let nothing interfere with our regular schedule. Picnics, ball games, circuses, etc., are taken care of by extra or special cars, whose movements are regulated by telephone orders, in-

TIME TABLE														
FAIR-OAKS ^{No.} WINGRA PARK.														
RUN	CAR	LEAVE CAR HOUSE	TO	RUN	CAR	LEAVE FAIR-OAKS	GOING WEST.							
2	33	5:50 A.M.	Wingra Park	4	38	6:40 8:00 9:20 10:40 12:00 1:20 2:40 4:00 5:20 6:40 8:00 9:20								
5	36	6:20	Cemetery	2	35	6:50 8:10 9:30 10:50 12:10 1:30 2:50 4:10 5:30 6:50 8:10 9:30								
7	39	6:30	Cemetery	2	33	7:00 8:20 9:40 11:00 12:20 1:40 3:00 4:20 5:40 7:00 8:20 9:40								
8	20	6:00	Wingra Park	8	20	7:10 8:30 9:50 11:10 12:30 1:50 3:10 4:30 5:50 7:10 8:30 9:50								
4	35	5:50	Hayes Sidings	3	34	7:20 8:40 10:00 11:20 12:40 2:00 3:20 4:40 6:00 7:20 8:40 10:00								
6	38	5:50	Hayes Sidings	1	32	7:30 8:50 10:10 11:30 12:50 2:10 3:30 4:50 6:10 7:30 8:50								
3	34	6:10	Wingra Park	5	36	7:40 9:00 10:20 11:40 1:00 2:20 3:40 5:00 6:20 7:40 9:00 10:10								
1	32	6:10	Cemetery	7	39	7:50 9:10 10:30 11:50 1:10 2:30 3:50 5:10 6:30 7:50 9:10 10:20								<i>Last Car going west 10:20 P.M.</i>
GOING EAST														
RUN	CAR	LEAVE FAIR-OAKS	LEAVE CEMETERY									LEAVE WINGRA PARK		
2	33	Wingra Park	6:25	7:40 9:00 10:20 11:40 1:00 2:20 3:40 5:00 6:20 7:40 9:00										10:15
5	20	"	6:35	7:50 9:10 10:30 11:50 1:10 2:30 3:50 5:10 6:30 7:50 9:10										10:25
7	34	"	6:45	8:00 9:20 10:40 12:00 1:20 2:40 4:00 5:20 6:40 8:00 9:20										10:35
8	32	Cemetery	6:50	8:10 9:30 10:50 12:10 1:30 2:50 4:10 5:30 6:50 8:10 9:30										<i>Last Car leaves Cemetery 9:30 P.M.</i>
4	36	"	7:00	8:20 9:40 11:00 12:20 1:40 3:00 4:20 5:40 7:00 8:20										9:35 10:45
3	39	"	7:10	8:30 9:50 11:10 12:30 1:50 3:10 4:30 5:50 7:10 8:30										9:45 10:55
6	38	"	7:20	8:40 10:00 11:20 12:40 2:00 3:20 4:40 6:00 7:20 8:40										9:55
1	35	"	7:30	8:50 10:10 11:30 12:50 2:10 3:30 4:50 6:10 7:30 8:50										10:05 <i>Last Car leaves Wingra Park 10:55 P.M.</i>

FORM OF SCHEDULE USED BY THE MADISON & INTERURBAN TRACTION COMPANY, MADISON, WIS.

tions vary. We are operating a single-track system, with sidings, 1000 ft. in length, at suitable points, and are governed as to the number of cars to be run by the number of passengers carried. We run extra cars during hours of heaviest traffic, and the aim is to make the best possible headway

independently of the regular schedules, so that in case of storm we can take off part or all of the extra cars and not in any way interfere with the regulars. By this method we are enabled to secure greater flexibility and perfect control of all cars in operation. The question of schedule making is a very impor-

TABLE OF CHANGES														
FAIR OAKS ^{No.} WINGRA PARK														
DINNER														
NO 1	No 1 Man leaves Fair Oaks 10:10 A.M. Goes to Hayes Sidings, Meals and Changes and returns to Fair Oaks, off for dinner 11:00, relieved by No 2 relief.													
3	No 3 Man leaves Fair Oaks 10:20, goes to Hayes Sidings, Meals and Changes and returns to Fair Oaks, off for dinner 11:10, relieved by No 3 relief.													
5	No 5 Man leaves Fair Oaks 10:30, goes to Hayes Sidings, Meals and Changes and returns to Fair Oaks, off for dinner 11:20, relieved by No 4 relief.													
7	No 7 Man leaves Fair Oaks 10:40, goes to Hayes Sidings, Meals and Changes and returns to Fair Oaks, off for dinner 11:30, relieved by No 5 relief.													
AFTER NOON														
NO 2	No 2 Man on No 1 relief leaves Fair Oaks at 11:50 A.M. goes to Hayes Sidings, Meals and Changes and returns to Fair Oaks, off for afternoon 12:30, relieved by No 2 relief.													
4	No 4 Man on No 3 relief leaves Fair Oaks at 12:10, on his own run - relieved by No 3 relief.													
6	No 6 Man on No 5 relief leaves Fair Oaks at 11:55, goes to Hayes Sidings, Meals and Changes and returns to Fair Oaks, off for afternoon 12:20, relieved by No 5 relief.													

SECTION OF "TABLE OF CHANGES" USED BY THE MADISON & INTERURBAN TRACTION COMPANY IN CONNECTION WITH ITS REGULAR SCHEDULES

with the least number of cars. For example, we have gradually reduced our headway from a 15-minute to a 10-minute schedule, without increasing the number of cars in operation. This improvement has been brought about by reducing the number of stopping places and long waits, and by improvements made in roadbed and rolling stock. The result of these changes has been a very satisfactory increase in our earnings, and the public is much better satisfied.

In making time schedules, we also make a table of changes and runs, showing the time and changes of each individual run, so that any man can take out his car in the morning and, by following directions and instructions for his run, can not possibly make any mistake nor become confused. The section of the "change" chart, reproduced in this connection, explains the reliefs for "dinner" and "afternoon." The original

chart is extended to indicate the reliefs for "supper," "night," and the times at which cars arrive at the car house. We aim to let nothing interfere with our regular schedule.

G. H. Shaw, Gen. Supt.,
Madison & Interurban Tract. Co., Madison, Wis.

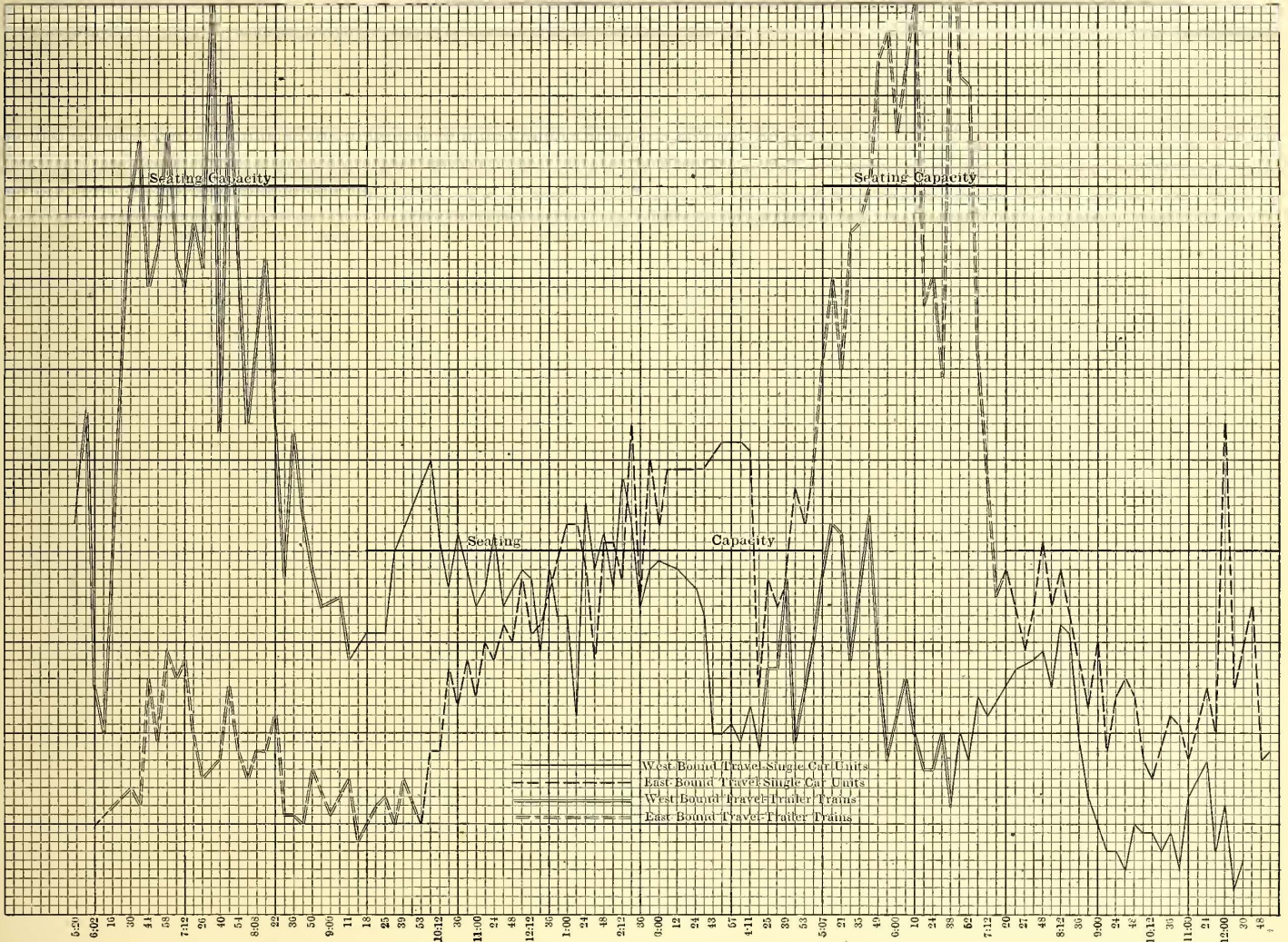
The Indiana Union Traction Company prints its time tables in the form of comprehensive folders, which give detailed information regarding schedules on all lines, maps, connections and rules and regulations pertaining to tickets, baggage, etc. The time tables are prepared in accordance with regulation steam railroad practice. For determining schedule efficiency we keep the train earnings of each train separate, giving the number of passengers carried on each train run, and in this way keep watch to see if the schedules are properly covering the service. We examine each crew before they enter the service, to see that they thoroughly understand all rules,

time tables and signals. On interurban lines, the train dispatcher calls off all extra trains when the heavy travel is over. The different train masters call off all extra service on city lines as soon as the heavy travel is over.

C. A. Baldwin, Supt. Trans.,
Indiana Union Tract. Co.

[The Birmingham Railway, Light & Power Company, of Birmingham, Ala., in determining if schedules are suitable for the traffic, plots the number of passengers carried by hours in diagrammatic form on cross-section paper, in about the same

of line is given by the dispatcher by telephone, each trip. In order to determine if the schedules are properly meeting the conditions, we obtain from the auditor records of passengers carried per car or trip, going in and out, and we often have conductors report on separate trip sheets or day cards the number of passengers carried from, to, or between points, when desired. We also have division superintendents and inspectors watch the traffic at certain specified times and places. We watch changeable conditions by stationing division superintendents or inspectors at resorts or along the routes to such parks or resorts, and these officers keep the superintendent informed in regard to the state of travel.



(Note—On the original the lines shown on the reproduction as double lines are shown as single red lines.)

METHOD OF MAKING STUDIES OF TRAFFIC CONDITIONS FOR DETERMINING SCHEDULE EFFICIENCY USED BY BIRMINGHAM RAILWAY, LIGHT & POWER COMPANY, BIRMINGHAM, ALA.

way as described elsewhere in this issue of the Question Box, but it adds one commendable feature not mentioned in the other systems described. That is, a line is added to the load curves, showing the seating capacity of the car. In other words, the seating capacity is taken as the base line, and the variations of the load lines above or below this base indicate at a glance the relation between seating capacity and the number of passengers actually carried. A sample study in the form followed at Birmingham is shown herewith.—Editors.]

We make a monthly "board," showing the run each man is entitled to and also the time that each car is due to leave the car house. Printed schedules of running time and headway are furnished to the trainmen. The starting time from end

Our system of telephones keeps the dispatcher and superintendent in touch with every point on the road, so that there is never delay in adjusting the service to meet the traffic; and in like manner the superintendent may be immediately informed should any accident, delay or blockade occur. We have in Denver a central loop, around or through which pass nearly all lines in the city and nearly all the lines leading to parks or resorts. We have extra storage tracks in and around this loop. On special occasions when there is likely to be heavy traffic, and there is some doubt as to which point will demand the heaviest service, these cars are stationed upon these loop tracks, and sent out to the best advantage.

John A. Beeler, V. Pres. & Gen. Mgr.,
Denver City Tramway.

[Note.—The following communication from Mr. Hibbs, general superintendent of the United Railroads of San Francisco, was received prior to the disaster that recently overtook that city. It is printed herewith as showing the practice of the United Railroads in handling the matter of schedules before the earthquake and fire. Undoubtedly, the same general principles will be applied as soon as conditions again become normal.—Editors.]

On the United Railroads of San Francisco traffic statements are made at frequent intervals, using the conductor's day card as a basis. These traffic sheets show the number of passengers carried on each half trip, by hours, for the entire day. In addition, we have the cars of the line under investigation ridden by persons trained for this purpose, who ascertain: first, the carrying capacity of each car for each hour; second, the load conditions of each car at various points on the line. In addition to this we make an analysis of the issue and collection of transfers at the different transfer points and intersections on the line. We find from these different processes; first, the number of passengers for whom provision must be made at different hours during the day; and, second, the number of cars necessary to transport the said number of passengers—which fixes the headway at which cars are to be operated. We also obtain, from the records referred to, information that enables us to turn certain cars back before reaching the outer terminus, and lengthen the headway in the suburban district to the extent of accommodating our patrons and yet not run unnecessary mileage. Schedules are posted in the car houses at least three days before being placed in operation, and the carmen are, under agreement, permitted to pick runs according to seniority of service, which process is known as "signing up." A man's signature opposite the run number picked by him is notification by him that he has examined the schedule and is familiar with the details, and is accepted as such by the superintendent or operating officer in charge. Inspectors, or—as they were formerly known here—timers, make a copy of the leaving time of each run, at both the inner and outer terminus of the line, by trips, and with the information furnished by the "running time and time points," are enabled to check up each crew at any point on the line at any time during the day. Inspectors are required to board any car not conforming to the schedule, and inquire into cause of running either ahead or behind time, and report this fact to the superintendents.

It so happens that in San Francisco all resorts which attract large numbers of people are so located that lines running to these resorts also run through thickly populated districts via main thoroughfares, which require frequent service and short headway under all conditions, and, in case of unexpectedly heavy riding, all cars can be sent to outer terminus, to enable other cars to be sent out by car despatcher to cover the gap which would otherwise occur, and to maintain the headway provided for by the schedule. The reverse of this operation is effective when weather conditions are such that the service provided is in excess of the requirements. An inspector, located at the outer terminus, has certain runs noted in his time book which turn in the car house when notified by him to do so. The runs to be turned in are selected with a view of maintaining a regular headway, and also with the purpose of enabling each crew to obtain a fair day's pay. To illustrate this point, a crew who would go to work at 7 o'clock in the morning could be turned in at 2 o'clock in the afternoon, rather than another crew whose work only commenced at noon. Inspectors are in constant communication with the operating officials at car houses by means of a private system of telephones, and keep headquarters advised of the traffic conditions, in order that all persons interested in

the operation of the line may be kept informed of what every other operating man is doing, and so everyone acts in harmony with everyone else. E. D. Hibbs, Gen. Supt.,
United Railroads of San Francisco.

On the Buffalo system the traffic on the different lines is watched by the division superintendent and inspectors, and the schedules made up according to travel. Occasionally, the number of passengers on cars are estimated by men assigned for this purpose at different points along the lines. All schedules are made by the division superintendent, and approved by the superintendent of transportation. (The schedules are prepared in form practically identical with the form reproduced in this connection, as used by the Schenectady Railway Company.—Eds.) Time cards are posted at all stations and the men familiarize themselves with these cards before going on duty. All time tables are thoroughly explained to all employees by the division superintendent. The schedules are compiled to suit ordinary travel. If anything special takes place on a line it is taken care of by extra cars, which are added to the regular line in such manner as not to interfere with the regular schedule. If weather conditions are such that cars are not needed, extra cars do not go out. Extra cars are pulled in by the division superintendent or an inspector when travel will so permit. C. A. Coons, Supt. Trans.,
International Ry. Co., Buffalo.

Our schedule is printed in the form of a vest-pocket guide and is published with the idea of familiarizing the public with the running time of city cars. This was more or less necessitated by the fact that we cut down the total number of cars, in order to reduce excessive city car mileage. The schedules were changed to give cars 20 minutes to 30 minutes apart. In order to assist the public in learning the time of these cars, the same as they would interurban cars, we have marked the exact time when the city cars pass most of the prominent street car corners in the city. We keep the cars absolutely on time by compelling motormen to have their watches in a suitable watch pocket in front of them in the vestibule. Over the watch is hung a copy of the schedule, and motormen must arrive at a certain corner at the exact time shown in the time schedule. Any deviations from schedule time, without reasonable excuse, are punished by lay-offs. It is interesting to note how accurate the men have become, and how much the public have grown to rely on these time tables. We have apparently not lost any fares on account of the reduced schedule, and we have gained the advantage of considerably increased car mile receipts.

Ernest Gonzenbach, Gen. Mgr.,
Sheboygan Lgt., Pow. & Ry. Co.

In Louisville we first make out a time table setting forth the due time for each car at the various points along the route, and a copy of this time table is furnished to the motorman and conductor who operate that particular car. These men are also required to study the entire time table, as displayed in the office of the car house foreman at the place of reporting. We use what is known as the inspector system. It is the duty of the inspectors to ride back and forth over a particular line, covering the entire time that the cars are in operation. They note carefully the travel, and the trends of travel and report daily to the superintendent on the results of their observations. The reading of the register would not as accurately give the information desired in making up the proper schedule as the above plan. Each inspector has a blank that he is required to fill out, showing the number of passengers on cars at the various points along the line. We find this an excellent plan.

We have a bulletin board in the offices of the car houses where crews are required to report, and the time table is framed and put upon this bulletin. The crews are required to read each day before they take out their runs everything appearing on this bulletin. We also require all car house foremen to read over these schedules to the men at reporting time, and in order that they may be certain that all have been fully instructed, the foreman is required to take the name of each employee as he instructs them, and to preserve the list, so that ignorance of the instructions will not be taken as an excuse for not knowing. This plan works all right. We have a series of time tables always on hand, and these are termed "Fair Weather," "Rainy Weather," etc. There are also tables to be used when there are attractions, and these will include cars for handling the park travel. In this city there are a number of public and private parks, and the tables are all numbered. We watch closely for all attractions and, to a great extent, govern our schedules in that way. We keep on hand (especially during the park season) a large number of extra men, that is men who have no regular runs, but are reporting for work, and in this way we rarely ever run short of a sufficient number of cars to transport the travel with reasonable comfort. The telephone is a great adjunct in the moving of our business. We have our own telephone service, connected with the superintendent's office and residence, and it is rarely, by close observation and application, that we fail to transact the business in a satisfactory manner. There is no question of greater interest to street railways than the matter of schedules, and the writer has only briefly outlined a few of his ideas bearing on the information requested. The question of moving the people at all times and under all circumstances and conditions, is of the greatest importance both to the public and to the street railway companies throughout the country.

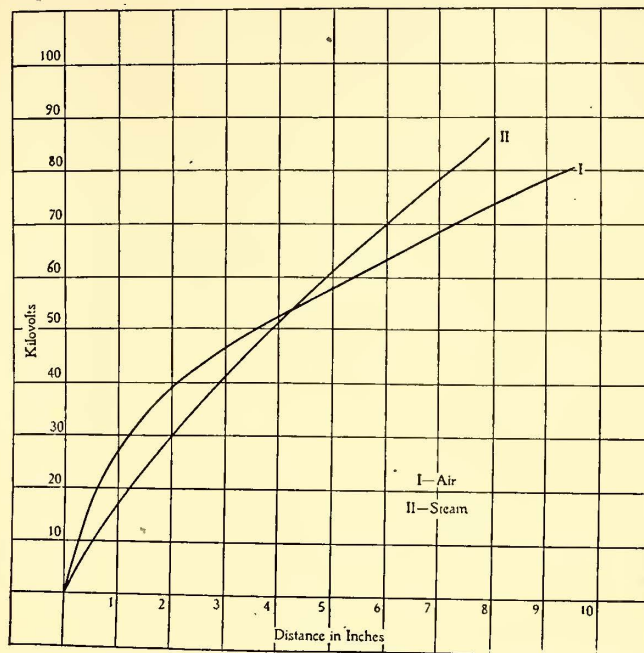
J. T. Funk, Gen. Supt.,
Louisville Ry. Co., Louisville, Ky.

EFFECT OF SMOKE ON TROLLEY WIRE IN JOINT OPERATION

Apropos of the general interest in the outcome of the many proposals now under way looking to joint operation of electric cars and steam locomotives over the same tracks, there has been considerable discussion as to whether if high-voltage trolley wires are placed over the tracks of railroads using steam locomotives, and particularly at such places as in tunnels and under bridges, there might be dielectric discharges from the trolley to the locomotives and ground caused by the steam and smoke of passing locomotives acting as conducting mediums. To determine the actual properties of steam and smoke under these conditions and to find out the likelihood of trouble from this source, certain tests have recently been made, and are described by S. M. Kintner writing in a recent issue of "The Electrical Journal." Mr. Kintner states that in the first test two terminals were placed one above the other and arranged so that the space between them forming the discharge gap could be varied at will. The terminals were 1/2 in. in diameter with spherical ends, and were so mounted that jets of steam and smoke could be projected around the terminals in a direction parallel to their axis of support.

In the first test a column of steam was projected across the gap between the two terminals. The steam was purposely made very moist by passing it through a long line of pipe, so that it lost a large quantity of heat before arriving at the gap. The results of this tests are shown in the curves on the accompanying diagram. In summarizing the results the author

points out that the striking distance, or distance at which current will jump the gap, is greater for a given voltage in air than in smoke for voltages below approximately 55,000, but that at this point the curves cross each other, and it requires a greater voltage to jump a given gap in steam than in dry air. The jumping distance in air, as plotted in this curve, was obtained by measurements taken at the time the curve for steam was determined, the same terminals being used and the points checked several times, so that it seems certain that the values are relatively correct. During the test with steam



GRAPHIC REPRESENTATION OF TESTS TO DETERMINE RELATIVE TENDENCIES TO DIELECTRIC DISCHARGES IN ORDINARY AIR AND STEAM

the terminals were saturated with moisture to such an extent that the water dripped from them freely. No perceptible change was noted, however, when the steam was somewhat drier.

The next test was made to determine the conductivity of smoke and cinders. The terminals were immersed in a dense volume of smoke produced by building an intense fire in a small stove. After a hot bed of coals was obtained some fresh coal, containing considerable dirt, sulphur, etc., was thrown on to the fire to prevent perfect combustion and produced large quantities of very dense black smoke. It was in this case impossible to maintain constant conditions through a sufficient period to obtain a curve, but a number of observations were taken which indicated that the striking or jumping distance through dense smoke was not materially reduced from that of the steam or air in the previous test.

One set of readings was as follows:

Voltage	Distance in Inches
14,000	1.375
25,000	2
35,000	3
42,000	3.75

From these tests the conclusion is made that with a reasonable factor of safety, of possibly six or seven, over the dielectric strength of air, no difficulty will be encountered through steam and smoke from locomotives attracting current from an overhead trolley wire.

REPORT OF ELECTRIC RAILWAY TEST COMMISSION—I*

REVIEW BY LOUIS BELL, PH. D.

There lies before me the Report of the Electric Railway Test Commission, which served at the St. Louis Exposition. It is a volume of more than 600 pages, containing by far the most valuable collection of data upon electric railroading that has yet been gathered. In some respects the information secured is unique, and in nearly every case it is thorough and far reaching to a rare degree. In initiating such a series of tests two courses were open—to make a scientific reconnaissance over a wide field, or to select certain important phases of the work, hitherto insufficiently understood, and upon them to concentrate effort. Very wisely, the Commission took this latter course, and as a result we have a mass of detailed information about certain important matters that will be, for years, a mine of information to the engineer. Of course, electric railways have been much investigated, but as a rule under very unsatisfactory conditions, and with inadequate equipment. Such tests are always difficult, since they have all out-of-doors for a laboratory, so that minor sources of error may remain in spite of every effort, yet by persistently directing attention, as did the Commission, to certain important things, these at least can be very satisfactorily determined.

The investigations were directed by exceptionally competent committees and seem to have been carried out with most conscientious care. Naturally, not all of the subjects considered could be of equal importance from an engineering standpoint, nevertheless they unite in being thoroughly practical and of direct applicability to standard existing conditions. Some of the number, however, are of singular importance, and are worthy of somewhat detailed discussion on account of their direct bearing upon future work in electric railroading.

The first subject to engage the attention in this volume is the series of tests upon single-truck, double-truck and interurban cars, under service conditions. Special importance is given the first two items from the fact that the types tested were those standard in St. Louis, so far as general character is concerned, and which represented, as every one who visited the Exposition will agree, a very high degree of efficient service. In so far the tests of these, as in case of the interurban car, are interesting and valuable, yet of much more interest were the tests of some details later reported. If one were to select from the mass of valuable material reported, the topics of most vital future bearing, these would be the braking tests, the determination of rail constants for alternating currents, and the train resistance trials of high-speed interurban cars.

It is hard to overestimate the usefulness of exact data on the making of electric cars. As electric traction developed, its growth in speed and power far outran the braking equipments, and entirely new conditions were encountered. In a few years, both the weight of the cars and their speed were doubled. The kinetic energy of the car at speed increased enormously, while the power of absorbing this energy for a quick stop remained practically constant.

Every car may be conceived of as bearing ahead of it a dangerous space equal to the distance required for stopping. Within that space no stationary object is safe, and hence a knowledge of this dangerous space is a fundamental requisite for the avoidance of accidents. As the weight and speed of the car increases, so does the length of the dangerous space,

and a majority of the accidents upon interurban roads may be charged directly to lack of appreciation of this simple fact. On a single track cars that get within double the dangerous space when running in opposite directions must inevitably collide, and, as we shall presently see, the distance thus indicated is much longer than one would at first be disposed to think. Likewise, on a double city track, rear-end collisions occur because the motorman miscalculates the intentions of his mate on the car ahead and slips within dangerous distance before he realizes it. For safe running, it is not enough to provide powerful brakes, but the motorman must know their capacity for a quick stop. On the fast interurban cars this knowledge is even more important, since the distances which must be judged are longer and there is less by which to gage them.

The braking tests of the Commission were thorough, and made with the latest appliances. A careful study of them, checking the results for his own equipment, should be the self-imposed duty of every manager of an electric road, and time and money spent in this manner will pay for itself a dozen times over in immunity from accident.

The tests of the Commission on the single-truck city car braking problem are particularly interesting as involving the very ingenious Westinghouse magnetic brake, which simultaneously brakes on wheels and track, and brakes the armatures by setting the motors on short circuit through the energizing coils of the brakes. The traveling power thus obtained is enormous, since the track is brought into service as well as the wheels, and it seems to be feasible thus to push the deceleration up to a point as high as the safety of the line load will permit. As the experiments were actually carried out, the car, which weighed as equipped for the test 14.3 tons, was brought to rest from maximum speeds ranging from 15.8 m. p. h. to 20.8 m. p. h., and averaging 18.15 m. p. h. The mean distance required to stop in the twenty-five test runs was 114.67 ft. This is a most excellent showing for the average deceleration of 2.57 m. p. h. per sec., and at a pinch one could have shortened the distance without taking undue chances with the line load. Examining the details of the runs one finds the braking distance varying according to the manipulation of the brake controller and the speed, from 90 ft. up to 164.4 ft. The decelerations ranged at times to an average of about 3 m. p. h. per sec. and a maximum of about 4 m. p. h. per sec.—in other words, pretty near the limit advisable unless in dire extremity. The report states that these results are rather better than with air brakes under similar conditions, so that taking the data as a whole, one must conclude that the real braking space of a city car of this description on a good, level track is somewhere from 30 yards to 40 yards. Under unfavorable conditions it would quite certainly rise to 50 yards, which should be taken as an approximate value of the dangerous space for a car of similar weight to the one tested at maximum speeds of 15 m. p. h. to 20 m. p. h. Hand brakes give less favorable results.

The value thus obtained ought, when opportunity offers, to be checked on a line with considerable grades and with track in bad condition, and also for somewhat lower maximum speeds, but the report certainly gives a good line on probable performance under favorable conditions.

It is a pity that similarly complete tests could not have been made with the heavy double-truck city cars, but although an elaborate test was made of the air-brake system as such, it was made on service runs which did not admit of heavy braking tests of the kind that could be made on experimental runs. Still it is well known that the order of magnitude of the braking distance is not widely different from that in the former case. Some interesting data were obtained as

* Report of Electric Railway Test Commission. McGraw Publishing Company, New York; 621 pages. Price, \$6.

to the actual amount of power required to operate the air-brake system. Two different arrangements were employed, one using stored air taken from a compression station, the other a motor compressor on the car itself. The car considered weighed 22.5 tons and operated at a schedule speed of about 9 m. p. h., including stops, of which there were in the various runs 4 to 6 per mile. In this service the power required for furnishing compressed air for the brakes totaled to a very small amount, less than 2 per cent of the entire power required for the car. Oddly enough, the advantage in power taken lay with the individual motor-compressor, which took just about 1 per cent of the total power demanded by the car, while the tank system took 1.75 per cent. In either case it is obvious that the actual power required is entirely trivial.

By far the most striking series of braking tests was that executed on a fast interurban car on the lines of the Indiana Union Traction Company. The car concerned weighed 39.66 tons, was driven by four No. 85 Westinghouse motors, and had a "straight" air-brake system with motor compressor. The braking tests were made at the regular working speeds of nearly 50 m. p. h., and are particularly important as giving definitive braking figures for the heavy and fast interurban cars now so widely used. The air pressures used were 20 lbs. to 40 lbs. per square inch.

In the general result it was found that the braking distance at the heavier pressures was normally nearly a thousand feet, but could be reduced to between 600 ft. and 700 ft. by letting the maximum deceleration rise to between 4 m. p. h. per sec. and 5 m. p. h. per sec. This amount would never be permissible save in an emergency stop, which might be made at a pinch in 500 ft. under the conditions taken. The proper braking distance without severely sharp deceleration seems to be, on good track, about 300 yards. The effect of slightly unfavorable grades and bad track can only be estimated, but it seems within bounds to say that under ordinary conditions, even assuming an emergency stop, a car like that used in these tests would take 200 yards to 250 yards in stopping from 50 m. p. h. In other words, the dangerous space is roughly an eighth of a mile. If, therefore, two fast interurban cars, running in opposite directions on a single track, get within a quarter of a mile of each other without reducing speed the chances for a collision are of the best. The obvious moral is that in any place, or at any time, when there is not a clearly visible quarter of a mile of clear track ahead a speed of anywhere around 50 m. p. h. is dangerous, and either track conditions or schedule should accordingly be modified. As the working speeds are increased there is, of course, more energy to be disposed of in braking, and also there was found in these tests the usual decrease in the effectiveness of the brake pressure at the higher speeds. Everything, in fact, points to the need of great caution in handling these fast interurban cars on single track. The writer is strongly of the opinion that the frequent serious accidents upon lines of the interurban class are very largely due to ignorance of the real braking conditions or to disregard of such knowledge concerning them as is at hand.

The second subject taken up by the Commission, of those specially noted, was that of the resistance of steel and iron sections and rails to alternating current of various frequencies. In view of the certainty of the extended use of alternating-current motors of various sorts for traction the behavior of the rails as conductors of alternating current rises to great importance. Two entirely different factors enter into the final determination—first, the inductance as such, and, second, the "skin effect," which, while insignificant in ordinary conductors, is no longer so when large iron or steel sections are considered. Experiments on the subject have, until the work

of the Commission, been rather few and of very small range. The conditions of flow of alternating currents in such conductors can, of course, be subjected to mathematical analysis, but with complicated sections of unknown permeability the expressions obtained are intricate approximations of no practical value.

Hence, the experiments here reported are of singular importance, constituting, in fact, a large proportion of the available knowledge of the subject. The study of lost power is of particular interest as showing the actual net effect of the skin phenomenon in increasing rail resistance. The whole matter really turns upon the permeability of the material for small magnetizing forces. With permeability at or near the values commonly taken in magnetic calculations, the skin resistance would become very serious indeed. In actual practice, not only are the values of the magnetizing force moderate, by reason of low-current density, but the character of the steel is such that the permeability is decidedly low under all working conditions. Nevertheless, the difference in actual watts lost with direct and with alternating current, even if low frequency is startlingly great, and especially so, of course, with the heavy rail section of which the ohmic resistance is very small.

A good idea of the general nature of the results may be had from those derived from a standard 80-lb. T-rail. With a current of 100 amps. per rail at 25, the ratio of impedance to d. c. resistance rose to 6.0. With a 56-lb. rail and the same current this ratio fell to 3.0. In each case the ratio increases with increase of current up to about 500 amps. per rail, after which the diminishing permeability begins to show its effects. At 500 amps. per rail the above figures become 9.8 and 6.2, respectively.

These results show very clearly the importance of low-current density in the rail in traction by alternating currents, adding another urgent reason for working a. c. traction systems at high voltage. At a few thousand volts on the working conductor the current in the rails falls, under ordinary conditions, so low that the impedance factor is very moderate, say between two and three. With the same traffic at 500 volts on the working conductor, the factor would be more than double, to say nothing of the increased ohmic loss.

If the current densities in the rails are high, the only way to keep the impedance factor within reasonable bounds is to lower the frequency, say, to 10 cycles or 15 cycles per second, and even this is comparatively ineffective. A study of the detailed curves in the report is exceedingly instructive to anyone interested in a. c. traction, and must inevitably lead to the conclusion that the strongest hold of a. c. traction is in work that permits of high trolley voltage. It is a pity that the Commission was unable to extend this research to the deep-girder rails used in heavy urban service. These, from the shape of the section, would tend to reduce the relative skin resistance, without, however, much chance of thus averting the effects of high-current density.

In the study of square and round sections, as might be expected, the impedance effects were very marked, indeed. Certainly, in dealing with any a. c. traction problem, diminished rail conductivity will have to be taken seriously into account. A comparative study of permeability in rails of different composition would be a very useful addition to the data of this report. It might be feasible to secure a rail steel of good mechanical properties which would give considerably lower values of the permeability for the practical magnetizing forces than either of the rails studied by the Commission, so that one could draw a track-rail specification with impedance in mind just as one now includes the specific resistance in a third rail.

MEETING OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

The May meeting of the Central Electric Railway Association held at the Algonquin Hotel, Dayton, May 23, was noteworthy from the fact that fully three-quarters of the 150 present came to the meeting on electric cars, furnishing a remarkable demonstration of the facilities offered by interurban roads for long-distance trips through the States of Ohio, Michigan and Indiana.

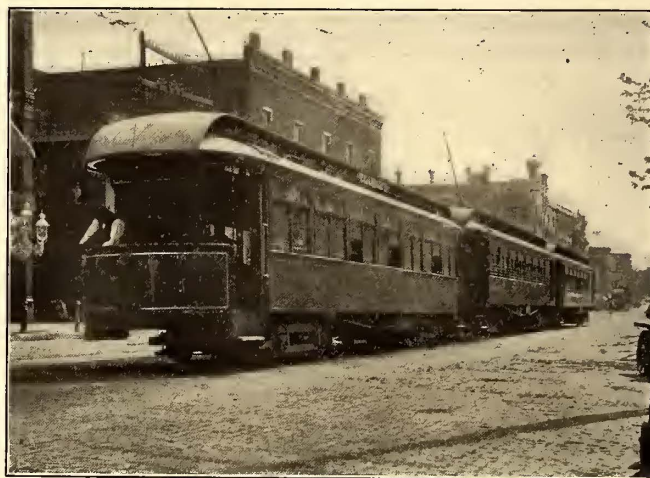
The Indianapolis, Columbus & Southern Traction Company operated a car from Columbus, Ind., to Dayton by way of Indianapolis, and brought members from the Southern portion of the State, and from the neighborhood of Indianapolis. The car made a remarkable run of 3 hours and 20 minutes over the 108 miles from Indianapolis to Dayton, a full hour less than the limited schedule over this route. The Dayton & Muncie Traction Company had a special car from Muncie, bringing delegates from Anderson, Marion, Muncie and other cities in that vicinity, while the Ft. Wayne & Wabash Valley sent its private car "Lawton" by way of Lima, covering the 145 miles in fast time. Michigan was represented by a large party who came from Detroit and vicinity on the Detroit United parlor car "Yolande," a distance of 222 miles. A number of ladies accompanied this party and they made the trip in easy stages, running to Lima, where they remained over night, going to Dayton in the morning. A party of Clevelanders left Cleveland on the morning limited of the Lake Shore Electric, going to Toledo, where they caught the noon limited on the new Toledo-Dayton service which was started last week, arriving at Dayton for supper, making the run of 282 miles in the remarkable time of less than 12 hours elapsed time. Members from as far east as Newark went by way of Columbus and Springfield on regular cars. The special cars from distant points in three States attracted a great deal of attention on the streets of Dayton and in the numerous cities and towns through which they passed and resulted in a great deal of excellent newspaper publicity for the interurbans of the district.

President E. C. Spring, who presided, announced a new plan in the appointment of local committees for taking care of matters of local interest with a view to keeping the permanent secretary in touch with the situation in all parts of the district, and to act as an advisory board to the executive committee. These local committees were announced as follows: Cleveland—J. O. Wilson, Cleveland & Southwestern Traction Company; F. W. Coen, Lake Shore Electric Railway; Charles Kenworthy, Electric Package Company. Toledo—E. E. Darrow, Toledo & Indiana; C. T. Chapman, Toledo & Western; Charles Hawley, Toledo, Port Clinton & Lakeside. Findlay—C. F. Smith, Toledo Urban & Interurban Railway; F. W. Adams, Toledo, Fostoria & Findlay; E. H. McKnight, Lake Erie, Bowling Green & Napoleon Railway. Lima—C. C. Collins, Western Ohio, and H. M. Dicke, Ft. Wayne, Van Wert & Lima Traction Company. Ft. Wayne, Ind.—C. F. Shelton, Ft. Wayne & Wabash Valley Traction Company; W. Fledder-Johann, Ft. Wayne & Springfield Railway Company. Indianapolis—F. D. Norvall, Indianapolis & Northwestern; A. A. Anderson, Indianapolis & Cincinnati; W. G. Irwin, Indianapolis, Columbus & Southern. Dayton—Valentine Winters, Dayton & Western; John F. Ohmer, Ohmer Fare Register Company. Columbus—George Whysall, Columbus, Delaware & Marion; L. C. Bradley, Scioto Valley Traction Company; L. C. Davies, Columbus, Buckeye Lake & Newark. Cincinnati—F. J. J. Sloat, Cincinnati Northern; C. E. Hooven, Cincinnati, Lawrenceburg & Aurora

Railway. Canton—J. R. Harrigan, Canton-Akron Railway. Youngstown—C. J. A. Paul, Mahoning & Shenango Valley Traction Company. Pennsylvania—J. W. Brown, West Penn Railway.

A. N. Neareamer was appointed a member of the transportation committee, representing the Columbus, Delaware & Marion Railway, Columbus, Ohio.

Mr. Spring said that while the office of the permanent secretary had accomplished an immense amount of good for the roads in the association, its usefulness was limited without the co-operation of the various members. The secretary has recently sent inquiries for information on various subjects about which inquiries have been made by members, but very few had taken the trouble to reply to these communications. He urged that various roads pay more attention to this matter and reply promptly to all requests for information and he said that where it is desired, the information would be kept strictly confidential. Without this co-operation the secretary's work will be handicapped and the results will be likely to prove incomplete and unsatisfactory. He also urged



THREE OF THE CONVENTION CARS: 222 MILES BY DETROIT UNITED; 145 MILES BY FORT WAYNE & WABASH VALLEY; 168 MILES BY INDIANAPOLIS, COLUMBUS & SOUTHERN

that the members make prompt remittances for assessments due for various funds. Thus far the association has met its obligations promptly and it has some money on hand, but recent consolidations of a number of properties have reduced the number of individual roads considerably, the managers of these properties claiming that the assessment should be for a single line instead of for the number of roads consolidated. This is likely to reduce the amount guaranteed for the secretary's office, and also for the interchangeable transportation bureau fund. It has been suggested that it would be more equitable to divide these funds on a basis of gross earnings or mileage, and this is a matter which will probably be taken up later.

Later in the day the supply men held a meeting and appointed a committee composed of John Ohmer, of the Ohmer Fare Register Company; Wm. Bloss, Buda Foundry & Machine Company, and C. Drake, of the Galena Oil Company, to formulate a plan whereby the supply men will make up the small amount required for the maintenance of the secretary's office the first year. The committee will send a circular letter to the various supply men who are represented in the association.

The constitution and by-laws of the Central Electric Association have been printed through the courtesy of the Pogue Printing Company, of Cincinnati, and are being distributed. The next meeting of the association will be held in September, probably at Indianapolis, and arrangements

will be made for an outing for the members who attend.

Secretary J. H. Merrill gave a brief outline of the work of the secretary's office since it was instituted March 1. The office maintains a mailing list of fifty-two companies in Ohio, twenty-six companies in Indiana, and forty-one companies in Michigan, to whom a total of 21,165 circulars have been issued. In addition to this, a total of about 1500 letters have been mailed in caring for the general correspondence. Thirty-four companies in the three States agreed to pay an assessment of \$50 each towards the maintenance of the secretary's office to June 1, 1906, all of which have responded promptly to the remittance with the exception of ten companies. The membership represents a total of 366, of which 152 are railroad men and 107 supply men. The payment of dues, especially by the railroad men, has not been as prompt as could be desired.

The Muncie & Portland Traction Company, which will open service May 30, between Muncie and Portland, Ind., has signed the interchangeable coupon ticket agreement. Inquiries have been received from wholesale houses in New York, Philadelphia, Boston, Buffalo, Cleveland, Chicago and other cities regarding the conditions of the interchangeable coupon book for the use of their traveling men, which indicates the growing popularity of this transportation. Members were asked to instruct their conductors to take up book No. 24,036, issued by the Muncie, Hartford & Ft. Wayne Traction Company, said to have been fraudulently used. A circular letter sent to the members of the interchangeable transportation agreement, asking them to signify their approval or disapproval of a plan to handle the accounting of these books in the office of the secretary, resulted in six companies with a mileage of 404 miles voting in the affirmative; fifteen companies representing 1120 miles voting in the negative, and ten companies representing 372 miles failing to make any response. In view of this vote the present practice of each company accounting for the interchangeable books and settling by balance will remain in force.

The Assistant Quarter-Master General, of Ohio, recently made application to the association for a uniform rate of 1 cent per mile and free transportation of baggage in consideration of the mobilization of the Ohio National Guard by means of the traction lines for the annual encampment this summer. The transportation committee to whom the matter was referred declined to accede to this request, but the official was urged to use the traction line for this purpose, emphasis being laid upon the already low rates being given by the electric roads.

The traffic committee held meetings on April 15, at Bowling Green, Ohio, May 12, resulting in the adoption of a uniform practice of lifting interchangeable coupon tickets within the limits of large cities where there are traffic agreements with city companies, for the handling of interline tickets in these cities, and for the checking of through baggage. Each road has handled these matters in its own way heretofore, resulting in some confusion. A standard form of passenger tariff is being prepared by the committee. A form of "loading platform permits" has been adopted by the committee and copies forwarded to the members.

The secretary's office compiled an outline of the bills passed by the recent Ohio Legislature relating to steam and electric roads, and copies of these will be forwarded to members on application.

The new law relating to the sprinkling of streets is regarded by many of the interurban roads as unconstitutional, as it is said to be class legislation, and it is not required in many of the franchise grants. Some of the companies are planning to test this law. On the other hand, some companies are offering to take the contract for sprinkling the whole of a

street on which their tracks are built. Upon request the secretary recently communicated with a large number of cities to secure the prices paid for sprinkling of improved and unimproved streets within the corporate limits of cities. The prices ranged from \$14.50 to \$15.50 per thousand square feet per season.

A plan for uniform practice of bonding employees has been suggested, but the number of replies has not been sufficient to warrant action.

The secretary's office is keeping in close touch with the plans of the American Street & Interurban Railway Association for its annual meeting at Columbus in October, and it is co-operating with that organization by forwarding its literature to the roads in this district.

ACCIDENT DATA

E. M. Hoover, of the Hoover-Holmes Information Bureau, of New York, addressed the morning session on the subject of his information bureau for protection against fraudulent and excessive accident claims. The company has been in existence for a number of years and it compiles data relating to accidents of all kinds, keeping its members informed as to duplicate accidents to the same individual. As evidence of the widespread prevalence of fake accidents, he stated that the first year the bureau started business, the number of duplicate accidents amounted to 5 per cent or 6 per cent of the claims reported, while at present nearly 33 per cent of the claims reported come from individuals who have had previous accidents, or, where there were two or more reports of the same accident. The association co-operates with both insurance companies and the transportation companies, having forty-six of the former and forty of the latter on its lists. The association has over one million reports of accidents filed by card system and carefully indexed so that information regarding any accident is quickly accessible, and these reports are now increasing at the rate of about 200,000 a year. He pointed out that the co-operation between the accident companies and the transportation companies was a valuable feature in their work. Accident fakers frequently try to work several companies for the same accident, although insurance companies are harder to beat than the transportation companies, because the former have a plainly stated contract providing for immediate notice of accident, certified statements, examinations and other protecting clauses. The transportation company has no such protection, as claims are frequently instituted months after accidents occur and witnesses are lost. He cited several instances where parties had brought claims against several transportation companies for the same "accident," and where the bureau had promptly revealed the true condition of affairs.

H. C. Moore, of the Pitman-Myers Company, Indianapolis, described the advantages of the company's "First Aid Box," a package containing gauzes, bandages, salve and antiseptic preparations for the treatment of wounded before a surgeon can be reached. The box also contains a booklet giving full instruction for first aid treatment by inexperienced hands. Such outfits are in use on a great many steam roads and have recently been adopted by a number of electric roads.

Y. M. C. A. WORK

E. L. Hamilton, railway secretary of the Young Men's Christian Association, of Chicago, reviewed the history of Young Men's Christian Association club work on steam railroads, which he said had been a most potent factor in promoting temperance and efficient service among steam railroad men. There was a time when train crews at the end of their runs frequented the saloons and cheap lodging houses where they were subject to intemperance and other undesirable influences. Of late years the steam roads have come to recognize the Young Men's Christian Association as a busi-

ness proposition favorable to their interest, and nearly every large steam road in the country has made liberal donations for the erection and maintenance of Young Men's Christian Association club houses. Usually these are located at the terminals, so that men after finishing their runs can congregate in a place where they are surrounded by elevating influences. In many of the branches there are restaurants, where the men can obtain meals at low cost, reading rooms, and numerous other amusement features, and many of them are provided with sleeping rooms where the men can obtain a comfortable bed at a nominal cost, thus keeping employees within call and giving them proper rest after long runs. This feature alone had been of tremendous benefit in creating a better feeling towards the company and insuring the best possible work from the men. Mr. Hamilton quoted from an address made by W. C. Brown, vice-president of the New York Central Railroad, at the opening of a railroad Young Men's Christian Association building at Collinwood, Ohio, a month ago, this building having been erected by the company at a cost of \$32,000. Mr. Brown said: "If a railroad officer seeking an excuse to decline to make the contribution of this character propounds the ancient interrogatory 'Am I my brother's keeper,' the reply should be emphatically in the affirmative. The railroad, which annually draws thousands of young men from the villages and farms to fill up its ranks depleted by age, accident and disease, owes something to this army of young men. Above all, they owe it to the public who daily place in the custody of these men their lives and property, to do everything within their power to make them the best and safest and most efficient men possible, and in doing this, in my opinion, no agency can be enlisted so adapted, so consecrated, and so successful in the work as the railroad branch of the Young Men's Christian Association."

Mr. Hamilton said that the railway branch of the Young Men's Christian Association had 212 club houses and 85,000 members. Formerly the railroads gave about 60 per cent towards the maintenance of these organizations and the men about 40 per cent, but of late years, due to the growing interest, the per cent has been reversed. Last year the companies paid about \$260,000 towards the support of branches, while the men themselves contributed \$340,000. This work has been extended to the street as well as interurban railways. Three years ago the Rochester Railway Company, of Rochester, N. Y., opened a Young Men's Christian Association branch, and after two years it opened a second. The Richmond Passenger & Power Company, of Richmond, Va., recently opened a fine building. At Memphis, Tenn., there is an organization with 615 members, while others are being talked of for various sections of the country. Mr. Hamilton said that the growth of the long-distance interurban service, which required men to remain away from home over night, should make it an incentive for interurban companies to pay more attention to this class of work. He said that C. D. Emmons, general manager of the Ft. Wayne & Wabash Valley, had recently been appointed a member of the State railway committee in Indiana, being one of the first traction men to become active in this work. Of the thirty-one interurban companies in Indiana, the headquarters of at least twenty of them are accessible to the railway branches in these cities. Mr. Hamilton said that his organization would be glad to cooperate with any of the traction managers that were interested in this work, with a view to supplying them with information and advice as to how to start and handle such organizations. The talk was illustrated by lantern views of a large number of fine club houses devoted to this work.

Henry N. Staats, manager of the Associated Railway & Light Insurance Companies, reviewed some of the recent

work of his mutual fire insurance companies, whose objects have been outlined in the columns of the *STREET RAILWAY JOURNAL* on several occasions. Two of his companies are ready to write business and have a large amount of insurance ready to sign up. Four of the old line insurance companies have agreed to take insurance at a low rate on sprinkled risks where the inspections are made after the rules laid down by the new companies, while several of the Eastern factory mutual companies have agreed to do the same. The American Railway Insurance Company, which is a stock company allied with the traction mutual companies, is planning to increase its capital stock from \$500,000 to \$1,000,000, which will enable it to take \$100,000 on any one piece of property instead of half that amount, the maximum heretofore.

AXLES

J. R. Replogle, superintendent of the Cambria Steel Company, presented a paper on "Axles for Interurban Cars." He divided his subject into four subheads: "Steel vs. Iron Axles," "Forged vs. Cold-Rolled Axles," "Broken Axles," and "Specifications." He said that experience of years had demonstrated that the steel axle was superior to the iron axle, not only on account of its greater power of resistance against shocks and vibrations in service, but on account of its better wearing qualities, the friction being less than in the iron axle, where lack of sufficient heat, presence of scale and other conditions often prevent perfect adhesion. Even a perfectly welded iron axle will not allow high polish and minimum amount of friction obtainable in the steel axle. While the art of steel making has grown more and more perfect, the material and skill for making good iron have retrograded, due largely to the difficulty of securing a good quality of scrap, that now available being composed of inferior iron, intermixed with pieces of steel, which produce irregular welds and irregularities in the finished axle. This permits torsional strains and friction to separate the fibres of the metal, finally resulting in the failure of the axle.

In tests made by the United States Government on wrought iron and .45 per cent carbon steel bars, 1 in. in diameter and 36 ins. long, loaded in the middle so that the fibre stress was 40,000 lbs per sq. in., and rotated at 1500 r. p. m., the former broke after 95,000 revolutions while the latter broke after 976,000 revolutions. To test the value of iron and steel axles and the effect of strains similar to those imposed by service, Mr. Wohler, chief engineer of the Prussian State Railway, constructed a machine for the purpose by which the bars were exposed to vibrating actions and repeated strains within adjustable limits. A bar placed in bearings was revolved and to one end was attached a spring, giving a constant downward pull, by which action the bar was bent down at the end. The breaking strain of the fibrous iron under these conditions was 22,400 lbs. per square inch; soft steel, 33,600 lbs. per square inch. In other tests the effect of repeated strains applied to the center of the axle in which the fibres in each section were strained in the same direction each time; the tension of each fibre varying from zero to the strain imposed, was that the fibrous iron broke at a tensile strain of 33,600 lbs. to 40,320 lbs. per square inch, and soft steel at 50,400 lbs. to 56,000 lbs. per square inch.

Walter E. Koch, a prominent engineer, in a recent paper on "Fifteen Years' Experience With Open-Hearth Steel," says that "statistics show in Great Britain that eight iron axles break to every one of steel, and it is astonishing that so many iron axles are still used in this progressive country."

Mr. Replogle said, that in the early days of steel axles the steel maker had difficulty in proving the superiority of his product, as there were numerous breakages for which he

could not account. This was found to be due to the fact, that while light hammers of perhaps 2000 lbs were sufficiently powerful to build iron bars probably 1 or 2 ins. thick into an axle about 5 ins. in diameter, it was inadequate for forging steel axles, as steel, not possessing the welding properties of iron, could not be made in the same manner. Instead, the process had to be reversed and the axle hammered down from a billet about twice the size of the finished forging. The hammer not being sufficiently powerful to penetrate though the mass did not give the axle the homogeneous structure essential for a forging subjected to heavy alternating stresses which a car axle undergoes in service. The end of the forging showed a deep concave, indicating that only the surface metal had expanded. It also showed an inclination to "pipe."

Heavier hammers were then installed. These brought about a distinct improvement, but still the forging did not give absolute satisfaction, and it was found that the heat treatment was largely responsible. The axle maker reasoned that as no two parts of the axle were subjected to the same temperature, internal strains set in. To relieve these internal strains, annealing was resorted to. By heating to a temperature slightly above the recalescent point, he eliminated all crystallization resultant from the cooling from the forging temperature of about 1800 degs. and a fine amorphous structure was obtained. While the ductility of the annealed forging was greatly increased it suffered a slight loss in elasticity. Realizing the importance of a high degree of elasticity in metal subjected to alternating tension and compression and often to torsional strains, the axle maker started on experiments to increase the elasticity. Oil tempering and toughening processes were tested with the following results: The elastic limit was increased to a marked degree; the percentage of elongation and reduction of area were greatly increased; a high degree of toughness was obtained; the steel changed from a crystalline to an amorphous state; internal stresses were eliminated, and uniformity of structure and strength were obtained.

The increase in elasticity is of the greatest possible benefit, because once the elastic limit of metal has been passed and the forging distorted it will not stand even minor loads. In wrought-iron forgings the elastic limit does not exceed 20,000 lbs. per square inch, which steel of .45 per cent carbon will show three times as much elasticity.

Cold-rolled axles have been extensively used for some years, but have not been found wholly satisfactory for heavy interurban or elevated service. The process of cold rolling is simply one in which the steel is stretched beyond its elastic limit to a point near the ultimate strength, the degree of stretch being indicated by the reduction of elongation. This introduces internal stresses which may result in failure under even normal condition. To advocate cold-rolled axles is about as consistent as to take a member off a bridge after stretching 25 per cent, cut it off, put it back and say it is superior to its former condition; or to take an engine shaft which has been twisted, straighten it and claim it is superior to its initial condition.

To determine the comparative merits of cold-rolled axles and "Coffin process" axles, tests were recently made, using axles 4 ins. in diameter, 6 ft. 9 ins. long in each case. The axles were tested under standard M. C. B. standard-drop testing machine 1640 lbs. weight falling 24 ft., striking the axles resting on supports 3 ft. center to center. The cold-rolled axle stood an average of fifteen blows with 7.75 deflection at first blow, as against an average of fifty blows with 7.63 deflection on the "Coffin process" axle.

Pieces were then cut from the outside of rounds, turned

down to cylinders 1 in. long and 1 in. square area in cross-section. These were tested in an abrasion machine and run without abrasive material on a hardened steel plate under a pressure of 100 lbs. per square inch. The cold-rolled axle wore to the extent of 33.9 grams and the forged-steel axle 17.5 grams, the resistance to wear closely following the physical tests.

Mr. Replogle said that in seventeen years' experience he could recall only seven of his company's steel axles broken in service, four of these being due to inferior design. He believed this record was due not only to the superior quality of steel used, but to the policy of thoroughly annealing all forgings. Examinations of broken axles found in various railway shops lead to the belief that failures were largely due to "fatigue of metal," or a gradual parting of the steel extending inward all around the piece, being due, undoubtedly, to the use of low-carbon steel having low elastic strength.

A marked characteristic of the fractured surface of a piece of metal broken from long continued alternating stresses, is that it never presents fibrous appearance in the fracture, but is more or less smooth, due to the fractured parts rubbing each other and having the appearance of an old break. This breaking slowly, a little at a time, is known as a "detailed fracture," and should not be confounded with a rupture produced in any other way.

Steel axles were first used on the Pennsylvania Railroad in 1875, and its early experiences were interesting. The maximum calculated fibre stress between the wheels was about 15,000 lbs. per square inch, and the maximum fibre stress in the journal was 6700 lbs per square inch. The steel in these axles was an open-hearth steel containing from .22 per cent to .28 per cent carbon and not over .04 per cent phosphorous, and with tensile strength of about 65,000 lbs. per square inch and an elongation in 2 ins. of over 25 per cent. So tough was this steel that one passenger-car axle was tested under the drop test with 67 blows without rupture. Some 300 of these axles were put in service, and in the course of two years the journals began to fail from detail fracture. The matter became serious, and a consultation was held as to how to meet the difficulty. There seemed but two ways of procedure, either to increase the size or to change the nature of the metal. Since an increase in size meant a redesign of all the parts, the latter alternative was chosen, and a metal of 80,000 lbs. tensile strength was substituted for the softer steel, no other changes being made. This completely cured the difficulty, and no case of breaking in detail in car axles is known to have occurred since that time, unless the metal was of a lower tensile strength than the figures given, or the axle was worn to limit, so that the maximum fibre stress was too high.

Another frequent cause of trouble is the failure to provide good fillets in the journals and back of wheel fit. This centralizes the strain at these points and frequently results disastrously.

Mr. Replogle recommended that all axles should be purchased subject to a chemical and physical test, as by this method only can the product of irresponsible manufacturers be eliminated, who have no facilities for doing high-grade work and who have failed to realize the heavy responsibility attached to the manufacture of axles for high-speed interurban service. The following chemical and physical property was recommended:

Carbon, .35 per cent to .50 per cent.

Manganese, not over .60 per cent.

Phosphorus, not over .05 per cent.

Sulphur, not over .06 per cent.

Elastic limit, not less than 50 per cent of tensile strength.

Ultimate strength, not less than 80,000 lbs. per square inch.

Elongation, not less than 20 per cent in two inches.

Reduction of area, not less than 40 per cent.

All axles should be thoroughly annealed in an annealing furnace, as by this method only is the true intrinsic strength of the steel represented. It would be beneficial, from the consumers' standpoint, to adopt a "maximum weight clause" compelling manufacturers to rough turn the axles to within $\frac{1}{8}$ in. of the finishing dimensions, thereby eliminating the necessity for the payment for probably 50 lbs. per axle of excess material, which also necessitates a vast amount of extra work at the finishing shop, subjecting the lathes to both roughing and finishing duties, which are detrimental to the best results in fitting. The name of the manufacturer and date of application should be plainly stamped on all axles, so that a complete record could be kept of its service.

F. J. J. Sloat, of the Cincinnati Northern Traction Company, said that at one time he bought a lot of fifty new axles, and after about two years of service they commenced to break. Within a few weeks practically every one of them had broken at about the same place and at practically the same mileage. Although they had had numerous broken axles, they never had a serious accident resulting from this cause, the wheels simply dropping between the tracks and bringing the car to a stop. He thought a broken axle much less dangerous than a broken wheel.

SEALING MILK CANS

Charles Kenworth, general manager of the Electric Package Company, operating on the Cleveland interurbans, discussed the advisability of sealing milk cans. His company handles about 1000 cans of milk per day and had never heard any complaints about milk or cream being stolen by the train crews, which he supposed was the reason for bringing up this subject. He thought that the odor of milk cans was so unpleasant that the men had no inclination to tamper with the contents. The farmers handle their own milk at cross-road stations, and it would probably be difficult to induce them to use any kind of a sealing device. He thought there would also be an objection to this plan on the part of the health authorities, who open cans and take out samples at frequent intervals. The company itself would also have an objection to the plan, as it desires to see whether the cans contain milk or cream, cream being charged for at a higher rate than milk, as the big creamery associations have a trick of extracting the water and condensing it and then turning the hose on the milk after they get it into the city, making it milk again.

MOTOR INSPECTION

A. A. Anderson, of the Indianapolis & Cincinnati Traction Company, opened the discussion on the subject "Inspecting Motors for Low Bearings." He thought that the best method depended upon the type of motor. Some motors have hand-holes in which a gage can be inserted, while others have peep-holes through which the condition of the bearing can be seen by the use of a light. As a rule, bearings do not receive enough attention and they are allowed to run until the bands are rubbed off and then the pieces get into the armature and make trouble. Frequent inspection was the only remedy he knew of.

C. N. Wilcoxson, Cleveland & Southwestern, agreed with Mr. Anderson that troubles with bearings could not be attributed to lack of ample means for making inspections, but they were due, as a rule, to inspections not being regular and systematic, and also to the bearings not being properly lubricated.

R. Palmer, of the General Electric Company, said that the only satisfactory method to avoid such troubles was to keep a record of mileage and not attempt to exceed a fair mileage.

C. Clark, of the Muncie, Hartford & Ft. Wayne, said that bearings on his road were inspected daily by the use of a gage, and they had had no trouble in two years.

TROLLEY EARS

F. Wickwire, of the Ohio Brass Company, spoke on the subject of "Trolley Ears," illustrating his talk with a large line of samples. He said that the quality of metal should be pre-eminent. Above all, trolley ears should not be made of scrap metal, as it was impossible to secure a uniform composition when scrap was used. There is a great difference of opinion as to the best sizes and shapes of ears for certain service. Of late the bronze ear has been growing in popularity. Bronze has great strength and toughness and at the same time has the ductility which permits it to be clinched and unclined and used over again. The galvanized clamp continues to be very popular. The short clamp is no longer used to any great extent, as the wires have a tendency to break near the ends. On round wire the most popular length for heavy interurban service is the 15-in. ear, of the clincher type and not soldered. The practice of soldering ears seems to be dying out, as it seems to injure the wire. For Fig 8 or grooved wire the popular length is 12 ins. When properly clinched, this gives no trouble without the use of solder.

L. J. Schlesinger, of the Muncie, Hartford & Ft. Wayne, said they used both clincher ears and clamps. Clincher ears were found very satisfactory where the trolley wire was kept fairly tight, but when pulling on a wire, the clincher ear was of some disadvantage. They used a mechanical clamp ear at splices. They use bronze soldered ears on curves and points of special strain.

TRANSPORTATION FOR EMPLOYEES

In introducing the subject of "Transportation for Employees," F. J. Sloat, of the Cincinnati Northern, said that his views had undergone a change of late. Instead of allowing men to ride on badge or card pass, he aimed to supply a form of transportation which gave a conductor a coupon in each case. Passes for section men are issued by the section foreman, who is provided with a punch and issues passes as they are needed, good for the day and certain trip only. Emergency crews are supplied by the despatchers in the same way. Other employees are given books containing 62 tickets, good for one month, in some cases limited to distance and in some others unlimited.

A. A. Anderson, Indianapolis & Cincinnati Company, said that all subordinate officers were supplied with card passes and the conductor takes a receipt and registers it as a ticket. Car service men must make written application to superintendent, and they are given trip passes with reasonable limits. Transportation to families of employees has been discontinued. Men sent out on business for the company are given employees tickets which contain space for name, date and limiting points.

C. N. Wilcoxson, Cleveland & Southwestern, thought that the matter of granting passes to employees depended a great deal upon local conditions. Where the headquarters are in small towns it is necessary to furnish more transportation than otherwise. Their higher officials and heads of departments are given books of coupons, good for rides between stations, punched on the back. Books are good for one year. In every case the cover of the old book must be returned before another can be secured. Train service men are given straw-board tickets similar to transfers on which limitations are punched. Section men are given books good between certain points but they are good only for the month, and the old cover must be turned in before another is issued. Section foremen are provided with unlimited tickets and punches, Shop and power house men have books of sixty

tickets. The tickets are large enough so that they can be signed in every case, and they are rung up as passes on the register. Train men are given almost unlimited transportation when they apply for it, but it has been found that as a rule they do not do much riding on days off. Wives of employees only are furnished trip passes within reasonable limits.

Mr. Anderson asked Mr. Wilcoxson if he knew the percentage of free riding on his road.

Mr. Wilcoxson replied that he did not, but that it was probably higher than on the majority of roads as the system is in six divisions and it is necessary to do a great deal of dead heading of train crews. On the other hand, transportation to other than employees is very limited.

Mr. Anderson said that on his line about 8 per cent of those riding were carried free. Wives of a few heads of departments and assistants are carried free, but not to families of employees in general.

Mr. Jordan, of the old Appleyard system, said that they formerly kept a close record of free riding, but it had been discontinued under the new management and the free transportation had been cut down considerably. Monthly passes are issued to some of the employees, while those whose duties call for regular riding are provided with books of five-cent coupons, and coupons are detached according to the distance. Wives of trainmen are supplied with free transportation, but it is not asked for very often.

H. A. Nicholl, of the Indiana Union Traction Company, said that free transportation aggregated about 5 per cent of the total traffic. Card passes have been eliminated. Books of 200 five-cent coupons are issued to the general officers and heads of departments and linemen, and coupons must be turned in to correspond with the length of ride. Some of the books are limited for use between certain stations. Covers must be turned in in every case. Free transportation to those outside the service has been cut down to the minimum.

E. C. Spring, of the Dayton, Covington & Piqua Traction Company, said that their headquarters was 17 miles from Dayton in a small town where there were few stores and it was necessary to go to the city for many supplies. Wives of employees are furnished with all the transportation they want up to a limit of one trip a week. Many, however, do not use it once a month. He much preferred having the employees ask for the transportation, because he believed that Sam Brown would carry Bill Jones' wife any way, and vice-versa.

COMPUTING MILEAGE

Introducing the subject of the "Best Method of Computing Mileage," Mr. Wilcoxson, of the Cleveland & Southwestern, said that they had blanks containing the number of each car and the mileage was taken daily from the despatcher's sheet which shows the distances between points. Four copies of this report are made; one for the master mechanic, another for the executive office, the third for the general manager and the fourth is in a book kept by the despatcher. Mileages are entered daily for cars, bodies, trucks, wheels, axles.

Harrie Clegg, of the Dayton & Troy, said that this plan would be unsatisfactory and inaccurate on their road because they frequently change wheels and trucks from one car to another.

Mr. Wilcoxson said they did the same thing. That in addition to the ledger they kept a card index of the various parts and when they were changed from one car to another the card was simply transferred to the proper car with the date of change noted on it. All wearing parts mentioned are numbered separately and in series.

Mr. Evans, of the Indianapolis Traction & Terminal Company, thought that it was an easy matter to carry the car mileage record to the extreme. He thought that on city lines where they had short runs and frequent trippers, it was almost impossible to keep a record for each car. They secure a statement of the revenue miles for each month or week by adding up the number of regular trips for each line and adding the extras and deducting the cars delayed or taken out. By dividing by the number of days they secured the approximate mileage for any period.

Mr. Fitzgerald, of the Cincinnati Traction Company, said that they kept the totals in a similar manner. On trolley wheels they take the total number of car miles and multiply it by two (they have the double trolley system) and divide by the wheels given out, of which they have a record. He thought that to secure the actual figures would mean an immense amount of clerical work which would require special men as the average car house men were not capable of handling the matter.

Mr. Jordan, of the Columbus, London & Springfield, said that he formerly was record clerk on a city line having 100 cars, and figured accurate mileage on every truck, car body and set of wheels.

Mr. Anderson, of the Indianapolis & Cincinnati Traction Company, said that they kept mileage on trucks, bearings, wheels and car bodies, using the train sheet of the mileage and the master mechanic's reports for changes of parts.

Mr. Mitten, of the Indiana Union Traction Company, said they did the same thing and entered the mileages on individual car sheets, truck sheets, wheel sheets, etc.

Mr. Evans stated that he was on the committee for standardization of the national association, and he asked various members to be sure and furnish all desired information to Secretary Swenson, of the National Association, who would send out blanks. The topics for consideration are of special importance to interurban roads and are as follows: "Brake-Shoes," "Wheel Flanges and Treads," "Journal Boxes and Bearings," and "Standard Sections of Rails."

BAGGAGE REGULATIONS

The traffic men of a number of roads in Ohio, Michigan and Indiana held an informal conference during the Dayton meeting, and discussed the subject of free checking of baggage. The sentiment in favor of eliminating all charge for the handling of baggage, especially on interline trips, is gaining ground in Ohio and Indiana, especially in the latter State, due to the recent passage of the 2-cent fare bill on steam roads, which renders it necessary for the traction lines to make certain concessions in order to keep their rate below those of the steam roads. The traction rates in Michigan, however, have always been considerably lower than those in Ohio and Indiana, the average rate being only 1.4 cents per mile. Under these circumstances Michigan roads were unwilling to make this further concession, although on trips over two or more lines they were willing to confine the charge to one collection of 25 cents. No action was taken in the matter, but, as intimated, there is a growing sentiment in favor of cutting out the baggage charge altogether. Some of the roads have recently increased the limit from 100 lbs. to 150 lbs. for 25 cents.

EXHIBIT NOTES

Several manufacturers of street railway material had exhibitions of new devices at the Dayton meeting of the Central Electric Railway Association.

The W. R. Garton Company, Chicago, showed a line of its supplies and porcelain insulators. A sample of a large insulator designed to handle 100,000 volts of the type adopted

by the Hudson River Power Company, and said to be the largest insulator ever built, attracted a great deal of attention.

The Garton-Daniels Company, of Keokuk, Ia., showed a new automotoneer, an improvement on its well-known device for limiting the speed of feeding the controller by the motorman.

The Electric Shade Light Company, of Lima, Ohio, showed a headlight shade for screening an arc lamp while on city streets. It consists of a simple roller curtain placed back of the glass where it is protected against the weather. The shade is operated by a string leading to the motorman's cab, so that it is not necessary for the motorman to stop the car or reach outside to dim the lamp. The company is also bringing out an adjustable headlight which swings on the dash, following the movements of the truck, thus permitting the rays of light to follow the curves.

The Cary Inventions Company, of Chicago, showed the Cary automatic car and train pipe coupling, by the use of which the air brake pipes are automatically coupled at the same time as the car. The samples shown were the same as those in use on the Aurora, Elgin & Chicago Railway.

ENTERTAINMENT AT LIMA

The delegates from Fort Wayne and Detroit, who traveled in special cars to the meeting of the Central Electric Railway Association, stopped in Lima over night and were entertained at the Lima Club by Hon. Walter B. Ritchie, a prominent politician and general counsel for the Lake Erie & Western Railroad (steam). In an informal address he congratulated the electric railway managers upon the splendid development of electric railway interests, and appreciated the growing tendency on the part of the steam and electric lines to co-operate and work together. He said that the steam roads were becoming reconciled to the fact that the electric lines were entitled to the local passenger traffic and to the local package freight business, but he said that in attempting to handle heavy carload freight in trains the electric lines were going outside of their province. He said that not only would the steam roads resent the attempt at usurping business which they believed to be their own, but the cities and towns would cry out against freight being hauled through the streets. He gave the electric lines which are attempting this class of traffic eighteen months in which to discover that they were not only not equipped to handle carload freight, but that it would be a losing proposition financially.

ELECTRICAL ENGINEERING AND RAILWAY LABORATORIES AT WORCESTER POLYTECHNIC INSTITUTE

The board of trustees of the Worcester Polytechnic Institute has just awarded the contract for the erection of a new electrical engineering building which upon completion will house the largest and most extensive electrical engineering and electric railway engineering laboratories to be found in any college in the world. The building itself will cost about \$125,000, and it is expected that its construction will have progressed to a point where the most of the laboratories will be available early in the next college year. It will be constructed of red brick, with darker red brick and brownstone trimmings and a roof of light-green slate. The laboratories have been planned by the members of the electrical engineering department of the institute.

Besides recitation rooms, auditorium, library and general laboratory there will be a telephone laboratory and electric railway laboratory. The general laboratory will have a length

of 200 ft. and a width of 55 ft., and, with the three galleries, will have a floor area of 19,400 sq. ft. and volume of about 400,000 cu. ft. This laboratory is to be served by a 10-ton electric traveling crane covering the entire central portion of the laboratory between the galleries. Upon the second or upper floor of the building will be located, in the west wing, a large high-potential and insulating laboratory, where are located the high-potential transformers, permitting the use of voltage of any desired frequency and potential up to 750,000 volts, for the study of the various problems of long-distance high-potential power transmission, and the dielectric and electrostatic phenomena of insulating and other material.

Referring again to the general laboratory, the galleries will be designed to accommodate the lighter and accessory laboratory equipment, such as the switch signal, air brake and controller apparatus for the electric railway work, the arc lighting apparatus, transformers, and all other equipments not having heavy rotating or reciprocating parts. These galleries are to be served by 2-ton trolley hoists, covering their entire length, the trolleys being arranged so that a load may be transferred from the traveling crane, covering the main floor to the trolley hoists covering the galleries. On the main floor there will be five generators of from 30 kw to 60 kw capacity. Each will be directly connected to induction motors receiving power from the Institute service power plant, which is located in another building on the campus. These generators will comprise 110-volt and 500-volt direct-current machines, and single, two and three-phase alternators. There will also be a 300-hp, two-phase, 60-cycle synchronous motor, driving a double-current generator, delivering 500 volts direct current, or 350 volts single-phase, 25-cycle alternating current. This machine will supply power for railway experimental and testing purposes.

Two tracks, connecting with the tracks of the local railway company, and in that way with the suburban and interurban railways of New England, are to enter the building at the west end. Both of these tracks are covered by the traveling crane, and one, the inspection track, is for its entire length over a pit, from which work may be done on the trucks, brakes or motors. The second track will enter a testing plant, where the car under test is supported on 36-in. wheels, the tires of which are of the same section as the top of a No. 100 A. S. C. E. rail. These supporting wheels will be carried to a standard gage on axles which revolve in bearings carried by pedestals which can be moved to accommodate cars of any truck and wheel base, up to a maximum of 48 ft. between front and rear wheels. Generators mounted on the supporting pedestals and geared to the support axles will provide a load, as well as keep the rotation of the axles synchronous with one another.

On each supporting axle will be mounted a fly-wheel the weight of which is capable of variation to suit the weight of the particular car under test, so that in acceleration or retardation the inertia due to the weight of a moving car will be faithfully imitated, and all of the actions of the equipment from the start, through acceleration, constant speed running, coasting and braking to a stop may be studied while the car body itself remains stationary in the laboratory. The effects due to wind resistance and grades will be obtained by means of varying the loads on the generators geared to the supporting axles. The draw-bar pull will be measured by a traction dynamometer.

As a part of the railway laboratory equipment, the Institute will own a double-truck four-motor car of the high-speed interurban type. Exteriorly, this car will greatly resemble an ordinary interurban car, but instead of being equipped with seats for passengers, the interior will contain special

recording apparatus for automatically registering speed, distance, voltage, current, etc., whether operating on the laboratory testing stand or on lines of an electric railway. The car will also be fitted for making tests of bonds, feeder losses and other physical determinations of the track and electrical systems passed over.

As the testing stand will be arranged to accommodate any electric car, and the test car can operate on any standard-gage track, the connection of this laboratory with any of the New England railways by means of the tracks of the Worcester local street railway should be of quite a practical advantage to these railways, as well as providing unexcelled facilities for instruction.

Besides the equipment of motors, controlling, lighting, heating and braking apparatus permanently mounted on the test car, various other makes and systems of such apparatus, as well as signaling apparatus and overhead and third rail and track material will form parts of the laboratory equipment, so that tests may be made on various systems under various conditions of service. A system of wires and pipes will enable the test car to be operated, while on the test stand, by any of the control or air-brake systems outside of the car, if desired.

DISCUSSION ON THE FIRE PROTECTION OF CAR HOUSES

At the annual convention of the National Fire Protection Association, held in Chicago, May 22, 23 and 24, the report on car houses, which appears in the *STREET RAILWAY JOURNAL* for May 12, was considered in detail before being adopted by the convention. The discussion in part related to the wording of the different paragraphs, thickness of walls, and other details, but the greater portion of the discussion dealt with the installation of sprinkler systems. A question was raised as to whether or not it was preferable to follow the wording of the National Code, and allow parapets of division walls to extend from 3 ft. to 5 ft. above the roofs rather than not less than 5 ft., as the paragraph under section I. (b) required. On this point Convers Goddard stated that the car-house committee felt that the extra height of these parapets should be required, in view of the fact that car houses were filled with combustible material. On a suggestion from H. A. Fiske, the word "sliding" was inserted in that paragraph relating to automatic closing fire doors under Section I., in order to prevent the installation of folding or other forms of doors. The word "wall" was substituted for "opening" in the same paragraph in that sentence relating to the position of doors.

Chairman C. H. Patton, of the committee on car houses, stated that paragraph (b), under Section 4, relating to roofs and roof supports, had been revised so as to require all roof girders to be covered on sides with 4 ins. of fire resisting material, and on top and bottom with 2 ins. of fire resisting material, instead of requiring 4 ins. on all sides. The committee had also added a note to this section, requiring all necessary tie-rods, templets, etc., to be, in quality and design, in accordance with the requirements of the National Board of Fire Underwriters.

H. A. Fiske thought Section 9, relating to pits, should state definitely the requirements for the cut-off walls between pits, and the committee was instructed to add a clause specifying the character of these cut-offs.

E. T. Cairns objected to Section 1, under sprinkler requirements, in that it permitted ceiling curtains to be of 1-in. tongued and grooved boards. He thought nothing but non-combustible curtains should be permitted. However, the section, by vote, was allowed to stand as printed.

Regarding the height of aisle sprinklers, H. N. Staats, of the committee, in response to a suggestion to place these sprinklers opposite transom windows, stated that one objection to placing them at this height was that these windows were often of heavy plate or wire glass, and were not easily broken. A further objection was that the depth of the windows was so small as to prevent a large amount of water from the sprinklers entering the interior of the car through them. He said better results were obtained when the sprinklers were from 4 ins. to 6 ins. from the sides of the car, and about 4 ins. below the top of the car window.

J. E. Curtis thought the minimum size of pipe in aisle lines should be 1¼ ins. This suggestion was based on the fact that it was often quite difficult to support the pipe at close enough intervals and the increased size of pipe would add to the rigidity. The convention, however, decided to allow the wording of the report permitting 1-in. pipe to stand.

Mr. Fiske thought paragraph (c), under Section 2, relating to aisle sprinklers, should be modified so as not to compel the installation of two lines of aisle sprinklers, where the distance between the sides of cars on adjacent tracks was more than 4 ft. Even with cars 6 ft. distant from each other, he did not believe that the fire would get from one line to the next with but one line of aisle sprinklers.

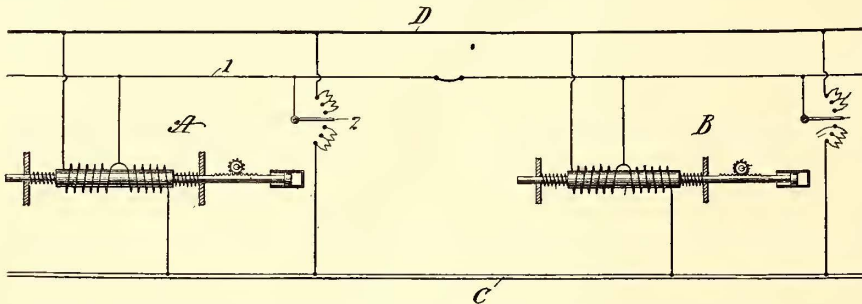
In reply to Mr. Fiske, Mr. Cairns stated that, in actual experiments, best results were gotten with the sprinklers up close to the car. When removed a short distance a current of cold air passed up between the side of the car and the sprinklers, and prevented the latter from opening. Mr. Fiske explained that he had no thought of putting the sprinklers half way between cars, but his idea was that one line of sprinklers placed up close to the bodies should take care of one line of cars. Albert Blauvelt, a member of the committee, said he hoped the report would not be changed regarding two lines of sprinklers. The second line of aisle sprinklers did not add much expense. In the Cleveland experiments he remembered that, although one line of sprinklers put out the fire, it was done at a very close margin, as the paint on other cars was blistered. This blistering would not have occurred with two aisle lines. On a motion of H. Bennett, the section under discussion was referred to the committee for further consideration.

The question of shields for aisle sprinklers was the subject of considerable discussion. Mr. Staats thought that these shields complicated the sprinkler system. It was stated that there had been several tests in which the overhead sprinklers opened before the side sprinklers, and that these latter were then prevented from opening because of the water falling upon them. After considerable discussion in which widely varying opinions were expressed, the convention, on a vote, referred the paragraph relating to shields to the committee for further consideration.

Another point which was discussed at length was the placing of aisle and overhead sprinklers on separate supply systems. The cost was an argument against equipping them in this manner, while the fact that one system would be in commission when repairs were being made on the other was urged in favor of so doing. It was finally voted that the report be changed to state that it was preferable to place the two lines of sprinklers on separate dry pipe systems. Afterwards the report as a whole, with the recommendations suggested, was accepted by the convention. The committee was also requested to draw up a standard set of rules for reinforced concrete car houses, based on the standard for that construction in the building code of the National Board of Fire Underwriters.

SINGLE-WIRE MULTIPLE-UNIT SYSTEM

An ingenious method of operating a multiple-unit train by a single-train wire was patented last week by H. McL. Harding and Charles M. Martin, of New York. As is well known, all previous multiple-unit systems have required two or more train wires, and in some cases the connecting cable had to be manufactured with a large number of conductors. The tendency towards high voltages suggested to the inventors the desirability of reducing the number of pilot wires, and this



WIRING DIAGRAM OF MULTIPLE-UNIT SYSTEM USING A SINGLE-TRAIN WIRE

has finally been accomplished by their reduction to a single wire. The method of accomplishing the result is shown by the accompanying engraving, in which D is the third rail, or trolley wire; B is the motor car; A is the second car in the train; C is the return circuit, and τ is the pilot wire. Each car is supplied with one or more solenoids differentially wound and with the middle point of the winding connected with the pilot wire. The master controller is at 2, and consists of a switch with resistances, so that the middle point of the solenoid winding can be connected either to trolley voltage or ground. The operation of the system will then be easily understood.

When the master controller switch is at zero position, current flows through the differential winding from the trolley voltage to ground and produces no effect on the solenoid. When the pilot wire is connected to the trolley voltage, the left half portion of the solenoid winding on each car is out of circuit and the solenoid plunger is thrown forward. When the master controller switch is connected with ground, the right hand side of the differential solenoid winding is out of circuit and the plunger is thrown backward. When the master controller is shifted to the zero position, the plunger returns to its original position.

In the accompanying illustration is illustrated a method of operating the car controllers from the solenoid plunger by means of a rack and pinion, and of regulating the throw of the plunger by the dash-pot, and by varying the resistance at the master controller. It is stated in the patent, however, that this is simply one possible method, and the claims cover the method of controlling any kind of motor circuit on the car and securing forward, stop, reverse or any intermediate condition of the motors by changing the potential of the single pilot wire.

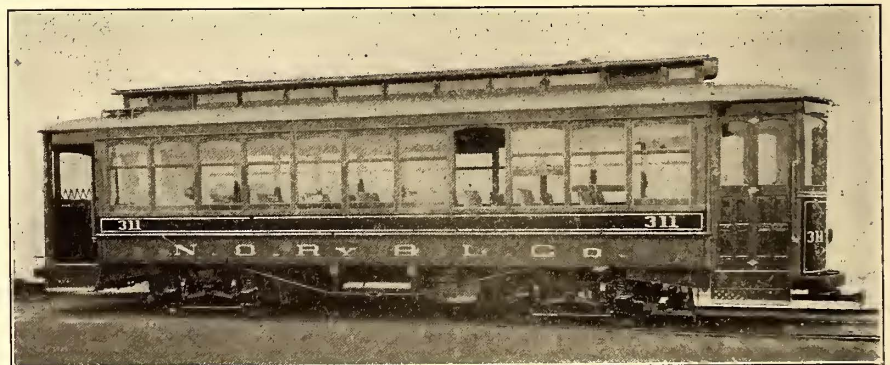
According to an announcement made in Boston, the Boston Suburban Street Railway Company is to put in operation between South Framingham and Worcester, as an experiment, a combination car with a smoking compartment, the first of the kind in eastern Massachusetts.

NEW EQUIPMENT FOR THE NEW ORLEANS RAILWAY & LIGHT COMPANY

The New Orleans Railway & Light Company has recently received from the American Car Company twenty-five groveless-post, semi-convertible cars built under Brill patents with 30-ft. 8-in. bodies and mounted on Brill 27-G trucks; also twenty single truck closed cars measuring 20 ft. 8 ins. over the bodies. Both types are vestibuled. The New Orleans Railway & Light Company's system has a trackage of 185 miles, embracing twenty-seven different routes, among them being four belt lines. The company operates all of the electric lines and controls all the electric and gas lighting business in the city, and operates on an average 350 cars. The roadbed and tracks in the central portion of the city have lately been entirely relaid, and the company is spending upwards of two and a half millions of dollars in improvements and extensions. The company's lines radiate to every part of the city, and the excellent street railway facilities given

have been a great factor in the development of the city. New Orleans has a population of 350,000 and is rapidly growing. In addition to Audubon, City and Athletic Parks, all of which are reached by the lines of the street railway company, and the numerous squares which are in the residence section, New Orleans is well supplied with open air resorts, those situated on Lake Pontchartrain being the most popular. Along the gulf coast, within easy access, are a number of popular resorts, where fine fishing and boating attract many visitors.

The single-truck cars have transverse seats with a capacity of twenty-eight passengers per car. They are finished in mahogany with ceilings of maple veneer. Folding gates as well as folding doors close the vestibule entrances. The win-



DOUBLE-TRUCK CAR FOR THE NEW ORLEANS RAILWAY & LIGHT COMPANY

dow sashes drop into pockets in the sides and the small upper sashes are stationary. The following are the principal dimensions: Length over the bodies, 20 ft. 8 ins., and over the vestibules, 29 ft. 4 ins.; width over the sills, including panels, 7 ft. 7½ ins., and over the posts at belt, 8 ft.; sweep of the posts, 25½ ins.; centers of posts, 2 ft. 10¾ ins.; height from the floor to ceiling, 8 ft. 7⁄8 in.; from the track to the under side of the sills, 2 ft. 5½ ins.; and from the under side of the sills over the trolley board, 9 ft. 2½ ins.; from the track to the platform step, 13¼ ins., and from the step to the platform, 13¼ ins. The side sills are 3¾ ins. x 7 ins., and the end sills 3¾ ins. x 6 ins.; thickness of the corner posts, 4½ ins., and the side posts 1¾ ins. The seats are 33 ins. long, and the aisles 21 ins. wide. The truck-wheel base is 7 ft. 7 ins., and the trucks are fitted with 33-in. wheels and 4-in.

axles. Two 40-hp motors are used per car. The weight of the car and the truck without the motors is 14,000 lbs.

The double-truck, grooveless-post, semi-convertible cars seat forty-four passengers each, the seats being of Brill manufacture. The illustration shows one of the windows entirely open, with the sashes in the roof pocket and two of the windows raised at different heights. Five window lock stops are provided in the posts, so that the sashes may be held at any height desired. Stationary ventilators are used at the sides of each end of the monitor deck to permit a current of air to circulate through the upper part of the car when the ventilator sashes are closed. The bottom framing is unusually substantial and includes 12-in. x 3/8-in. sill plates and under trusses with king posts. The outside platform timbers are reinforced with angle-iron, and a pair of angle-irons, offset for the purpose, support the center of the platforms and extend well back of the body posts. The bronze trimmings of the



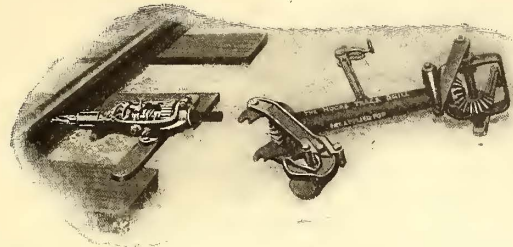
SINGLE-TRUCK CAR FOR THE NEW ORLEANS RAILWAY & LIGHT COMPANY

car throughout are nickel-plated, including corner grab handles on the seat backs. The interiors are finished in cherry, with three-ply poplar veneer ceilings painted robin-egg blue and decorated with gold. The lights are placed in the center of the deck in clusters of five and inclosed in frosted glass bulbs. The dimensions are as follows: Length of the car over the end panels, 30 ft. 8 ins., and over the crown pieces, 40 ft. 8 ins.; width over the sills, including the panels, 7 ft. 11 1/2 ins.; width of the posts at the belt, 8 ft. 2 ins.; sweep of the posts, 1 3/4 ins.; centers of the posts, 2 ft. 8 ins.; height from the floor to the ceiling, 8 ft. 5 1/2 ins.; from the track to the under side of the sills, 2 ft. 8 5/8 ins.; from the under side of the sills over the trolley board, 9 ft. 5 1/2 ins.; from the track to the platform step, 16 7/8 ins. The side sills are 4 ins. x 7 3/4 ins.; end sills, 5 1/4 ins. x 6 7/8 ins.; thickness of the corner posts, 3 3/4 ins., and the side posts, 3 1/4 ins. The seats are 36 ins. long, and the width of the aisle is 22 ins. The truck wheel base is 4 ft. 6 ins.; wheel diameter, 33 ins.; axle diameter, 4 1/2 ins. Four 50-hp motors are used per car. The weight of the car and the trucks without the motors is 27,000 lbs.

DRILL FOR TRACK WORK

To meet the demand for a rail-drilling machine designed for heavy and severe work, the Kalamazoo Railway Supply Company, of Kalamazoo, Mich., has brought out the Moore track drill, which possesses a number of commendable features. This drill was especially designed for use in yards and on busy lines without interrupting traffic. It is arranged to be placed between the rails, and the upright and cranks can be quickly and easily detached, leaving the lower parts lying below the top of the rail to allow cars or trains to pass. The working parts can then be re-attached and work resumed with very slight delay. This is a convenience which will be appreciated by track men.

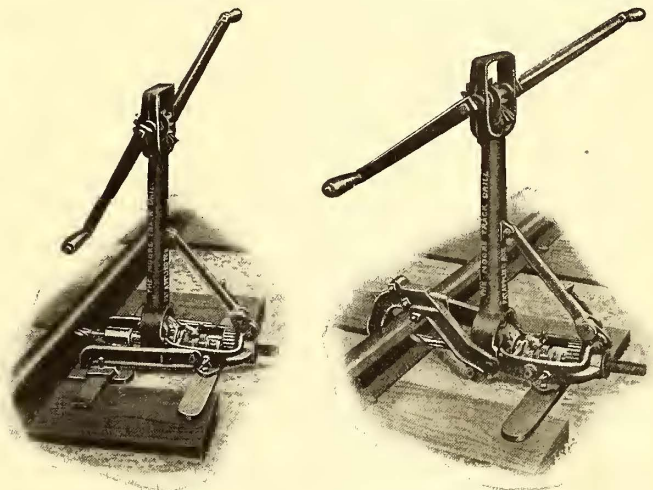
The drill has variable feed which can be adjusted to meet any requirement, as to size of drill and degree of hardness or softness of rail. It will be found especially convenient for reaming in bonding work, etc. By throwing the feed mechanism out of gear, the drill bit can be quickly fed up to or returned from the work. The under clutch is a new feature, which can



DRILL WITH OVER-CLUTCH ATTACHMENT, SHOWING UPPER PARTS DETACHED FOR PASSING TRAINS

be attached to the rail very quickly without digging under the rail. The drill can be equipped with either under or over clutch, or both as desired. Ball thrust bearings are used on spindle instead of friction washers, thus reducing friction to a minimum.

The machine is offered in two sizes, size No. 1, weighing 60



DRILL WITH UNDER-CLUTCH ATTACHMENT

DRILL WITH HOOK OR OVER-CLUTCH ATTACHMENT

lbs., designed for drilling holes 1 in. and smaller, but having sufficient power to drill holes 1 1/8 ins. and 1 1/4 ins. in diameter; and size No. 2, weighing 100 lbs., recommended for continuous heavy work and designed for drilling holes 1 1/8 ins. and 1 1/4 ins. in diameter. The accompanying engravings make clear the various details of the device.

EXCURSION CAR SERVICE ON AN IOWA INTERURBAN

The Inter-Urban Railway Company, of Des Moines, Ia., has inaugurated somewhat of a novelty in renting out special excursion or observation trolley cars. A special car named the "Iowa" was recently built for this service. It is 46 ft. in length, and in addition to kitchen, lavatory and motorman's cab, contains an observation room about 8 ft. long, and a dining room several feet longer. An observation platform on the rear is 5 ft. long and is surrounded by an ornamental brass railing. The company has issued a booklet descriptive of the car, and giving several reproductions of the interior arrangements. Other views given in the booklet are intended to give the reader an idea of the attractive features along the line of the Inter-Urban railway. The reading matter is got-

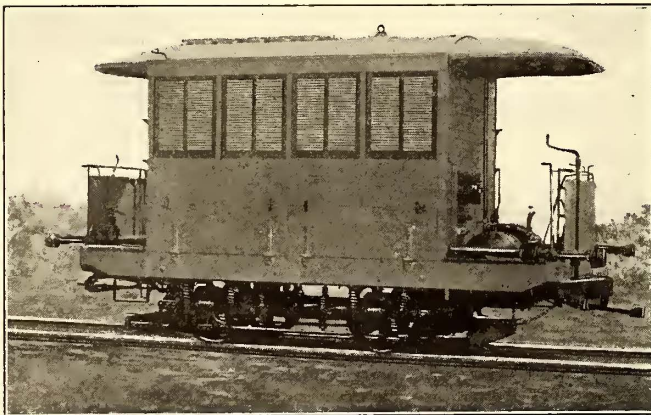
ten up in such a manner as to incite one who has never been over the line to make the trip for no other purpose than to view the scenery. On the Beaver Valley division, the road passes over the Des Moines River twice and continues for quite a distance along the bank of the river, and the scenery along this portion of the line is a series of attractive views, with the river in the foreground.

The special car "Iowa" can be rented with the services of a porter, waiter and chef, in addition to the regular trainmen. The company is also prepared to furnish provisions for meals at cost. When kitchen services and the services of the waiters is required, the total charge for the run of 90 miles is \$30. Without the service of the waiters and the use of the kitchen, the fee is \$25.

After June 1, the "Iowa" will make schedule trips each Wednesday and Sunday, alternating between Colfax and Granger. It will leave Des Moines at 5 o'clock in the evening, and will return to the city four hours later. Twenty people can be accommodated and the fare for the round trip, which includes supper enroute, will be \$2.

CENTRIFUGAL SPRINKLING CARS FOR MILAN

Among the shipments of sprinkling cars made by the J. G. Brill Company during the past spring were two of its patented centrifugal type to Milan, Italy, for use on the lines of the Commune di Milano. This type of sprinkler was introduced last year, and a brief description was published in the STREET RAILWAY JOURNAL for Sept. 2, 1905. The sprinklers



SPRINKLER EQUIPPED WITH CENTRIFUGAL PUMP

sent to Milan each consist of a centrifugal pump operated by a direct connected motor, both located on the platform at one end of the car. This pump draws the water from one pipe leading from the bottom of the tank and forces it into the sprinkling heads at each end of the car at a pressure sufficient to distribute the water over 50 ft. of roadway on each side of the track. As there is no air pressure, expensive double riveting and special bracing of the tank are not required, as only the weight of the water has to be taken into account. Another important advantage claimed for the centrifugal over other power sprinklers is that there are no wearing surfaces other than the shaft of the centrifugal pump, and, as no check valves, inlet valves, crank shafts and piston rods are used, the old and common difficulty of heated parts is obviated. Aside from the gate valves there are but two valves in the pipe, one on the suction pipe leading to the pump, and the other on the delivery pipe. The latter has a spring-pressure valve which opens automatically when the sprinkling heads are closed and thus prevents back pressure on the motor. The rheostat, which controls the motor, is conveniently placed against the end of the tank housing, as will be seen in the

illustration. The pump may be used for filling the tank as well as for expelling the water, and the connection for this purpose is arranged directly under the pump. Water may be easily lifted vertically 20 ft. and drawn from a considerable distance. The tank may be filled in the usual way by an inlet valve at the side of the piping or through the manhole. The special sprinkling heads control the amount and range of the water so that the water may be cut down to the thinnest volume, closed off entirely or directed upon any part of the roadway from a point between the rails to a distance of 50 ft. outside of the rail. If it is desirable not to change the adjustment of the sprinkling head, such as at street crossings, or when passing vehicles, the water may be instantly cut off by the gate valves. The tanks of the Milan cars have a capacity of 2480 gals., and measure 6 ft. 6 ins. x 10 ft. The car measures 16 ft. 6 ins. over the end sills, and without truck motors weighs about 16,000 lbs. The cars are mounted on Brill No. 7 trucks.

LOCOMOTIVE CRANES FOR RAILWAY COMPANIES

The use of locomotive cranes for coal handling has become quite common on a number of American steam railroads, but they can also be used on electric railways where large quantities of heavy freight are handled, for coaling power plants, wrecking purposes, etc. These machines are built for service on a standard gage track, which allows them to be hauled any



LOCOMOTIVE CRANE USED FOR ERECTING A SMOKESTACK

distance, and, if necessary, they can do the switching of a number of loaded freight cars at one time.

An interesting example of what can be done with a locomotive crane may be noted by referring to the accompanying illustration, which shows a No. 2 crane, made by the Browning Engineering Company, of Cleveland, placing a 4½-ton section on the top of a power-house smokestack at 25-ft. radius, making the total height of the complete stack 100 ft. The long-boom arrangement was fitted up especially for the occasion by fastening a heavy 40-ft. timber on the 65-ft. iron boom, allowing 10 ft. for lap.

LEGAL DEPARTMENT*

THREE-CORNERED FIGHTS

It has been often explained in this place that street cars, drivers of vehicles, equestrians and pedestrians in general have concurrent rights to use the public streets and the street crossings in a city. In a certain sense, a street railway company's right is preferential because of the rigid nature of the course which its cars must follow. Attention has been called, from time to time, to many cases illustrating the common right and also the incidental differences developed by the necessities of the situation, either in favor of or against a street railway company. Questions of difficulty arise when either a passenger or another person is injured by concurrent action of the operator of a street car and the driver of some other kind of vehicle. If the accident was due to negligence of both parties, they, or their masters, may be treated as joint tort-feasors and held jointly and severally liable. The street railway company and the owner of the colliding vehicle may be, and frequently are, sued in the same action, when there ensues a three-cornered fight in which each defendant will strive to show (1) that there was no negligence on the part of either defendant; (2) that if there was any negligence by either defendant, plaintiff's contributory negligence prevents a recovery; and (3) if there was any negligence on the part of defendants, it was solely the negligence of one of them, and that the other must be exonerated from liability.

A typical illustration is furnished by the case of *Denver City Tramway Company v. Norton*, recently on appeal before the U. S. Circuit Court of Appeals in the Eighth Circuit (141 Fed. 599). It was held that in a joint action against a street railway company and an omnibus company for personal injuries to a passenger, resulting from a collision at a street crossing, tried to a jury, with a verdict of not guilty as to the omnibus company and guilty as to the street railway company, no error committed by the Trial Court in favor of the omnibus company can avail the plaintiff in error (the street railway company) except in so far as it may have prejudiced the defense of the plaintiff in error in showing that the injury resulted from the negligence of the omnibus company without the concurring negligence of the street railway company.

The Appellate Court shows that the Trial Court had not adequately and justly charged the jury as to the duty of persons driving a tallyho coach with four horses to avoid a collision with an electric street car, saying in part:—

While the general rule in respect of the driver of a vehicle in approaching a railroad crossing, a known place of danger, to stop and listen where his view is cut off, may not generally apply to the use of such crossings in a city, yet, under the circumstances of this case, it was the driver's imperative duty, where, as his evidence tends to show, the heads of the lead horses would almost reach the railroad track before the car came into full view from his seat, to at least so slacken the speed and so slowly approach it that with his horses well in hand he could at once bring them to a standstill or turn them, in the event of the approach of a street car. On the contrary, his evidence is that he did not slacken the speed of the horses, but went in a jogging trot onto the track, so that it was impossible to have stopped the vehicle readily on the approach of the car. If he judged for himself that he could clear the track before the car reached him, and that was a reasonable judgment, how can the motorman be condemned if he, viewing the same situation, reached the same conclusion?

It is, of course, the rule that an error in favor of the party who escapes liability at the hands of the jury cannot, as such, be taken advantage of by the other defendant who is rendered liable. Nevertheless, in a large number of cases arising it will be found that the conduct of the party who was exonerated will bear quite materially upon the question of the legal responsibility of the other defendant against whom a verdict was given.

In three-cornered trials of this kind, evidence is sometimes offered which may be competent for or against one defendant but not for or against the other. As each party tries the case for his own benefit, testimony must be admitted, though it have but a particular application and force, and the jury are instructed to limit its consideration and weight to its strictly legal bearings. The fact that the jury may not be very successful in actually carrying out such instruction does not affect the rule of admissibility itself.

CHARTERS, ORDINANCES, FRANCHISES

FLORIDA.—Municipal Corporations—Separation of Races on Street Cars—Ordinance—Authority to Enact—Delegation of Authority—Penalties—Reasonableness.

1. Although the municipality of Jacksonville is not by its charter of incorporation, approved May 31, 1887, expressly authorized to provide by ordinance for the separation of the races on the street cars in such city, yet it has such authority in the general welfare clause of its said charter, enabling it to "pass all ordinances necessary for the health, convenience, and safety of the citizens, and to carry out the full intent and meaning of this act, and to accomplish the object of this incorporation." But even without such general welfare clause, or other express authorization, the design of such an ordinance being to safeguard the peace and good order of society within such city, its enactment and enforcement is within the incidental police powers of the city directly resulting from its incorporation into a municipality.

2. An ordinance of a city designed to separate the two races upon the street cars in such city, that requires the companies operating such cars to effect such separation in one or the other of two clearly defined modes: (1) By providing separate cars for the two races; or (2) by division of the car when the same car is assigned to the two races—leaving it discretionary with such carrier as to which one of the two prescribed modes of separation it will adopt, is not an unauthorized delegation of authority or discretion to such carriers.

3. Where the Legislature has defined the delegated powers, and prescribed with precision the penalties that may be imposed, a municipal ordinance within the powers granted, prescribing a penalty within the designated limit, cannot be set aside as unreasonable.

4. A passenger on a street car has no right to any particular seat in such car, nor to a seat in any particular end of such car, and a regulation of a street car company, acting under the provisions of a city ordinance designed to effect a separation of the races on such cars, by which the seats in the rear end of its cars are assigned to the use of passengers of the colored race and the seats in the front end of such cars to passengers of the white race, or vice versa, is not an unreasonable regulation, nor an unlawful discrimination between the races.—(*Patterson vs. Taylor*, 40 S. E. Rep., 493.)

GEORGIA.—Carriers—Separation of White and Colored Passengers—Mistake of Conductor.

If it be actionable per se, as against a street railway company, for its conductor, in endeavoring to comply with the statute requiring the separation of white and colored passengers, to negligently mistake a white passenger for a colored one, and in the presence and hearing of others inform him that he must be seated in the portion of the car set apart for negro passengers, it is essential to the maintenance of such an action that the petition allege the plaintiff to be a white man. The petition in the present case not containing such necessary allegation, it was properly dismissed on general demurrer.—(*Wolfe vs. Georgia Ry. & Electric Co.*, 53 S. E. Rep., 239.)

ILLINOIS.—Street Railroads—Franchises—Construction—Nature of Right—Mandamus—Petition—Necessary Allegations—Excuse for Delay—Construction—Limitation of Time.

1. Grants by the public, such as are given by a city to a street railway, authorizing it to build its road in the street, are to be construed most strongly against the grantee.

2. A grant to a street railway, authorizing it to lay its tracks and operate its road in the street, is a mere license, to be exercised upon the conditions named in the grant.

3. Where a street railroad is authorized by ordinance to lay its tracks in the streets of a city within a certain time, and that time has expired, and it seeks by writ of mandamus to enforce the rights conferred on it by the ordinance, it must allege such a state of facts as excuses the delay in not building its road within the time specified.

* Conducted by Wilbur Larremore, of the New York Bar, 132 Nassau Street, New York, to whom all correspondence concerning this department should be addressed.

4. Where an ordinance authorizing the construction of a street railroad required the road to be built within a specified time, but provided that the time of any delay caused by an injunction should not be computed as a part of the time limited, the failure of the railroad to build a certain part of its line within the time limited was not excused by the pendency of an injunction restraining it from building a small and relatively unimportant connecting line situated several miles from the portion of the road in question, in the absence of anything to show that the portion of the road covered by the injunction was connected with the rest of the system in such a way as to make it undesirable or inconvenient to build one without the other.—(Blocki vs. People ex rel. South Chicago City Ry. Co., 77 N. E. Rep., 172.)

ILLINOIS.—Appearance—General Appearance—What Constitutes—Effect—Eminent Domain—Condemnation Proceedings—Pleading—Jurisdictional Allegations—Pleading—Plea to the Jurisdiction—Appeal—Presumption—Propriety of Court's Action—Eminent Domain—Condemnation Proceedings—Petition—Inclusion of Separate Tracts—Right to Separate Trials—Evidence—Similar Transactions—Value—View by Jury—Consideration—Review of Facts—Conclusiveness of Verdict—Record—Matters to be Shown—Party Requesting Instructions—Exceptions, Bill of—Construction—Appeal—Abandonment of Errors—Failure to Argue.

1. Where a property owner appeared in condemnation proceedings and moved for a separate jury trial without limiting his appearance, he thereby subjected himself personally to the jurisdiction of the court, and could not deprive the court of the jurisdiction so conferred by afterwards entering a special appearance and filing a so-called plea to the jurisdiction.

2. Failure of the petition in condemnation proceedings to allege that petitioner has located its line of railroad over the strip sought to be condemned does not deprive the county court of jurisdiction to entertain the petition; but the court may, under the express provisions of the eminent domain act, permit the petition to be amended, and thereby supply the defect.

3. After motion to dismiss has been overruled, a plea to the jurisdiction based on the same ground should not be entertained.

4. Under the provisions of the eminent domain act, which authorizes any number of separate parcels of property to be included in the same petition, and authorizes the compensation for each to be assessed separately by the same or different juries, as the court or judge may direct, the Supreme Court will presume that the discretion of the lower court in denying separate jury trials was properly exercised, in the absence of anything in the record to show the reasons making separate trials desirable, or to show any injury to the persons demanding such trials.

5. The provision of the eminent domain act that any number of separate parcels of property situated in the same county may be included in one petition does not require the separate parcels to be owned by the same person in order that they may be included in the same petition.

6. Under the provision of the eminent domain act which authorizes any number of separate parcels of property to be included in the same petition, and requires the compensation for each to be assessed separately by the same or different juries, as the court or judge may direct, a property owner whose property is included in the same petition with other property is not entitled to a separate trial as a matter of right.

7. In condemnation proceedings, evidence of the sale price of platted lots in the vicinity of the tract in question, which was not platted, was inadmissible.

8. In condemnation proceedings, a question as to whether or not the village in which the property was situated was improving was too indefinite, and properly disallowed.

9. In condemnation proceedings questions relating to the location of a naval school in the village in which the property was situated were immaterial, in the absence of evidence that such school had been located there.

10. In condemnation proceedings, questions concerning factory sites in the village in question, how they were acquired, and whether they were usually sold or donated, were immaterial.

11. In condemnation proceedings, questions as to how certain property near factories rented and as to the rental demand therefor were immaterial.

12. In condemnation proceedings, questions asking a witness what value he placed upon lots in certain sub-divisions in the vicinity of the tract in question, what he considered the lots worth, and whether the lots ran in his mind at from \$100 to \$1,000 per lot, were immaterial.

13. In condemnation proceedings, plans showing a certain man-

ner of sub-dividing the tract in question into lots, and thereby illustrating the testimony of a witness, were properly excluded, the tracts not having been actually sub-divided; but it could be shown that the land was adaptable to sub-division, and its enhanced value on account of such adaptability could be taken into consideration.

14. In condemnation proceedings, the jury may consider, in connection with the evidence, what they see while visiting and inspecting the premises in determining questions of values, benefits and damages.

15. In condemnation proceedings, where the evidence is conflicting, and there is nothing to show that injustice has been done, or that passion or prejudice influenced the action of the jury, the verdict will not be disturbed by the Supreme Court.

16. Errors in instructions will not be considered on appeal, in the absence of anything in the record or bill of exceptions to show that those request such instructions were given, or whether they were given by the court of its own motion.

17. A bill of exceptions is to be taken most strongly against appellant.

18. Alleged error in the refusal of instructions must be regarded as abandoned, when not mentioned in appellant's brief or argument.—(Martin et al. vs. Chicago & M. Electric Ry., 77 N. E. Rep., 86.)

ILLINOIS.—Railroads—Interests in Land—Forfeiture—Pleading—Legal Questions—Railroads—Right of Way—Abandonment—Intention—Evidence—Parol—Invalidating Deed—Quieting Title—Pleading—Allegation Showing Possession.

1. The fact that a railroad represented, when land for a right of way was decided to it, that it had theretofore located its line of road over the land conveyed and would do certain things in the future, and subsequently abandoned the proposed route, is not ground for cancellation of the deed, in the absence of anything to show that such representations were false when made.

2. In the absence of an allegation of acts of a railroad manifesting an abandonment of its right of way, an allegation that it had abandoned a portion of its right of way at a certain time is a mere conclusion of the pleader and is bad.

3. In order to constitute an abandonment by a railroad of a part of its right of way, an intention to abandon the right of way must coexist with non-user.

4. A deed acknowledging the payment of consideration cannot be contradicted by parol, for the purpose of invalidating the deed or impairing its legal effect.

5. A bill to cancel a deed as a cloud on title is bad, where it alleges that the grantee is in possession of part of the premises covered by the deed.—(Stannard vs. Aurora, E. & C. Ry. Co., et al, 77 N. E. Rep., 254.)

NEW JERSEY.—Street Railroads—Power to Regulate.

1. Though a city may have had no power to impose on a street railroad the burden of repaving any portion of its streets, or to exact a contract for such repaving, it could impose on the company, as a condition to granting it the right to use the electric motors as the propelling power of its cars, and for that purpose to erect poles and string wires thereon in streets, that the company should pave the parts of the street between and adjoining the tracks.

2. Providing that any street railway company may use electric motors as the propelling power of its cars, instead of horses, provided it shall first obtain the consent of the municipal authorities, a contract whereby a city gave the street railroad company the right to use electric motors on condition that it should pave certain parts of streets was not *ultra vires*.

3. Providing for the taxation of all the property and franchises of corporations using or occupying public streets, and that the franchise tax provided by that act shall be in lieu of all other franchise taxes, does not relieve a street railroad company of its duty to pave certain parts of streets imposed as a condition to its right to use electric motors.—(Inhabitants of City of Trenton vs. Trenton St. Ry. Co., 63 Atl. Rep., 1.)

NEW JERSEY.—Street Railroads—Use of Streets—Reasonableness of Ordinance—Enforcement of Restrictions—Defenses—Undue Consideration—Sale of Franchise—Liabilities of Purchaser—Mandamus—Duty to Pave Streets.

1. Where, under the general traction act of 1893 an ordinance is passed by the Common Council of a municipality granting a location of street railway tracks, subject to restrictions in the ordinance specified, the question whether such restrictions are reasonable is a question of fact, and the burden of proof is upon him who asserts them to be unreasonable.

2. The restrictions in the case under review held not unreasonable.

3. The ordinance having been carried into effect by the construction, maintenance and operation of the street railway, the traction company and its successors in title, while retaining and enjoying the privileges and franchises granted by the ordinance, cannot resist the claim of the municipality for enforcement of the restriction, on the plea that the ordinance was *ultra vires* the municipal corporation.

4. Where an ordinance granting a location for street railway tracks pursuant to the general traction act of 1893, contains restrictions in the form of covenants requiring the traction company to pave the streets in which the tracks are laid, the fact that performance of this covenant would to some extent relieve the municipal treasury from expense does not taint the proceeding; there being no interest on the part of the members of Council beyond their interest as ordinary taxpayers.

5. An ordinance granted a location of street railway tracks to a traction company and its assigns, subject to restrictions and conditions to be observed and performed by the grantee. Held, that the restrictions and conditions are obligatory upon any subsequent purchaser of the street railway tracks and franchises, even without an express assumption.

6. Mandamus is the proper remedy for enforcing performance by a traction company of its duty to pave a street pursuant to the terms of the ordinance granting to its predecessor the right to locate tracks in such street.—(Mayor, etc., of Borough of Rutherford vs. Hudson River Traction Co., 63 Atl. Rep., 84.)

NEW JERSEY.—Mandamus—Street Railroads—Transfers to Passengers.

A writ of mandamus should not issue at the instance of a municipal corporation to compel a street railway company to give transfers to its passengers within the municipality, when the obligations of the company to do so arises wholly from its assent to certain municipal ordinances which, of themselves, have no legislative force.—(Mayor, etc., City of Newark vs. North Jersey St. Ry. Co., 62 Atl. Rep., 1003.)

NEW YORK.—Carriers—Street Railways—Transfer—Obligation to Issue—Operation and Control of Road—What Constitutes.

Under Railroad Law, Laws 1890, p. 1113, c. 565, sec. 101, as amended by Laws 1897, p. 776, c. 688, relating to street surface railroads, and providing that no corporation constructing and operating a railroad under the provisions of this article, etc., shall charge any passenger more than five cents for one continuous ride from any point on its road, "or on any road, line or branch operated by it, or under its control," to any other point thereof, etc., and Railroad Law, Laws 1890, p. 1096, c. 565, sec. 39, imposing a penalty on any railroad corporation receiving more than the lawful rate of fare, etc., the operation or control of a road within the meaning of such sections means a control of the operation of the road, and not merely a control of the corporation or individuals operating it by reason of the ownership of a majority of the road's capital stock.—(Senior vs. New York City Ry. Co., 97 N. Y. Sup., 645.)

NORTH CAROLINA. — Municipal Corporations — Streets — Street Railroads — Construction — Additional Servitude — Abutting Owner — Rights.

1. The construction of a street passenger railway does not impose an additional servitude on the property fronting on the street so occupied, though in the original laying out of the street a mere easement was taken, and not the fee.

2. A city sidewalk being a part of the street which the city has set apart for the use of pedestrians, an abutting proprietor has no more right therein than in the roadway of the street.

3. An abutting proprietor is only entitled to have the street and sidewalk in front of his premises open and unobstructed so as not to impair ingress or egress to his lot by himself and those whom he invites there.

4. Complaint owned an irregularly shaped lot, which was only 7 ft. 7 ins. wide at the intersection of two streets, on which street car tracks were laid; the length of the curb in front of such lot at the intersection of the streets being but 22 ft. 5½ ins. The sidewalks adjoining the lot on the two streets were 10 ft. and 8 ft. wide, respectively, and between the curb and the nearest rail of the track was a distance of 15½ ft. on one street and 13½ ft. on the other. In order to transfer cars from one track to the other, a curve was constructed in front of the narrow portion of complainant's lot in such a manner that cars passing over it extended over a small corner of one angle of the sidewalk; the rails being

laid level with the street, and the ties being buried at the shortest part of the curve slightly under the sidewalk. On three or four occasions when the curve was first used, cars ran off the track at such place. Held, that such facts were insufficient to show that complainant's right of egress and ingress to his lot was damaged by the curve.—(Hester vs. Durham Traction Co., 50 S. E. Rep., 711.)

WISCONSIN.—Eminent Domain—Taking of Property—Appropriation of Streets—Measure of Damages—Appeal—Harmless Error—Erroneous Theory of Damages—Presumptions—Deliberations of Jury—Obedience to Instructions—Errors Reviewable—Instructions—Necessity of Specific Exceptions.

1. Under Rev. Stat. 1898, secs. 1862, 1863a, authorizing the formation of corporations for constructing and operating street railways, providing that municipalities may grant to any such corporation the use of streets or bridges within their limits for the purpose of laying tracks, and empowering such corporations to exercise the right of eminent domain, the use of a street by an electric railroad, for interurban traffic is a burden not contemplated by the original taking of the land for street purposes, and the appropriation of the street by the railroad for that traffic constitutes a taking of private property for public purpose, for which the abutting owners are entitled to compensation.

2. The measure of damages to abutting premises, for the appropriation of a street by an electric railroad for interurban travel, is the difference, at the time of the filing of the Commissioner's award, between the market value of the premises with the road located upon it, and their market value freed from the use and burden of the road.

3. On the issue of damages to abutting property by the appropriation of a street by an electric railroad for interurban travel, the admission of evidence of the value of the premises in 1898, when the railroad first commenced its interurban business, and the giving of an instruction that the measure of damages was the difference between the market value of the premises just before the railroad commenced its interurban business upon the street, and its market value in 1904, when the award of damages was made by the Commissioners, were not prejudicial to the railroad where the market value of the property, as shown by the evidence covering the period prior to the filing of the award, was substantially the same as it would have been without the burden of the railroad in 1904, when the award was made.

4. In proceedings by an electric railroad to condemn a right of way over a street for interurban travel, where the court repeatedly charged that the abutting owners were not entitled to any damages due to the conduct of a city street railroad business along the street in question, it would be presumed on appeal that the jury followed the charge and did not allow any damages for the operation of a city street railroad.

5. A general exception to the refusal of a number of requested instructions covering distinct propositions, presents nothing for review.—(Abbott vs. Milwaukee Light, Heat & Traction Co., 106 N. W. Rep., 523.)

LIABILITY FOR NEGLIGENCE

ALABAMA.—Carriers—Injury to Passenger—Action—Allegations of Negligence—Sufficiency—Duty of Carrier—Existence of Relation.

1. A complaint alleging that plaintiff, while a passenger upon defendant's railway, was injured, and that his injuries were proximately caused by the negligence of defendant's servants, was not demurrable on the ground that it did not specify with sufficient particularity the manner in which plaintiff was injured.

2. A complaint alleging that plaintiff, while a passenger upon defendant's railway, was injured, etc., was not defective for failure to show that defendant owed any duty to plaintiff; the existence of the duty being inferable from the allegation of the relation of carrier and passenger.

3. A complaint alleging that plaintiff, while a passenger upon defendant's railway, was injured, etc., was sufficient to show that the relation of carrier and passenger existed at the time of the injury, although there was no direct allegation that defendant was a common carrier.—(Birmingham Ry., Light & Power Co. vs. Adams, 40 S. Rep., 385.)

CALIFORNIA.—Carriers—Action for Injury of Passenger on Street Car—Evidence of Negligence—Appeal—Review of Instructions—Harmless Error.

1. While the injury of a passenger while on a street car is not of itself sufficient to raise a presumption of negligence in the operation of the car, evidence that when a passenger was about to step off a car, which had almost come to a stop, and while he was

standing with one foot on the step, and holding to a stanchion with one hand, the car suddenly jcrked ahead with such violence as to break his hold and throw him to the ground with his head toward the rear of the car, is sufficient *prima facie* to charge the company with negligence, and the passenger is not required to show the cause of the sudden movement of the car.

2. Where there was no evidence of a want of proper and skillful surgical attention to a personal injury for which plaintiff sued, an instruction that his right to recover, or the measure of his damages, would not be affected by want of such care and attention if he was financially unable to procure the same, even if erroneous, was harmless error.—(Renfro vs. Fresno City Ry. Co., 84 Pac. Rep., 357.)

COLORADO.—Trial—Consolidation of Suits—Courts—Jurisdictional Amount—Appeal—Review—Joint Action Against Two Defendants—Street Railroads—Vehicles—Relative Rights—Negligence of Motorman—Sounding of Gong on Car Pursuant to City Ordinance—Witnesses—Instruction—Interest of Plaintiff—Contributory Negligence of Plaintiff—Damages—Personal Injuries—Personal Examination of Plaintiff.

1. Where separate actions are brought by separate plaintiffs against the same defendants, pending in the same court, for personal injuries sustained in the same accident, depending upon the same evidence, with the only difference in the extent of the injuries to the respective plaintiffs, the causes, under section 921, Rev. Stat. U. S., are properly consolidated for trial.

2. Under the judiciary act the amount in dispute or matter in controversy, determining the jurisdiction of the court, is the amount demanded in the petition in good faith, and not the amount ultimately recovered.

3. In a joint action against a street car company and an omnibus company for personal injuries to a passenger, resulting from a collision at a street crossing, tried to a jury, with a verdict of not guilty as to the omnibus company and guilty as to the street car company, on writ of error sued out only by the street car company, no error committed by the trial court in favor of the omnibus company can avail the plaintiff in error, except in so far as it may have prejudiced the defense of the plaintiff in error in showing that the injury resulted from the negligence of the omnibus company without the concurring negligence of the plaintiff in error.

4. While street cars and drivers of vehicles, equestrians and pedestrians, as a general rule, have concurrent rights to occupy the public street crossings in a city, the right of the railroad at such point is superior, in the sense that it is preferential, as to the right of way.

5. Facts reviewed as to whether or not the motorman was guilty of negligence in approaching a street crossing, and held to be a question for the jury.

6. Where a city ordinance requires the motorman of a street car on approaching a street crossing to sound a gong within 60 ft. of the crossing, and the evidence tends to show that the gong was not so sounded, but that the driver of the coach approaching the crossing in fact saw the car more than 60 ft. from the crossing. Held, that the court erred in its charge in directing particular attention to the failure to give the signal as required by ordinance.

7. Where the plaintiff in an action for damages on account of personal injuries testified to material facts respecting the character and extent of such injuries, and especially in contradiction of other witnesses. Held, that the defendant was entitled to an instruction to the effect that while under the statute the plaintiff is permitted to testify in her own behalf, yet in considering such evidence the jury may take into consideration the fact that she is directly interested in the result of the suit. Held, further, that the duty to so charge is not met by a general instruction to the effect that the jury are the judges of the credibility of the witnesses and the weight to be given to the testimony of each.

8. While the court does not assent to the proposition that in all given cases contributory negligence may not be attributed to a person riding in a vehicle with a driver, not the passenger's servant, yet, where the passenger is riding in a coach, the driver not being her servant or under her control, on a seat several feet from the driver and at an elevation of 7 ft. from the ground. Held, that contributory negligence is not attributable to her for either failing to warn the driver of danger, or in not leaping from the coach under the circumstances.

9. In the Federal jurisdiction, in an action for personal injuries, in the absence of some enabling statute of the State, the plaintiff cannot, by order of court, be required to submit to a personal examination by a surgeon. All the right the defendant in such

instance has is to make request upon the plaintiff to consent to such examination, and in case of refusal the defendant should be permitted to disclose such refusal on the trial, and comment thereon to the jury, to the plaintiff's prejudice.—(Denver City Tramway Co. vs. Norton et al. Same vs. French et al., 141 Fed. Rep., 59.9)

GEORGIA.—Negligence—Pleading and Proof—Trial—Instructions—Invading Province of Jury—Electricity—Street Railways—Live Wires—Injury to Pedestrian.

1. In a suit to recover damages for personal injuries alleged to have been sustained by reason of negligence on the part of the defendant, the plaintiff must recover, if at all, upon proof establishing the specific acts of negligence alleged in his petition.

2. Even in a case to which the doctrine of "res ipsa loquitur" is applicable, it is erroneous for the court to charge the jury that a given state of facts either constitutes, or affords prima facie proof of, negligence, when there is no statute expressly declaring that this is true as matter of law.

3. The charge of the court being in certain respects inaccurate and prejudicial to the excepting party, a new trial is ordered.—(Augusta Ry. & Electric Co. vs. Weekly, 52 S. E. Rep., 444.)

ILLINOIS.—Trial—Arguments of Counsel—Comments on Witnesses—Instructions—Invading Province of Jury—Credibility of Witnesses—Abstract Instructions—Carriers—Injury to Passenger—Question for Jury—Who are Passengers.

1. Counsel, in an argument before the jury, have a right to attack the testimony of witnesses as untrue, though there has been no attempt to impeach them.

2. An instruction that denunciations of witnesses by counsel should not influence the jury to disregard the testimony, if unimpeached, is erroneous.

3. There is no presumption of law that an unimpeached witness has testified truly, and an instruction to that effect is erroneous, as infringing on the province of the jury.

4. Where an instruction states a rule of law, which, though not incorrect, does not relate to any fact in the case, it is improper.

5. In an action for injuries to a passenger, an instruction as to the duties of a carrier of passengers for hire is not unwarranted, though that the relation exists is denied by the carrier, where the facts alleged in the declaration, if proved, would establish such a relation.

6. The question of the credibility of a witness testifying in contradiction of others is for the jury.

7. The relation of passenger and carrier is created by contract, and does not necessarily arise from the mere fact that a person runs toward a moving car to get on board.—(Chicago Union Traction Co. vs. O'Brien, 76 N. E. Rep., 341.)

ILLINOIS.—Appeal—Harmless Error—Negligence—Trial—Instructions—Questions of Law—Review—Questions of Fact.

1. In an action for personal injuries, error in refusing to strike out an answer to plaintiff as to her physical condition since the injury, "I have been a nervous wreck ever since," is harmless error, where there is ample evidence to show plaintiff's physical condition.

2. Where, in an action for personal injuries, the court instructed that the questions involved, as alleged in the declaration, as to negligence of defendant, if any, and reasonable care by plaintiff, if any, "are what is known as questions of fact, which it is the duty and province of the jury to determine under the law and the evidence," the instruction was not erroneous, as summarizing the elements of recovery and directing a verdict without requiring proof of injury.

3. An instruction, in an action for personal injuries, that, if the jury believe the plaintiff has proved the allegations in one or more of the counts of the declaration by a preponderance of the evidence, she can recover, does not submit a question of law to the jury.

4. In an action for personal injuries, question whether the verdict is excessive is a question of fact, on which the judgment of the Appellate Court is conclusive.—(Chicago & J. Electric Ry. Co. vs. Patton, 76 N. E. Rep., 381.)

INDIANA.—Trial—Peremptory Instructions—Carriers—Injury to Passenger—Contributory Negligence—Passengers—Trespassers—Payment of Fare—Appeal—Briefs—Recital of Evidence.

1. In considering a motion for peremptory instruction, the court must accept as true all facts which the evidence tends to prove, and all such inferences as are reasonably deducible therefrom against the party asking a protection of the verdict, and, in case of conflicting evidence, excluding that favorable to him.

2. In an action by a passenger for injuries, the question of contributory negligence held under the evidence, one for the jury.

3. Where a street car company stops a car equipped for carrying passengers at a place selected by it to receive passengers, a person who, desiring to be transported, boards or attempts to board the car for such purpose, becomes a passenger, as the stopping of the car at the customary place is an implied invitation to those waiting to take passage.

4. A person desiring passage, who boards a street car stopping at a customary place to receive passengers, and indicating his intention to become a passenger, without notice that persons are not invited to board, cannot be treated as a trespasser.

5. A special contract with a street car company, based on the payment of fare, is not essential to make a person boarding a car stopping at the customary place a passenger.

6. Rule 22 (55 N. E. v.) requiring that, if the insufficiency of the evidence to sustain the verdict is assigned, the statement in the brief shall contain a condensed recital of the evidence in narrative form, so as to present the subject clearly and concisely, cannot be invoked as a basis for refusing to determine the substantial issues presented, when the brief sufficiently conforms to the rule to enable the court to comprehend the proposition relied on.—(Hall vs. Terre Haute Electric Co., 76 N. E. Rep., 334.)

INDIANA.—Negligence—Contributory Negligence—Defense—Trial—Special Findings—Conflict with General Verdict—Carriers—Injuries to Passenger—Presumptions by Passenger—Question for Jury—Similar Injuries—Damages—Special Damage—Interference with Business—Necessity of Pleading.

1. In an action for personal injuries, a general verdict in favor of plaintiff is, in effect, a finding in his favor on the issue of contributory negligence and upon every issuable fact necessary to sustain his cause of action, and is supported, as against special findings, by every presumption and inference of fact which may be drawn from the evidence properly admitted under the issues, and will yield only after resolving all reasonable presumptions against such special findings.

3. A passenger on a street car may presume, in the absence of knowledge to the contrary, that all necessary precautions for his safe transportation have been and will be taken.

4. A passenger who knowingly exposes himself to danger in a way that an ordinarily prudent person would not have done under the circumstances, and is thereby injured, or who by reasonable precautions could have foreseen the danger and avoided the injury, cannot recover on account of such injury.

5. The question of contributory negligence is for the jury, except where the exact standard of duty is fixed.

6. In an action against a street railway for injuries to a passenger riding on the running board of an open car, caused by his coming in contact with iron posts of a bridge over which the car passed, whether plaintiff was guilty of contributory negligence, in that he might have taken a position in the front vestibule of the car, where he would not have been injured, and in that he had ridden over the bridge before and had a general knowledge of its construction, held, under the evidence, a question for the jury.

7. In an action against a street railway for injuries to a passenger standing on the running board of an open car, caused by his coming in contact with the structural work of a bridge over which the car passed, the fact that no passenger had ever before been injured by coming in contact with the bridge, during the long use thereof by defendant, was to be considered by the jury, but would not of itself relieve defendant from liability for the injury, if it so maintained its road as to endanger the lives and limbs of passengers riding on the running board of its cars by its invitation and with its permission, and with the recognition of the public that such running board was for the carriage of passengers.

8. Damage consisting of loss of time or interference with the business, trade, or profession of the person injured, is regarded as special, and is recoverable, in an action for the injuries, only when specially averred in the complaint.—(Union Traction Co. of Indiana vs. Sullivan, 76 N. E. Rep., 116.)

IOWA.—Carriers—Injuries to Passengers—Actions—Evidence—Appeal—Review—Harmless Error—Admission of Evidence—Withdrawal—Duties toward Passengers—Employment of Competent Servants—Actions—Admissibility of Evidence—Trial—Instructions—Construction—Costs—Appeal—Unnecessary Abstract.

1. In an action against a street railroad for the death of a pas-

senger, who jumped from the car in an excess of fright on seeing apparent electrical disturbances at the front end of the car, where the evidence was not conclusive as to whether it was the electrical display, or that connected with the high rate of speed and rocking motion of the car, which induced deceased to jump, evidence of the rocking motion of the car and of irregularities in the track was admissible, not only on the issue of the railroad's negligence in causing the electrical disturbance, but as showing an independent ground of negligence.

2. In an action against a street railroad for the death of a passenger, the admission in evidence of rules of the railroad regulating the speed of its cars and requiring stops at specified points was not prejudicial to defendant, where the rules did not require a higher degree of care than is imposed by law, and their effect was properly limited by an instruction.

3. In an action against a street railroad for the death of a passenger, the admission of evidence as to the speed of the car on which the accident occurred at a different time and place than the one in question was not reversible error, where it was withdrawn, and the jury were directed not to consider it, and no prejudice appeared to have resulted from its introduction.

4. A street railroad company, engaged in operating cars by electricity, must employ men of experience and competency, and its failure to do so is negligence.

5. In an action against a street railroad for the death of a passenger, who jumped from the car on seeing an apparent electrical disturbance in the forward end of the car, evidence that the conductor of the car became frightened, and jumped before deceased did, was competent to show negligence in operating the car with an incompetent conductor in charge of it.

6. In an action against a street railroad for the death of a passenger, a charge that it was the duty of defendant to transport deceased safely was not misleading, as a charge that defendant was an insurer of the safety of its passengers, in view of other portions of the same, and of other instructions in which the measure of defendant's duty was properly stated.

7. The cost of printing an unnecessary additional abstract filed by appellee and of appellant's denial of the same, and the cost of certifying the record in such case, will be taxed to appellee, although the judgment is affirmed.—(Blumenthal vs. Union Electric Co., 105 N. W. Rep., 588.)

MAINE.—Carriers—Injuries to Passenger—Care Required—Instructions—"Great Care"—Negligence—Care Required—Definitions.

1. The plaintiff was a passenger on one of the street railway cars of the defendant. There was evidence tending to show that the car, an open one, had come to a stop near the point of intersection with the tracks of a steam railroad, that it was the practice and custom of the defendant to stop there, but that the only purpose of the stop was to safeguard the crossing of said tracks; it not being a place where a stop was regularly made for passengers to get off or on the defendant's cars, although it was also in evidence that passengers did sometimes get off or on the cars while so stopping. There was likewise evidence tending to show that, while the car was stopping at said point of intersection, the plaintiff undertook to alight therefrom, but that while she was in the act of alighting, and before she had reasonable time to alight, the car was started, whereby she was thrown and injured. At the trial of this action the presiding justice, at the request of the plaintiff's counsel, gave the following instruction to the jury: "If you believe that this was the crossing of tracks, and that under the practice and custom of the company the cars stop at this crossing, and believe that people get on or off at this place while cars are stopped, then it was the duty of the conductor in charge of the car to ascertain for himself whether passengers wanted to get on or off; and if he could by great care discover who wanted to get off, whether they wanted to get off, that would be equivalent to actual knowledge on the subject."

2. This instruction imposed upon the conductor the duty of exercising "great care" to discover if any one wanted to get off the car. It is not modified by any other clause in the charge, but rather emphasized by a statement made immediately before it that "the railroad was bound to use greater than ordinary care." The law requires that the conductor should have acted only in the exercise of reasonable care. The phrase "great care," as used in the instruction, was without limitation. It was left entirely to the jury to say what meaning should be attached to it. Under it the jury may have said that it was the duty of the conductor to inquire of every passenger upon his car if they wished to alight, and that if he failed to do this, in the exercise of the duty requiring "great care," he was negligent; or, if so strenuous

a duty as to inquire of each passenger was not deemed necessary in the exercise of "great care," the jury might have found that some other burdensome duty was imposed by the instruction given.

3. The rule of law now generally recognized by the great weight of authority is that the legal measure of duty, except that made absolute by law, with respect to almost all legal relations, is better expressed by the phrases "due care," "reasonable care," or "ordinary care," terms used interchangeably. "Reasonable care" may be defined as such care as an ordinarily reasonable and prudent person exercises with respect to his own affairs, under like circumstances. In this definition it is the phrase "under like circumstances" that imposes upon the term "reasonable care" both its limitations and its elasticity. The term is a relative one. The same act under one set of circumstances might be considered due care, and under different conditions a want of due care, or negligence. Therefore the duty intended by the use of the phrase "ordinary care" is always referable to the circumstances and conditions, under which the act or omission to act is required to be performed. These limit or define the scope of the situation within which the performance of the same act may be called reasonable or unreasonable. Held, that the exceptions to the requested instruction given as aforesaid must be sustained.—(Raymond vs. Portland R. Co., 62 Atl. Rep., 602.)

MARYLAND.—Carriers—Duty Toward Passengers—Discharge of Passengers—Duration of Stop—Action—Evidence—Sufficiency—Trial—Directed Verdicts—Negligence—Question of Fact or Law—Injuries to Passengers—Contributory Negligence—Question for Jury.

1. While carriers of passengers are not insurers of absolute safety, yet they are bound to exercise the highest degree of care which is consistent with the nature of their undertaking.

2. Where a railroad stops its car to allow a passenger to alight, it is bound to stop a sufficient length of time to enable him to alight in safety, and is liable for an injury to a passenger occasioned by reason of its failure so to do.

3. In an action against a street railroad for injuries to a passenger, evidence held sufficient to show negligence on the part of the railroad in suddenly starting the car while plaintiff was alighting.

4. The court, in passing upon defendant's prayers for a directed verdict, must assume the truth of plaintiff's testimony.

5. The question of negligence is ordinarily one of fact and not of law, but the court may hold plaintiff guilty of contributory negligence when some prominent and decisive act of negligence has been committed by him, in regard to the character and effect of which no room is left for ordinary minds to differ.

6. A passenger was not guilty of contributory negligence per se in attempting to alight from a street car while it was moving very slowly and smoothly, but whether her act in so doing was negligent was a question for the jury under all the facts in the case.—(United Railways & Electric Co. of Baltimore vs. Weir, 62 Atl. Rep., 588.)

MASSACHUSETTS.—Evidence—Admissions by Servant—Competency Against Master—Witnesses—Impeachment—Conflicting Statements—Scope of Examination—Discretion of Court—Competency of Testimony—Appeal—Preservation of Error Below—Exclusion of Evidence—Necessity of Offer of Proof.

1. In an action against a street railway for injuries to a traveler on a highway, an admission by the motorman that he was at fault was incompetent against the street railway.

2. Where a witness testifies to a fact relevant to the issue, the adverse party may, for the purpose of impeachment, show that the witness has made prior or conflicting statements, either by eliciting such statements on cross-examination of the witness himself or by proving them by other witnesses.

3. To what extent a witness may be cross-examined on collateral issues to test his credibility must be left largely to the discretion of the trial court, but the rule has no application where the statements of the witness relate to the main issue on trial.

4. In an action against a street railway for injuries to a traveler on the highway, the motorman was a witness for the defendant, and on cross-examination testified that, although he had been stung on the hand, yet at the time of the accident he had one hand on the controller and the other hand on the brake. In response to a further question he denied having said that he had been stung on the hand or that at the time of the accident he was rubbing his hand. Held, that it was competent for plaintiff to impeach the motorman by showing that he had stated that he had been stung on the hand and was rubbing his hand.

5. The fact that plaintiff failed to formally state what answer a witness was expected to make to an excluded question does not preclude him from obtaining a review of the ruling excluding the question, where, from the purport of previous questions, it was obvious what the answer of the witness was expected to be, and the court distinctly excluded the question upon the same ground as it had excluded the previous question.—(Robinson vs. Old Colony St. Ry. Co., Thompson vs. same, 76 N. E. Rep., 190.)

MASSACHUSETTS.—Trial—Requests to Charge—Time—Rules—Leave to Present—Construction of Rule—Carriers—Injuries to Passengers—Beginning of Relation.

1. Superior Court rule 48, requiring requests to charge to be submitted before argument, does not prevent the presiding justice from receiving and passing on requests subsequently presented, if he so elects, and allowing an exception to the party aggrieved by giving or refusal thereof.

2. Where the trial judge received and refused certain requests to charge, presented after argument, his act in so doing was in effect the giving of special leave to present such instructions at the time they were presented.

3. Superior Court rule 48, requiring instructions requested to be presented before argument, does not mean that leave must be obtained to present requests later, but that requests presented later cannot be entertained without leave of court.

4. Where plaintiff boarded a street car, and on the conductor's announcing that the car only went to the stables plaintiff attempted to leave the same, and was injured by the sudden starting of the car as he attempted to do so, plaintiff not having been accepted as a passenger at the time of the accident, the carrier was only bound to exercise ordinary care.—(Robertson vs. Boston & N. St. Ry. Co., 76 N. E. Rep., 513.)

MISSOURI.—Municipal Corporations—Streets—Restrictions on Control—Street Railroads—Occupation of Streets—Appliances—Liability for Injuries.

1. The legislative or municipal control over streets in the matter of authorizing the placing of obstructions therein is not absolutely unlimited, but must be exercised for the public welfare, and private structures which are inconsistent with the primary use of the streets, or structures which prevent the use of streets for travel or access to abutting property, cannot be licensed.

2. Under Rev. Stat. 1899, Sec. 1187, and Municipal Code 1901, p. 220, authorizing the city of St. Louis to license, control and regulate railroad tracks in its streets, and to direct how they shall be constructed and maintained, a switch laid by a street railway in a street pursuant to a license from the city, is, *prima facie*, a lawful occupation of the street, and the street railway is within its rights in maintaining it, and is not liable for an injury to a traveler on the street caused by his buggy wheel coming in contact therewith, provided due care has been observed to keep it in good order and to select a reasonably safe appliance, if different kinds are available, and provided further that the danger and inconvenience to the public caused by the presence of the switch, is not so great as to make it a nuisance, notwithstanding its authorization by the city.

3. The fact that a street railway switch was so constructed that it was liable to "catch and hold vehicles," does not, of itself, show that the switch was such a structure as to render the railroad liable for injuries to a traveler in a buggy, the wheels of which were caught by the switch and who was thereby thrown to the ground and injured.—(Morie vs. St. Louis Transit Co., 91 S. W. Rep., 962.)

MISSOURI.—Justice of the Peace—Procedure—Complaint—Sufficiency—Carriers—Injury to Person Attempting to Board a Car—Instructions—Evidence—Damages—Personal Injury.

1. A complaint in justice's court, which alleges that plaintiff, while attempting to board a car of defendant with intent to become a passenger, was by reason of the starting of the car thrown to the ground, whereby his right shoulder was fractured, and whereby he was otherwise injured, to his damage in the sum of \$500, is sufficient.

2. An instruction, in an action for injuries received while attempting to board a car, that if, while plaintiff was boarding a car, defendant's motorman started the car, so as to drag plaintiff from the platform from which defendant was accustomed to receive passengers, thereby injuring him, plaintiff was entitled to recover, required the jury to find facts constituting negligence, and the omission of the word "negligence" was not erroneous.

3. Where, in an action for injuries received while attempting to board a car, plaintiff's evidence showed that the injuries re-

sulted from the sudden starting of the car, and defendant's evidence showed that plaintiff walked off the end of the platform from which passengers were received without touching the car, instructions directing a verdict for plaintiff if the car started while he was in the act of boarding it, and authorizing a verdict for defendant if plaintiff fell from the platform before touching the car, or if he relied on a third person in boarding the car, and he was guilty of negligence directly contributing to the injury, properly submitted the case to the jury.

4. Where, in a personal injury action, there was no proof that plaintiff had paid or incurred any liability for medical expenses, and the instruction on the measure of damages did not include medical expenses as an element of damages, but only authorized the jury to assess compensation for the injury and pain, the refusal to charge that the jury should not allow any damages for medical expenses was not erroneous.—(Barr vs. St. Louis & S. K. Co., 90 S. W. Rep., 107.)

MISSOURI.—Street Railroads—Care as to Trespassers—Licenses—Care Required—Evidence—Patrol Evidence Affecting Writing—Collateral Issue.

1. A motorman running over the company's private right of way is not bound to keep a lookout for trespassers when he has a right to assume that the track is clear.

2. Where pedestrians have for a considerable time been in the habit of walking along a street railway's private right of way, a motorman, before reaching a point where he has reasonable grounds to anticipate the presence of persons, is required to be on the alert and to keep a lookout.

3. In an action against a railroad company for injuries to one walking on the track, testimony of an officer of defendant that the right of way was a private right of way acquired by purchase was admissible, as the question was a fact collateral to the principal fact in issue.—(Levelsmeier vs. St. Louis & S. Ry. Co., 90 S. W. Rep., 104.)

MISSOURI.—Death—Action for Causing Death—New Trial—Inadequate Damages—Appeal—Discretion of Lower Court—Granting New Trial—Review.

1. Where, in an action by a wife for the death of her husband, no instructions in mitigation or aggravation of damages were requested or given, and the case admitted of no such instructions, but depended on decedent's contributory negligence, it was not error to set aside a verdict for \$500 on the ground that the verdict was substantial, and that the granting of a new trial subjected defendant to a new inquisition of damages, and to danger of being mulcted in \$5,000, the maximum amount recoverable under Rev. St. 1899, Sec. 2866, for the death of a person.

2. In an action by a wife for the death of her husband, the evidence showed that he supported her; that he was forty-nine years of age, in good health, and with an earning capacity of \$90 a month; and that he was industrious and stood well as a citizen. Held, that a verdict of \$500 was inadequate, justifying the court to award a new trial on that ground.

3. The Supreme Court will not interfere with the discretion of the trial court in granting plaintiff a new trial on a question of fact, except where he is not entitled to recover.—(McCarty vs. St. Louis Transit Co., 91 S. W. Rep., 132.)

MISSOURI.—Death—Action for—Penal Statutes—Construction—Amount of recovery—Petition—Sufficiency.

1. Rev. St. 1899, Sec. 2864, providing for the forfeit of the fixed sum of \$5,000 for wrongful death occurring through the negligence of the officers, employees, etc., of a corporation, etc., as therein provided, is a penal statute and in derogation of the common law, and is to be strictly construed.

2. Rev. St. 1899, Sec. 2864, provides that when any person shall die from any injury resulting from the negligence of any officer, servant, or employee whilst managing any locomotive, car, or train of cars, etc., the corporation, or individuals in whose employ such officer, etc., shall be at the time such injury is committed, shall forfeit and pay for every person so dying the sum of \$5,000, which may be sued for and recovered: First, by the husband or wife of the deceased, etc. Section 2865 provides that whenever the death of a person shall be caused by the wrongful act of another, such as would, if death had not ensued, had entitled the party injured to maintain an action and recover damages, the person who, or corporation which, would have so been liable shall be liable to an action. etc. Section 2866 provides that on a recovery for such wrongful death mentioned in the preceding section the jury may give such damages, "not exceeding \$5,000 as they may deem fair and just," etc. Held, that one suing under section 2864 must demand and recover the precise amount of the penal sum therein provided, and a petition which seeks to

recover a less sum states no cause of action in such section.—(Casey et al. vs. St. Louis Transit Co., 91 S. W. Rep., 419.)

MISSOURI.—Tender—Waiver—Release—Validity—False Representations—Questions for Jury—Instructions—Trial—Ignoring of Issues—Correction of Omissions.

1. Evidence that plaintiff's attorney went to the office of defendant's attorney and offered to pay him the amount paid by defendant for a release of plaintiff's claim, and that defendant's attorney stated that defendant would not accept the money and that there was no necessity of making a tender at defendant's general offices, was sufficient to show a waiver by defendant of a technical tender of the amount paid for the release.

2. A release of a cause of action obtained by defendant from plaintiff through false representations of defendant's claim agent, which induced plaintiff to sign the release, believing it to be simply a receipt and nothing more, constitutes no bar to a suit by plaintiff on the cause of action purported to be released.

3. Whether a release of a cause of action for personal injuries was obtained from plaintiff fairly, or was obtained through the false representations of defendant's claim agent that plaintiff was signing a mere receipt for money paid to her, held, under the evidence, a question for the jury.

4. On the issue of fraud in a release, a charge that if plaintiff was an ignorant woman, and within a few days after her injury defendant's claim agent called on her and induced her to accept the sum of \$10 by representing that defendant could not be compelled to pay her anything, but would do so as a gratuity, and procured her to sign the release in question without understanding its contents and in the belief that it was a mere receipt, the release was invalid, was not erroneous.

5. In an action against a street railway for injuries to a passenger, where a general denial and a release were pleaded in defense, a charge given at plaintiff's request authorizing a recovery on the establishment of defendant's negligence and plaintiff's freedom from contributory negligence, without reference to the question of release pleaded, was erroneous.

6. Instructions given for defendant which covered fully the question of release executed by plaintiff cured error in the omission of a charge for plaintiff to refer to the question of the release in stating the conditions of plaintiff's right to recover.—(Austin vs. St. Louis Transit Co., 91 S. W. Rep., 450.)

MISSOURI.—Malicious Prosecution—Arrest of Passenger—Termination of Prosecution—Carriers—Ejection of Passenger—Disorderly Conduct.

1. Plaintiff's petition was in three counts; the first for willful and unlawful ejection from one of defendant's street cars, the second for false imprisonment, and the third for malicious prosecution. The evidence showed that an altercation took place between defendant's conductor and plaintiff in regard to the payment of fare by plaintiff; that the conductor called a police officer and told him that plaintiff refused to pay his fare, but the officer refused to put plaintiff off unless the conductor would prefer a criminal charge. The conductor then preferred a charge of disturbing the peace, and plaintiff was conducted to a police station and locked up. Held, that if plaintiff was guilty of disturbing the peace, then his arrest on the car and commitment to jail were lawful, and he was not entitled to recover without showing that he had been tried and acquitted of the criminal charge, or that it had been dismissed.

2. Although a passenger on a street car has paid his fare, he cannot recover for ejection and arrest at the instance of the conductor, if he was guilty of the offense of disturbing the peace.—(Leonard vs. St. Louis Transit Co., 91 S. W. Rep., 452.)

MISSOURI.—Jury—Competency of Jurors—Bias or Prejudice—Question for Court—Appeal—Questions Reviewable—Discretionary Action—Rulings on Challenges to Jurors—Presumption of Error—Prejudice—Street Railroads—Operation—Negligence—Rate of Speed—Duty to Sound Gong—Contributory Negligence—Negligence of Motorman—Failure to Keep Lookout—Proximate Cause.

1. The question of the qualification of a juror, as against a challenge for prejudice, should be decided by the court on the facts stated by the juror with reference to his state of mind, and should not be allowed to depend upon the conclusions of the juror himself as to whether or not he could or would divest himself of an admitted prejudice existing against either of the parties, or against the character of the subject matter in litigation, or against a party as a class and not against him as an individual.

2. The discretion of the trial court in overruling a challenge to a juror is subject to appellate review where the facts are practically undisputed.

3. Under Rev. Stat. 1899, Secs. 3783, 3785, which provide for peremptory challenges and challenges for cause, respectively, the Supreme Court, in reviewing the action of the trial court in overruling a challenge for cause, will not consider whether or not appellant had exhausted his peremptory challenges, but will presume that the action of the court, if erroneous, was prejudicial, without regard to the state of the peremptory challenges.

4. In an action against a street railway for injuries, jurors, one of whom had some years before the trial been thrown off a car and had since that time entertained a prejudice against street railways in general which would influence him in the trial, and the other of whom had a prejudice against defendant which he did not think would influence his verdict, but which "would probably unconsciously bias his opinion," were disqualified for prejudice, although the former stated during his voir dire that he would be governed by the testimony and instructions, and believed that he could render an impartial verdict, that he had nothing against defendant, that he could try the case impartially, and that his prejudice had "just" been removed.

5. A rate of speed of from 8 to 15 miles an hour is not of itself a dangerous speed for a street car to maintain, and, in the absence of further evidence on the subject, it is not negligence for a street car to run at the rate of speed in an outlying district of a city over an unimproved street.

6. A street railway is not bound to sound a gong at a point where there is no intersecting street, in the absence of knowledge that any one is on the street at that point.

7. Persons passing over a street and driving on street car tracks are bound to know that street cars are constantly passing over the tracks, and to take proper precautions to get off the tracks in time to avoid a collision.

8. A street railway was not rendered liable for the death of a teamster driving on its tracks, caused by a collision of the car with his wagon, by the fact that the motorman in charge of the car momentarily ceased to keep a lookout, where the collision occurred on a dark night, and there was nothing to show that, if the motorman had been constantly looking ahead, he would have been able to discover the presence of the wagon any sooner than he did, or in time to avert the collision, and as soon as he did discover the same he immediately applied the brakes and reversed the power.—(Theobald vs. St. Louis Transit Co., 90 S. W. Rep., 354.)

MISSOURI.—Carriers—Injury to Passenger—Negligence—Evidence—Contributory Negligence—Appeal—Instructions—Harmless Error—Evidence—Verdict—Manner of Arriving at Verdict.

1. Evidence, in an action against a street car company for injuries received by a passenger while boarding a car, in consequence of the premature starting of the car. Held, sufficient to justify a finding that the company was guilty of actionable negligence.

2. For one to board a moving street car is not necessarily such negligence as will bar a recovery for an injury caused by the acceleration of the speed of the car while he was in the act of boarding it, but whether there is negligence depends on the circumstances.

3. The error, if any, in an instruction in an action against a street car company for injuries received by a passenger in consequence of the starting of the car, that plaintiff could not recover if he attempted to board the car while moving, was not prejudicial to defendant.

4. In an action against a street car company for injuries received by a passenger while attempting to board a car, plaintiff testified that he was thrown 10 ft. by the movement of the car on it starting while he was boarding it. The conductor testified that plaintiff was dragged along some distance and thrown to the ground. Other witnesses showed that he was not thrown 10 ft. Held, that the verdict for plaintiff would not be reversed, because his testimony was contradicted by physical facts based on the improbability that a car could start from a motionless state with such violence as to throw a person in the act of stepping on it 10 ft. away.

5. Where, in an action for personal injuries, the testimony does not show beyond dispute any fact rendering it impossible, according to the laws of nature, for the accident to have occurred from defendant's negligence, unless the injured person was also negligent, an instruction requiring the jury to determine the issues and to weigh the testimony of the witnesses according to the probability thereof is sufficient, without a charge that the finding must be in accordance with the physical facts.—(Schmitt vs. St. Louis Transit Co., 90 S. W. Rep., 421.)

NEBRASKA. — Carriers — Injury to Passengers — Tort of Stranger.

1. In order to render a street railway company liable for injuries received by a person traveling upon one of its cars, the negligence of its servants, either alone or in concurrence with the negligence or wrongful act of other persons, must be the proximate cause of the injuries.

2. The wrongful act of a stranger is not sufficient to make it liable, unless it might reasonably have been foreseen and guarded against by the carrier.—(Bevard vs. Lincoln Traction Co., 105 N. W. Rep., 635.)

NEBRASKA. — Carriers — Injury to Passenger — Burden of Proof—Negligence—Presumptions—Evidence—Duty as to Passengers—Witness—Impeachment.

1. In an action against a street railway company for damages for injuries sustained by one of its passengers, the burden of proof on the question of negligence does not shift to the defendant upon proof that the injuries resulted from a derailment of the car.

2. In such case a presumption of negligence arises from the fact of derailment; but, when that presumption is met by evidence which makes it equally probable that the accident was not due to negligence on the part of the defendant, in the absence of other evidence tending to establish the affirmative of the issue, the defendant is entitled to a verdict.

3. A street railway company is not an insurer of its passengers. It is not bound to do everything that can be done to insure their safety. It fulfills its obligations in that regard when it exercises the utmost skill, diligence, and foresight consistent with the practical conduct of the business in which it is engaged.

4. On a subsequent trial the evidence of a deceased witness, taken at a second trial, cannot be impeached by showing that some of his statements on the witness stand at the first trial are inconsistent therewith, where, upon the second trial, his attention was not directed to such statements, and he was given no opportunity to explain the alleged discrepancies.—(Omaha St. Ry. Co. vs. Roesen, 105 N. W. Rep., 303.)

NEW HAMPSHIRE.—Appeal—Review—Presumptions—Negligence — Contributory Negligence Injuries — Last Clear Chance—Street Railroads—Persons in Street—Injuries—Proximate cause—Instructions.

1. Where, in an action for injuries, the jury were not directed to pass on certain evidence, it would be presumed on appeal that such evidence was true, and would have established in the hands of the jury everything it tended to prove.

2. If a person is injured, in part by the negligence of another and in part by the insufficiency of the driver, horse, or carriage by which the person injured was being conveyed, which insufficiency was due to his own want of care in selecting them, no recovery could be had, not because the driver's negligence, or the defect in the horse, harness, or carriage, was imputable to the person injured, but because his own fault in selecting them was the proximate cause of the injury.

3. Where, in spite of plaintiff's negligence in selecting an incompetent driver, defendant street car company by the exercise of care could have prevented injury to plaintiff in the position he occupied in the care of such driver, defendant's failure to do so constituted the sole cause of the injury, for which plaintiff was entitled to recover, notwithstanding his prior negligence in selecting such driver, or the driver's negligence at the time of the accident.

4. Plaintiff was injured in a collision with a street car while he was being driven in a carriage by a driver claimed to have been negligent and intoxicated. There was evidence that, notwithstanding the driver's negligence and condition, the accident could have been prevented by defendant's motorman by the exercise of ordinary care, but the court charged that plaintiff's previous negligence in riding with such driver, or his misconduct in getting drunk, were not matters which would excuse defendant, if at the time of the accident plaintiff was doing all that prudence required of a person in his situation, and that in law plaintiff's prior negligence merely furnished an occasion for defendant to negligently injure him, and that its fault would be the legal cause of the accident, and the fact that the driver was drunk and was grossly negligent would be no defense; the question being, could plaintiff, at the time of the accident, have avoided the effect of the driver's fault by the use of ordinary care? Held, that such instruction was objectionable, as tending to mislead the jury in determining whether the insufficiency or negligence of the driver or defendant's failure to prevent the accident was the proximate

cause thereof.—(Hanson vs. Manchester St. Ry., 62 Atl. Rep., 595.)

NEW YORK.—Trial—Instructions—Pleading and Evidence to Sustain—Carriers—Injury to Passenger—Variance.

1. In an action for injury to a street car passenger, a charge that the mere fact of a car moving does not militate against the plaintiff, that it is a question for the jury whether there was negligence on the part of defendant, and that, if the plaintiff could reach the car and the car was slowly moving, the law leaves it for the jury to say whether the plaintiff was guilty of negligence in attempting to board the car at the time, was erroneous, under the allegation of the complaint that the car had come to a standstill and plaintiff's testimony that it might have been moving "a little bit; a child could have got on it though."

2. Where plaintiff alleged in his complaint that the car came to a standstill for the purpose of allowing him to board it, he could not recover on proof that the car was moving, no matter how slightly, when he attempted to board it.—(Wainwright vs. Interurban St. Ry. Co., 96 N. Y. Sup., 114.)

NEW YORK. — Carriers—Injuries to Passengers — "Sudden Jerk"—Res Ipsa Loquitur—Proof of Negligence.

1. Plaintiff, a passenger on an elevated railroad, testified that on arriving at a station she got up and was just going out of the car, when it gave such an extraordinary jerk that she was forced forward, causing her to fall and be injured. Held, that plaintiff's injury was not due to defective means or appliances employed in operating the train, and that the doctrine of "res ipsa loquitur" did not apply.

2. Where an action for injuries to a passenger was based on the fact that the car gave an extraordinary jerk or jolt, which forced her forward and knocked her down, and no error on the part of defendant's servants in operating the train was pointed out, it did not appear that the jerk was not incidental to the stoppage of the train in the usual and customary method of operation.—(Flynn vs. Interborough Rapid Transit Co., 96 N. Y. Sup., 259.)

NEW YORK.—Carriers—Injuries to Passengers—Street Railroads—Contributory Negligence—Question for Jury.

In an action for injuries to a passenger while standing in the aisle of a crowded street car, evidence held to require submission to the jury of the issue of plaintiff's contributory negligence in failing to have hold of a strap at the time he was injured.—(Butler vs. New York City Ry. Co., 96 N. Y. Sup., 254.)

NEW YORK.—Carriers—Injury to Passenger—Collision of Street Car with Wagon—Negligence.

In an action for injury to a passenger in a street car from collision with a heavily loaded wagon, which, after meeting the car and passing the front of it, 2 ft. to 4 ft. from it, struck a curve and slewed into the car, the motorman, who had the car under such control that it was stopped within a foot after the collision, cannot be held to have been negligent; the circumstances not indicating an apparent danger requiring him to stop and wait for the wagon to pass.—(Freeland vs. Brooklyn Heights R. Co., 96 N. Y. Sup., 251.)

NEW YORK.—Carriers—Transfers—Ejection of Passenger—Action for Assault.

1. The reasonableness of a provision in a transfer ticket that it is good only at intersection of issuing line is a question of law.

2. In an action against a carrier for an assault committed by defendant's conductor in ejecting plaintiff from a car on her refusal to pay fare, when informed by the conductor that the transfer ticket presented by plaintiff was void under the provision therein that it was good only at intersection of issuing line, it was reversible error to submit to the jury the question of substantial violation of the rule, where there was no dispute as to the fact that plaintiff boarded the car at a point substantially distant from the intersection, notwithstanding testimony of the plaintiff that she first waited at the intersection between five and ten minutes for a car, that none came, that she was just convalescent, that the day was windy and chilly, and that she walked away on the street of intersection and boarded the car at the distance of a block therefrom.—(Hanley vs. Brooklyn Heights R. Co., 96 N. Y. Sup., 249.)

RHODE ISLAND.—Carriers—Street Railroads—Injury to Passenger—Evidence—Stopping Places—Custom—Actions—Instructions.

1. Where, in an action for injuries to a passenger while attempting to alight from a street car, defendant introduced a plan showing the street where the accident occurred, with its intersecting streets, track, location of "white poles," and various dis-

tances between "white poles," it was error for the court to exclude a question as to whether the defendant had any established stopping places on that street, for the purpose of explaining the meaning of the "white poles" already shown to exist.

2. Where, in an action for injuries to a passenger while attempting to alight from a street car, the testimony as to the cause of the accident was conflicting, evidence that defendant had established stopping places at the time of the accident, and the relations of such fact to defendant's rules as to the stopping and starting of cars for passengers to alight, was admissible.

3. In an action for injuries to a passenger while alighting from a street car, by an alleged premature start, it was error for the court to refuse to charge that, if the car came to a full stop, and before plaintiff's wife had fully alighted therefrom it was started on a signal to start, given by some person not authorized to give the same, and the accident could not have been prevented after the giving of such unauthorized signal by the exercise of due care on the part of the conductor or motorman in charge of the car, plaintiff could not recover.—(Moore vs. Woonsocket St. R. Co., 63 Atl. Rep., 313.)

RHODE ISLAND.—Appeal—Verdict—Sufficiency of Evidence—Damages—Personal Injuries—Fractured Kneecap—Parent and Child—Earnings of Infant—Loss of Services—Damages—New Trial—Excessive Damages—Disregard of Instructions.

1. Where plaintiff's evidence, if believed, is sufficient to support the verdict, it cannot be interfered with on appeal.

2. Twelve hundred dollars is not excessive damages for a fractured kneecap.

3. A father is presumptively entitled to the earnings of an infant son.

4. In an action by a father for injuries to his child, the measure of damages is the son's full earning capacity, and not merely the "net result" of his earnings.

5. In an action by a father for injuries to his son, the fact that the verdict for \$400 was \$1.50 in excess of the damage proven did not require the granting of a new trial on the ground of excessiveness of the verdict.

6. The fact that in estimating damages the jury disregarded an erroneous instruction is not ground for a new trial, the verdict being justified by the evidence.—(Galligan vs. Woonsocket St. Ry. Co. (two cases), 62 Atl. Rep., 376.)

RHODE ISLAND.—Carriers—Injury to Passenger—Contributory Negligence—Question for Jury—Obligation of Company—Assumption of Risk—Evidence—Opinions—Competency of Witness.

1. It is not negligence per se for a passenger on a street car to stand on the running board, and hold the post or handle affixed thereto, where the car is so filled that there is no room inside.

2. A street railway company, accepting a passenger obliged to stand on the running board of the car because he cannot be accommodated inside the car, must do all that human vigilance reasonably can to prevent injury to him.

3. Where, in an action for the death of a street car passenger occasioned by his being thrown from the car, the evidence showed that decedent was obliged to stand on the running board of the car because of its crowded condition, and that he held onto the post with both hands, and that previous to the accident the car swayed violently, the question of the negligence of the company in operating the car was for the jury.

4. A passenger on a street car, who stands on the running board of the car, assumes only the risk of the ordinary motion of the car.

5. A witness who does not know the ordinary rate of speed of a street car on a particular route is not competent to testify that a car on a particular occasion on that route was run at an extraordinary rate of speed.—(Verrone vs. Rhode Island Suburban Ry. Co., 62 Atl. Rep., 512.)

RHODE ISLAND.—Carriers—Injuries to Passenger—Negligence—Burden of Proof—Evidence—Mortuary Tables.

1. In an action for injuries to a passenger, evidence of a collision between two cars controlled by the carrier cast on it the burden of explaining the implication of negligence arising therefrom.

2. Where, in an action for personal injuries, evidence to prove the permanent disability of plaintiff was admitted without objection, though not pleaded, the admission of Carlisle life tables was not error, such tables being admissible where permanent injury is averred and proved.—(O'Clair vs. Rhode Island Co., 63 Atl. Rep., 238.)

TEXAS.—Carriers—Action for Injuries—Burden of Proof—
Trial—Question for Jury—Appeal—Review—Verdict—Suf-
ficiency of Evidence.

1. In an action by a passenger for injuries he must make out his case by a preponderance of the evidence.

2. It is the province of the jury to weigh the evidence and determine the preponderance.

3. An appellate court cannot disturb a verdict, unless the evidence is such that no reasonable mind can form from it the conclusion reached by the jury.

4. In an action for injuries to a passenger, evidence held sufficient to show that plaintiff was not injured while a passenger on defendant's road.—(Domenico vs. El Paso Electric Ry. Co., 90 S. W. Rep., 60.)

TEXAS. — Carriers — Personal Injuries — Contributory Negligence — Negligence — Proof Required — Damages — Instructions—Method of Estimating.

1. A boy, riding on the running-board of a street car, putting one foot on the ground, and jerking it up again for amusement, was guilty of contributory negligence, if of sufficient discretion to understand the danger.

2. In an action for personal injuries, contributory negligence need be proven only by a preponderance of the evidence, and not "by a preponderance of the evidence to the satisfaction of the jury."

3. In a suit by a parent for injuries to an infant, an instruction that the value of the boy's services during minority was to be ascertained by the jury from their common sense, sound discretion, and the evidence, was not erroneous.—(El Paso Electric Ry. Co. vs. Kitt, 90 S. W. Rep., 678.)

TEXAS.—Damages—Personal Injuries—Instructions.

Where, in an action for injuries to plaintiff's wife, the court charged that recovery could be had only for expenses for medical services and medicines theretofore incurred, and there was no evidence before the jury of a greater amount for such expenses than that claimed in the petition, the refusal to caution the jury not to go beyond the amount so claimed, and consider future expenses, was not error.—(San Antonio Traction Co. vs. Menk, 88 S. W. Rep., 290.)

TEXAS.—Appeal—Presumptions—Propriety of Instructions—Negligence—Contributory Negligence—Burden of Proof—Trial—Instructions—Necessity of Request—Street Railroads—Injuries to Persons on Tracks—Discovered Peril—Duty of Motorman.

1. In an action for injuries, a charge that, "in view of the argument of plaintiff by his counsel, you are charged" that, unless plaintiff was injured through defendant's negligence, it will be the duty of the jury to return a verdict for defendant, though it may believe a verdict for plaintiff would brighten his life and make him happier, will be presumed on appeal, in the absence of a showing as to what the argument was, to have been inspired and warranted by the argument.

2. In an action for injuries, plaintiff has the burden of establishing by a preponderance of evidence all facts necessary to his recovery; and, until he has made a prima facie case by producing evidence sufficient to establish such facts, it is not incumbent on defendant to prove plaintiff's contributory negligence.

3. An omission to charge on certain issues raised by the pleadings and evidence is not ground for reversal, in the absence of any request to charge upon such issues.

4. A motorman who discovers the peril of a person on the tracks is bound to use only ordinary care to use all the means at hand to avoid injuring the person in peril.—(Beaty vs. El Paso Electric Ry. Co., 91 S. W. Rep., 365.)

TEXAS.—Evidence—Opinion Evidence—Admissibility.

In an action against a street railroad for injuries to a child ten years of age, it is competent to prove plaintiff's age and all other facts necessary to enable the jury to decide the question of her contributory negligence, and persons, who are acquainted with her, may testify that she is intelligent or the reverse; but after such facts have been narrated, the inferences and conclusions to be drawn therefrom are for the jury, and it is not competent for witnesses, whether experts or non-experts, to testify to their opinion that plaintiff is not of sufficient intelligence to appreciate the danger of going on a street car track without looking and listening for a car and has not the circumspection to avoid danger which an adult person would have.—(Citizens' Ry. Co. vs. Robertson, 91 S. W. Rep., 609.)

VIRGINIA.—Electricity—Injury from Live Wire—Presumption of Negligence—Rebuttal of Presumption—Evidence—Sufficiency—Proximate Cause—Harmless Error—Expert Testimony—Instructions—Damages.

1. Electric companies are not insurers against accidents, but they are held in a high degree of care in the construction and maintenance of their dangerous appliances.

2. The fact that a child was injured by picking up a live electric wire which had fallen to the sidewalk, created a presumption of negligence on the part of the corporation owning and maintaining the wire.

3. In an action for injuries sustained by a child picking up a live electric wire that had fallen to the sidewalk, the testimony of a lineman that he looked over the wire every day, and that between 6 and 7 o'clock in the morning of the day of the accident he had looked over the wire in question, and had found it all right, was not sufficient to remove the presumption of negligence on the part of the corporation owning and maintaining the wire.

4. The presumption of negligence which arises from an injury to a pedestrian in a public street from a broken electric wire is not overcome by testimony of employees of the one owning and maintaining the wire that the wire was properly constructed and put up.

5. Through a question asked a witness and his answer thereto are improper, if the propounder's case has been completely made out otherwise, the error is harmless.

6. Though exception to the testimony of a witness is well taken, if the same fact is proved by other witnesses without objection, the error is harmless.

7. In an action for injuries to a child caused by his having picked up a live electric wire that had fallen to the sidewalk, a witness testified that two women were struck in the face by the wire, but not injured, and that the child grasped it at a point where it was not insulated, and that he thought he (the witness) took hold of it at a place where it was insulated without being hurt. Held, that such evidence did not show that a lack of insulation, and not the falling of the wire, was the proximate cause of the injury.

8. In an action for personal injuries, it was proper to permit the physician who attended plaintiff to testify as to the probable future effects of the injuries.

9. In an action for personal injuries, the jury may consider, in addition to the expense and pain and loss already incurred and suffered, such as will reasonably and probably result as a consequence.

10. On appeal in an action for personal injuries suffered by a child, the question whether there was error in permitting his mother to testify that she had spent \$7 for medicines was precluded by the maxim, "De minimis non curat lex."

11. Where no exception was taken to certain testimony when the question was asked the witness, and no bill of exceptions subsequently asked for, and there was no mention of such an assignment of error in the petition to the Supreme Court for a writ of error, the admissibility of the testimony could not be considered on appeal.

12. The verdict of the jury in an action for personal injuries could not be disturbed on appeal where there was nothing to show that the jury were actuated by prejudice or partiality.—(Norfolk Ry. & Light Co. vs. Spratley, 49 S. E. Rep., 502.)

WASHINGTON.—Carriers—Injury to Passengers—Evidence—Negligence—Presumptions—Evidence—Question for Jury.

1. An accident resulting in injury to a passenger on a street car was caused by the blowing out of the controller on the car. The company had control over the equipment and operation of the car, and the passenger was not charged with contributory negligence. Held, the company was presumptively guilty of actionable negligence, it being presumed that the accident was caused by a defect in the controller.

2. A passenger on a street car, who, on being placed in danger in consequence of the blowing out of the controller on the car, jumped from the car with a view of saving himself and was injured, was not deprived of the right to insist that proof of the accident presumptively showed actionable negligence on the company's part.

3. In an action against a street railway company for injuries to a passenger by reason of the blowing out of the controller on the car, witnesses for the company testified that they did not know what the cause of the accident was, and that sometimes a blowing out would occur and the cause could not be ascertained. Plaintiff showed different causes for the explosion which might have been controlled and remedied by the company. Held, that the question whether the company rebutted the presumption of negligence arising from the occurrence of the accident was for the jury.—(Firebaugh vs. Seattle Electric Co., 82 Pacific Rep., 995.)

LONDON LETTER

(From Our Regular Correspondent.)

The Houses of Parliament are at present full of electrical affairs, and the London County Council is at present one of the chief promoters of electrical enterprise. Dealing first with its regular tramway work, the Council recently secured a victory as regards its bill for the construction of tramways along the Victoria Embankment and over Westminster Bridge and also over Blackfriars Bridge. The committee of the House of Commons has given its decision on these points favorably and the bill has now been ordered for third reading. It is not expected that the House of Lords will offer such strenuous opposition to the bill as in past years, especially as the Corporation of London has agreed with it. Pending the widening of Blackfriars Bridge, the tramways on the embankment would have to stop at a point opposite John Carpenter Street, and the committee has also insisted that the roadway at Westminster Bridge would have to be widened by taking 2 ft. away from each of the two footways. Clauses giving authority to the Metropolitan Police to control the traffic over these bridges on state occasions have also been inserted, and the period of construction has been reduced from seven years to five years. The bill, however, for the construction of a tramway from Cricklewood to Marble Arch by way of Edgware Road, which was a joint bill with the Middlesex County Council, has not been successful, the committee not having found the preamble of this bill proved. The Embankment and Bridges bill has, of course, met with the most strenuous opposition, the chief among the opposition being the bus owners and motor bus owners, who have balked the bill for so many years. It is a bill, however, which is bound to succeed in time, as it is one in favor of the general public, and there is a better chance now than heretofore with the strong Liberal Government now in office. It was brought out in committee that the tram lines on Westminster Bridge would not be placed in the middle of the bridge, but would keep to the side, and also that the lines on the embankment would be on the water side. In this way they would interfere with carriage and bus traffic as little as possible. When the work is done, the new subway line will be continued from the Strand to the western steps at Waterloo Bridge, emerging on the surface at that point. Mr. Fitzmaurice, chief engineer to the London County Council, also brought out the interesting information that the embankment was amply strong enough to sustain the weight of the tramways, and that although the embankment near Blackfriars Bridge especially had been some time in settling, the popular view that the embankment was founded on mud was a delusion. Another important decision laid down by the committee was that the Council would not have power to lay down tramway rails on the surface of the streets during the reconstruction of tramways for electric service. In the meantime, the work of the extensions already granted is being vigorously pushed. The Greenwich central station will soon be ready for work. Two new sub-stations are in course of construction at Battersea and Wandsworth, and there will be three new sub-stations at Limehouse, Mildmay and Shoreditch, while some of the older existing sub-stations will be discontinued as soon as the Greenwich central station is put in service. The new line from the corner of Victoria Street and Bridge Street near Victoria Railway Station is practically completed, and one of the interesting features of this section is that the lines are continued across the new Vauxhall Bridge, and while this has not yet been opened for service, trials of electric tramway cars across this bridge have already been made.

Important as this work is, much greater interest is being aroused at present by the bill which the London County Council has in Parliament to supply electricity in bulk for practically all purposes in the area of the county of London, and a committee is now sitting on that question and taking expert testimony from various sources. This bill is much in the same line as the bill brought forward last year by the Administrative and County Syndicate, which was thrown out at the last moment. J. H. Rider, electrical engineer to the London County Council, has been perhaps the most important witness, and he has been subjected to a most severe cross-examination, although he appeared to enjoy the hackling, and was never put out by any of the searching questions of the opposition. Mr. Ryder stated that the voltage would be 6000, which would give good, economical distribution, although to the far eastern sections of the area step-up transformers would be used. He felt not the slightest nervousness in placing high-tension mains underground in London, as the risk of break-

downs was practically nil. The Blackwall tunnel under the river would also be used for carrying cables. He stated that he considered the London County Council proposition to have its power houses on the Thames more practicable than if the electricity were generated some distance from London at the mouth of the coal pits, as such a scheme would necessitate overhead transmission, which would be a source of danger. Robert Hammond also gave a vast amount of testimony as to the capital expenditure, maximum load, plant, capacity, etc., of practically all of the companies at present serving London. He gave also all the prices charged by the various local authorities, and found that they ranged from less than 2½d. per unit in Stepney and Poplar to just over 5d. in Ealing, while the average price charged by companies averaged from a fraction over 2½ in Bermondsey to a fraction over 7d. in Chiselmurst. Previous to this, T. McKinnon Wood, M. P. and chairman of the Parliamentary committee, gave valuable evidence as to the extent of the scheme which the Council had in mind, the expenditure being something like £355,000 in 1907, £545,000 in 1908, and £449,000 in 1909. This bill has, of course, been vigorously opposed by the existing electric lighting companies, and by the local authorities already furnishing current within the London area. Certain compromises will undoubtedly be made, and it is thought that with the present government, the London County Council has a very fair chance of getting its bill passed.

The Hastings & District Electric Tramways Company has during the past month started a service of electric cars between Bexhill and St. Leonards-on-Sea, a distance of about 3 miles, and this route has already become very popular. The fight as to the equipment of the Hastings front has now been settled, the Town Council having consented to the laying down of a tramway on the Dolter surface contact system. This is extremely satisfactory, as experience elsewhere has proved that the conduit system on the front would not have been so satisfactory, and as up to the present time the Town Council has thoroughly opposed overhead construction on the front, the surface contact system is undoubtedly the best solution of the difficulty for the present. This ought to be a valuable franchise to the company, and will, so far as the writer can think of for the moment, be one of the very first electric tramways to be permitted to run along the front of any of England's fashionable watering places.

The London United Tramways Company is vigorously completing some of its various extensions, and the line between Malden and Kingston and the line from Kingston by way of Richmond Road to the Kingston entrance of Richmond Park are now practically completed. The extension from New Malden to Raynes Park by way of Wimbledon is also almost completed, and will be open for service in the near future. The company is also seeking Parliamentary powers this year for various other additions and extensions to its system, which from all appearances will have a successful issue.

In connection with the electrification of the railway between Victoria Station and London Bridge Station, and the London, Brighton & South Coast Railway, about which so much has been written, owing to the fact that it will be equipped by single-phase, high-tension system, it is interesting to note that the London Electric Supply Corporation has been awarded a contract to supply the London, Brighton & South Coast Railway with current for the new electric trains for the next seven years. In a recent interview with Philip Dawson, the consulting electrical engineer of this railway, the writer was informed that the work of the overhead catenary construction would be commenced within a couple of months, and that the construction of the first electric trains was well in hand. It is expected that in about nine months to a year this first section of the railway will be in operation. The sooner it gets in operation the better it will be for everyone, and there is little doubt that many electrical schemes of this nature for main line equipment are being held up until some definite results are seen from this most interesting piece of work.

The Lancashire & Yorkshire Railway Company, however, is evidently not inclined to wait for results of any other railway, and has decided to make considerable extension to its already existing electrical line from Liverpool to Southport, using the same system which is at present in service, and which, it will be remembered, was installed by Dick, Kerr & Company, of London. The results from the electrification of this branch of the Lancashire & Yorkshire Railway have been marvelously good, and, for this class of traffic, the Lancashire & Yorkshire Railway is evidently well convinced that electric trains are the most suitable.

So successful has the Falkirk Tramway been that the Falkirk District Tramways Company is promoting a bill in Parliament this year for considerable extensions, one of these being about

2 miles to Laurieston and the other between 3 miles and 4 miles to Grangemouth, situated on the River Forth. The whole district around Falkirk is a busy one, and no doubt the extensions of these tramways will be extremely popular. Laurieston has a population of about 3500, and at present has only indifferent transportation by brakes and buses. There is a railroad from Falkirk to Grangemouth, but there are no intervening stations, and the district will undoubtedly be better served by a tramway. The extension will cost about £57,000, and the Parliamentary committee has passed the preamble of the bill.

The Ardrossan, Saltcoats & District Tramways Company has also a bill in Parliament, which is for the construction of a tramway from Portincross to Noble's dynamite factory at Ardeer. The total length is 11½ miles, with a pier at Portincross, and the character of the country through which the tramway will run is very varied. Ardrossan and Saltcoats are, of course, large towns, and Stevenston is also an important industrial center. The scheme is naturally being opposed by the local railways, but a service of tramways in this district would undoubtedly be useful.

It would almost appear that a letter relating to British transportation matters, especially in London, would be incomplete without a reference to the motor-bus mania, which seems to have struck its roots deeply into the metropolis. There are now something like 400 motor omnibuses plying in the streets of London, and the noise and smell is beginning to be annoying. Motor buses have undoubtedly achieved a big success, but whether it is to be continued or not, remains to be seen. Electric cars will undoubtedly continue as before, and with their cheap fares and smooth running are undoubtedly in a firmly entrenched position. The horse omnibus in London is practically doomed, and these are being replaced practically every day just as fast as motor buses can be secured, both by new companies operating motor buses alone, and old horse omnibus companies, which are replacing the horse omnibus by motor omnibus. New companies are also being floated, and we ought, perhaps, to refer particularly to the one which was recently placed before the public under the name of the London Electrobuses Company. It is quite evident that a large number of the public, attracted by the success of the motor-bus companies, applied for shares of this concern, but various technical journals and the daily press immediately afterward began to attack the company in most severe fashion, so that a large portion of the subscribers have canceled their subscriptions, and the money, the writer understands, is to be returned to them, when a legal mode of doing so is arrived at, thus avoiding many threatened lawsuits. It is not to be wondered at that the position of the company was attacked, as, so far as can be gathered, there is little new in the system which this company intended to use, the system being simply a storage battery bus with suitable electric motor, etc. As anyone knows who is the least bit versed in electric traction matters, the history of the storage battery has been one of constant failure in electric traction, so it is not to be wondered at that soon after the issue the papers attacked the venture.

A much more interesting case, however, is that of the Gearless Motor Omnibus Company, which has not yet been floated, but which will go to the public in a few days. The system of propulsion to be adopted in this case is that known as the auto mixte, which is the name given to the arrangement of gasoline-electric combination, with storage battery auxiliary. This particular company has extremely good backing, E. Manville and Philip Dawson, the well-known consulting electrical engineers, both being directors. It will be an interesting system, and we hope in a later issue to give a description of it.

A month or so ago, we published an illustrated description of the Romapac system of patent renewable tram rails, with views of the special engine and apparatus for laying these rails and removing the worn out top when necessary. At that time only a very small portion of this system had been placed in Leeds, and we now have pleasure in reporting that the Leeds Corporation has placed with this company, the Romapac Tramway Construction Company, Ltd., an order for replacing a considerable portion of its wornout track, and has decided that a length of not less than 1 mile shall be laid as soon as possible. This decision has undoubtedly been arrived at in consequence of the satisfactory working of the short length referred to which was laid at Headingley last year. It will be remembered that this system consists in laying a special T-rail in the ordinary way, to the top of which is attached a tread rail by means of a special flanging machine. The system undoubtedly possesses many merits, and the experiment in Leeds will undoubtedly lead to further business for the company from other corporations.

The Dudley Town Council has reported that the arbitrator has

decided that the Council can acquire the electric tramways in the borough for upwards of £71,000, and as negotiations are taking place for acquiring the Netherton Tramways for £16,000, the Board of Trade will be asked to sanction the obtaining of a loan for £90,000, to complete the purchase and payment expenses.

The Leyton District Council has been endeavoring to obtain from the conservators of Epping Forest permission to widen Whipp's Crossroad and Lea Bridge Road by the acquisition of a portion of forest land for the purpose of the new electric tramways, the construction of the permanent way of which is now proceeding, or to use the forest land on which to place the poles and switch pillars for the overhead wires. From the beginning the conservators have been decidedly averse to encroaching on forest land, but in a letter which has been received from the solicitor to the City of London Corporation the alternative concession has been granted on condition that the Leyton Council pay the nominal rental of £1 annually for every pillar erected on the forest land. The Leyton Council has decided to accept this condition, and at the annual meeting several members expressed their pleasure at the way in which the Epping Forest conservators had considered the district's request.

Progress still continues to be made along the East Coast of Fife Tramway route. From the terminus at Carberry, Leven, to Muiredge Colliery the line has now been completed, and the section from Muiredge to the coal town of Wemyss will probably be finished very soon. From Coaltown to a point well on to the West Lodge the field rails have been laid, and work is being pressed forward also with the construction of the lines on the turnpike. The work of fitting up the engines at the power station at Denbeath is being pushed forward with all possible haste, and the car shed at Aberhill is practically finished.

The promoters of the scheme for the construction of a tramroad between Southport and Lytham—one feature of which is the erection of a conveyor bridge over the estuary of the Ribble—have recently been before a committee of the House of Lords with a proposal for an extension of time for the completion of the works, the necessary capital not having so far been raised. It was agreed that the building of the embankment in the neighborhood of Southport, apart from the tramway, should be completed by December, 1907, and the tramway by July 31, 1908. This gives one year's extension to the company for so much of the tramway as is on the land of the Corporation. The rest of the works is to be completed by 1910.

The Mansfield Council has informed the Board of Trade that it strenuously objects to the proposal of the Mansfield & District Light Railway Company to utilize its lines for goods traffic between the hours of 8 p. m. and 8 a. m., and to use electric locomotives with trailers, each capable of carrying 10 tons. The idea of the company is to convey coal from neighboring collieries to the town, and it is held that the traffic would constitute a danger to the public and a nuisance to people living alongside the line by preventing them from sleeping.

On May 31 the Corporation of Croydon will take over its own tramways from the British Electric Traction Company, and the system will be worked in direct communication with that of the South Metropolitan Company.

MASSACHUSETTS STREET RAILWAY MERGER

At a special meeting of the New Bedford & Onset Street Railway Company, the necessary two-thirds vote of the stock was secured, approving the terms of the contract for the consolidation of the New Bedford & Onset Company and the Taunton & Buzzards Bay Company, as agreed upon by the directors of the two companies. By the terms of the contract the New Bedford & Onset Company will seek authority from the Railroad Commissioners for leave to issue \$50,000 additional stock, increasing the capital stock from \$500,000 to \$550,000, the new issue to be given the present owners of the Taunton & Buzzards Bay Company in exchange for the surrender and cancellation of the stock of the Taunton & Buzzards Bay road. In addition to this the New Bedford & Onset assumes the payment of 4 per cent interest on the bonded indebtedness of \$150,000 of the Taunton & Buzzards Bay road.

A proposal has been made by the Postoffice Department to the Milwaukee Electric Railway & Light Company to operate two postal cars between the five sub-stations and the general post-office in Milwaukee.

UNDERLYING COMPANIES OF THE CHICAGO UNION TRACTION COMPANY TO FORM AN AGREEMENT FOR DEALING WITH THE CITY

An agreement which has been drawn up and which will be submitted for ratification to the stockholders of the North and the West Chicago Street Railway Companies, provides for settling the differences between these companies and the Chicago Union Traction Company, so far as dealing with the city is concerned. It is reported that the agreement provides for a new company, which will take over all the rights and interests of the companies concerned. The new company will have absolute ownership of the properties, and can turn them over to the city with a clear title should the latter decide to buy them. The arrangements for a new company will not, however, affect the details of the troubles between the Union Traction Company and the underlying companies. These will be threshed out in the courts.

Difference over the manner of reconstructing the La Salle and Washington Street tunnels have been adjusted. Engineer Ericson for the city, who favored reinforced concrete construction without cross I-beams, for the new roofs of the tunnels, has agreed to the plan of Samuel Artingstall, engineer for the traction companies, who favors the use of I-beams. The increased cost of the latter construction, about \$25,000, it is reported, will not be charged against the city should the latter purchase the railway systems at any time. This dispute as to the form of construction prevented the passing of the ordinance at a recent meeting of the Council, but it is now probable that the ordinance, with full provisions for lowering the tunnels, will be passed at the June 4 meeting of the Council.

PROGRESS ON THE ELECTRIFICATION OF THE WEST JERSEY & SEASHORE DIVISION OF THE PENNSYLVANIA RAILROAD

Work on the construction of the electrified section of the trunk-line railroad between Camden and Atlantic City is progressing rapidly. In order not to interfere with the regular operated steam trains, much track work has been done at night. In addition, an 8000-kw generating station and seven separate substations are being erected and equipped. At South Camden, Glasboro, Newfield and Reega, each sub-station contains two 750-kw rotary converters with auxiliary apparatus, with arrangements for a third complete set. At Mizpah and Clayville there are two 500-kw rotary converters, with room for a third, while at Atlantic City two 750-kw machines are being installed, with an ultimate equipment to consist of two additional 1000-kw units. The eighth sub-station is at the main generating plant and contains two 750-kw rotary converters.

The third rail is of the over-running type and is mounted on reconstructed granite insulators. The cable is laid in bituminized conduit, embedded in cement. A terra cotta cap completely protects the cable entrance of the conduit from the weather. The bonding on the 140 miles of track is well in hand and more than two-thirds is completed.

The power station will contain three 2000-kw Curtis steam turbines with 6600-volt alternators, and 33,000 volts is used for transmission. The third rail carries 650 volts. In the city of Camden, and between Newfield and Millville the overhead trolley will be installed.

It is entirely probable that when this appears the turbines will be in process of erection at the main station, and that a month from now they will be operating the cars over the new line—the longest section of trunk-line steam road up to the present electrified.

EDUCATING THE BROOKLYN PUBLIC

It is not usual but all the more commendable for a large public service corporation to take its patrons into its confidence and tell them of the work being done for their comfort. This progressive spirit is shown by the Brooklyn Rapid Transit Company, and is especially exemplified in the publication of a well-written and neatly printed pamphlet describing in popular style the merits of the Brooklyn Rapid Transit Company's new standard car (described in the STREET RAILWAY JOURNAL of Nov. 18, 1905), and explaining to patrons the local conditions that led to its adoption. This booklet is to be distributed among the patrons of the com-

pany, many of whom have already expressed their appreciation of this type. It has been established beyond dispute that this car has improved the running time on all the lines where it has been installed.

FROM ATLANTA TO MACON

Application is to be made to the City Council of Atlanta by the Atlanta, Griffin & Macon Electric Railway Company, shortly to be formally organized, to build into Atlanta on streets now occupied by the Georgia Railway & Electric Company. The petition asks for the right to enter the city at the south end of Capitol Avenue, and to run a double track along Capitol Avenue to Little Street, on Little Street to Fraser, on Fraser to Rawson on Rawson to Crew; a single track from the corner of Capitol Avenue and Little Street west, on Little Street to Crew, on Crew to Rawson, there to join the double track; then from Rawson to Trinity Avenue, with double track, then along Trinity Avenue to Washington, on Washington to proposed viaduct, to cross the viaduct to Gilmer Street, on Gilmer Street to Ivy, on Ivy to Exchange Place, and thence to Pryor Street, the terminus.

Briefly, the plan of the company is to build from Atlanta to Hapeville, Forest Park, Jonesboro, Hampton, Griffin, Forsyth and Macon, the total length being a little over 100 miles. The projectors say that they will probably select a route in the country districts through private land rather than on the public roads, as that will give a more direct route and save distance. The men interested in the company are N. B. Drewery, of Spalding County; W. J. Masee, Minton Wimberly and J. T. Moore, of Bibb County; N. P. Pratt, Clifford L. Anderson and W. A. Wimbish, of Atlanta.

THE UNION TRACTION COMPANY'S TERMS IN ANDERSON

The Indiana Union Traction Company is seeking a settlement of its franchise rights in Anderson. In 1902 the city granted the company an extension of franchise for a period of thirty years, making the present franchise reach to 1952. This extension was on condition the company would do four things, namely:

(1) Increase the power plant in North Anderson. (2) Build the company shops in or near Anderson. (3) Build a line from Anderson to New Castle by way of Middletown. (4) Build a line from Anderson to Elwood and Frankton. The company was given two years within which to complete these improvements, and this was extended to Dec. 1, 1906.

President Brady recites that the company has extended its power house plant, built the Anderson-New Castle line as far as Middletown, and says the company is now ready to build the proposed shops, the material investment to be \$125,000. He says, however, that the company is unprepared at present to go ahead with the work of constructing the Elwood and New Castle lines, and that conditions have so changed that it would be inexpedient to build the Elwood line even though the company were prepared. He asks that the city give the company twenty years and six months of the thirty years extension, because of the part of the agreement it has fulfilled, and will fulfill, by erecting its shops. He then asks that the remaining ten years be given if in that time it constructs the Elwood and New Castle lines. The city has taken the matter under advisement.

THE PACIFIC TRACTION COMPANY'S PLANS

Benjamin J. Weeks, formerly of the Spokane Traction Company, has assumed his duties as general manager of the Pacific Traction Company, recently organized. He says that work on the Centralia and Chehalis lines will begin as soon as franchises and rights of way matters can be settled, and that it is the intention of the company to build the line from Centralia north by way of Olympia to Tacoma and south to Portland. The supposition is that the line will extend from Tacoma to Seattle via Julius Gulch. The plans for a through line from Seattle to Portland are not sufficiently advanced for official announcement. The Centralia-Chehalis proposition is altogether separate from the Felt projects, and it is backed by different interests. C. H. Weeks, Cyrus Bradley, Ernest Levenson of Spokane, and Mr. Kennon, of Centralia, are interested with Mr. Weeks in the building of that line. The Centralia-Chehalis line will be built to Portland south from Centralia and Chehalis and north into Tacoma. As for the extension of the line to Grays Harbor, that has not yet been considered.

RAILROAD LEGISLATION IN MASSACHUSETTS

The two railway committees of the Massachusetts Legislature have voted to report without change, except clerical corrections and immaterial details, the bill for interurban electric railroad companies as printed on pages 183-196 of the report of the joint special committees on railroad and street railway laws. This bill provides that fifteen or more persons may form an electric railroad company. Such company shall have authority to construct, operate and maintain such a railway, at least one-half of which shall be upon private land. The agreement of association shall state the corporate name, which must contain the words "electric railroad company" at the end. It must also state the termini of the railroad, the length and name of each county, city and town in which it is to be located. The gage must be broad, 4 ft. 8½ inches standard. The capital stock must be not less than \$10,000 for each mile, the par value not less than \$100 per share. At least five persons, who shall be subscribers to the agreement, shall be directors until others are chosen and qualified.

Within thirty days after the first publication of notice, the directors shall apply to the Railroad Commissioners for a certificate and public convenience and necessity require the railroad, and must file a map. If the Railroad Commissioners refuse to issue such a certificate, then no further proceedings shall be had, but application may be renewed in one year.

In case the Commissioners grant the certificate the directors may, within sixty days, apply to the Aldermen or Selectmen of the localities affected to fix the route, and such boards shall give a hearing.

If there is a disagreement as to the route between the authorities and the directors, the latter may apply to the Railroad Commissioners, who may in their discretion, after due notice to the Aldermen or Selectmen and public hearing, fix the route. But such route shall not be deemed fixed until all requirements which may be imposed by the Aldermen or the Selectmen have been complied with.

Aldermen or Selectmen may prescribe how tracks shall be laid and the kinds of wires and poles and other appliances to be used.

The certificate of incorporation issued by the Secretary of State shall contain the words "electric railroad companies" instead of the words "railroad corporations."

An electric railroad company may act as common carrier of baggage, express matter and freight, subject to regulations and restrictions made by the local authorities, with the approval of the Railroad Commissioners.

If an operating electric railroad company is located partly within and partly without the limits of this Commonwealth, has paid dividends in excess of 8 per cent preceding the date of return, it shall for every such year in addition to the regular corporate franchise tax pay a tax equal to the excess to be determined by the Tax Commissioner.

There is a provision for a commutation excise tax to be computed upon a basis prescribed in the bill by the assessors in each city and town through which the route of said electric railroad company runs. All taxes thus paid to cities and towns shall be applied to the construction, maintenance and repair of the public ways and places upon which such electric railroad company is located, and to the removal of snow, etc.

AGREEMENT BETWEEN BOSTON & NORTHERN AND OLD COLONY AND ITS EMPLOYEES

An agreement has been reached, regarding operating questions, between the management of the Boston & Northern and Old Colony Street Railway Companies, and representatives of the men employed on the system. What the terms are will not be disclosed before the agreement has been reduced to writing and signed by the respective authorities, but they were reached in friendly discussion at the fourth conference, and probably are concessions from both sides.

The following statement agreed upon in the conference was given to the press for publication:

"We have arrived at what we consider a mutually satisfactory basis. All that is lacking to complete the negotiations is getting into writing, for purpose of signature, various items agreed upon. Throughout the whole negotiations the pleasantest relations prevailed; there was no attempt made at technicalities, there was on both sides an endeavor to arrive at what would be a fair conclusion."

CALUMET ELECTRIC STREET RAILWAY SOLD

The Calumet Electric Street Railway, along with all other assets of the National Bank of Illinois, which failed in December, 1896, has been sold to a Chicago syndicate. An order was entered by Judge Grosscup in the United States Circuit Court last week recording the sale of all the assets of the National Bank of Illinois to Messrs. Cole & McKinnon, of this city. The order provides that the transfer of the properties shall be made unless valid objection is offered before June 8, 1906. The purchased assets include all of the stock and all of the bonds of the Calumet Electric Railway. The other property involved consists of miscellaneous parcels of real estate, notes, judgments, etc. The purchase price, exclusive of cash in the receiver's hands is about \$3,150,000. On this basis the railroad property sells for approximately \$3,000,000.

THE MEXICO CONSOLIDATION

President F. S. Pearson, of the Mexico Consolidated Electric Companies, has fully set forth the plans of the Mexico consolidation, to which reference has been made before in the *STREET RAILWAY JOURNAL*. According to him, the Mexican Consolidated Electric Company has been organized with the object of acquiring and consolidating the tramway systems in the City of Mexico and the surrounding Federal District. With this in view it has acquired the controlling interest in the capital (£1,000,000) and the whole (with the exception of £2,000) of the "B" debentures (£287,000) of the Mexico Electric Tramways Limited (the Tramway Company), the only other debenture issue of the company being £400,000 5 per cent first charge debentures.

The Tramway Company operates under valuable concessions and under a lease from la Compania de los Ferro Carriles del Distrito Federal de Mexico (the District Railway Company) for the whole term (namely, till 1982) of such company's concessions, the rent providing for the fixed charges and 3½ per cent dividend on the capital of the District Railway. The Tramway Company now owns the entire share capital (\$5,000,000) and the whole of the second debenture issue (\$4,000,000 Mexican) of the District Railway, thereby reducing the actual rent to the annual interest on the \$6,000,000 (Mexican) 6 per cent first debentures of the District Railway.

The consolidated company will, as the holder of such capital and debentures of the Tramway Company, control and operate the tramway systems in Mexico and the Federal District, subject only to: (1) The \$6,000,000 (Mexican, say, £600,000) 6 per cent first debentures of the District Railway (the interest on which is provided by the rent payable by the Tramway Company); (2) £400,000 5 per cent first charge debentures of the Tramway Company.

To provide for the purchase of all the capital and the "B" debenture of the Tramway Company and for immediate extensions, additional equipment for freight and passenger service, the consolidated company has issued \$7,500,000 general consolidated first mortgage fifty-year 5 per cent gold bonds, which \$7,500,000 are now being offered for sale. A portion of the unissued bonds will be specifically set aside to retire the outstanding debentures above mentioned, and the remainder will be held in reserve for future extensions and development.

The tramway systems in operation consist of about 160 miles of track, of which 90 miles are operated by electric traction, 13 miles by steam and about 57 miles by animal traction. Equipment about 600 cars, with further cars ordered. The steam-power station has a capacity of 3200 kw. A contract has been entered into with the Mexican Light & Power Company, Ltd., for hydro-electric power up to 7500 hp, and, for the purpose of utilizing the same, 4000 kw of motor generators are under construction. It is expected that this plant will be ready for use on Oct. 1, 1906.

The right possessed to carry freight will enable the company to establish a terminal freight system for handling the freight to and from the steam railways through the city. When the consolidated company has completed its consolidation and carried out the improvements and extensions which will be made with the proceeds of the bonds, and the steam power is replaced by the hydro-electric power, the following statement may be taken as a conservative estimate: Gross income, \$4,400,000 Mexican (say, £440,000); net profit, \$2,200,000 Mexican (say, £220,000); less interest on underlying charges, £56,000; interest on the \$7,500,000 bonds, \$375,000 (gold) (say, £75,000); balance, net surplus applicable to depreciation, etc., and dividends on share capital equal to \$445,000 (gold) (say, £89,000).

STREET RAILWAY PATENTS

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

UNITED STATES PATENTS ISSUED MAY 22, 1906

821,000. Brake-Shoe; William Perry Taylor, Buffalo, N. Y. App. filed March 13, 1905. A brake-shoe comprising a cast body and a plurality of parallel fairly thin flat-surfaced reinforcing plates embedded in said body and having notched edges.

821,138. Merry-Go-Round Museum; Jacob L. Tidd, Lancaster, Ohio. App. filed Oct. 5, 1905. A pleasure railway consisting of a continuous track formed in the shape of a loop, one side of which is elevated and overlooks an inclosure which is provided with suitable scenery, so as to present a panoramic effect.

821,252. Railway Signal; James P. Norwood, Chicago, Ill. App. filed June 23, 1905. Indicators in each train to show the next station and the movement of other trains, and indicators at stations showing the movements of the different trains, all operated by suitable contacts and circuits along the trackway.

821,279. Car Truck; John A. Brill and Walter S. Adams, Philadelphia, Pa. App. filed April 4, 1900. A bolster comprising a cross-piece and oppositely disposed and centrally depressed slotted webs, side bearings, and a center bearing on the cross-piece.

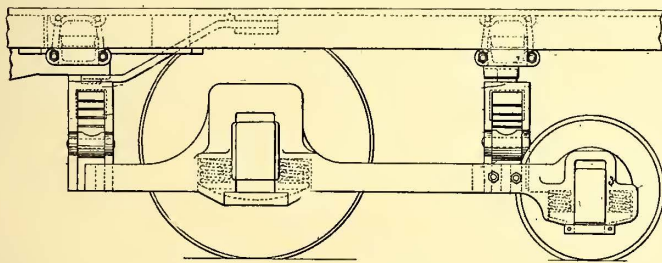
821,287. Multiple-Unit Control System; H. M. Harding, New York, and Charles M. Clark, of Summit, N. J. (See description on page 874.)

821,317. Conductor for Electric Cars; Frank L. Sessions, Columbus, Ohio. App. filed Aug. 14, 1902. A flexible cable for furnishing power to mine locomotives, unwinds from a drum on the car as the latter moves along.

821,346. Car Fender; Harry Ekrem, San Pedro, Cal. App. filed Oct. 31, 1905. The fender is yieldably supported in an elevated position, and a trip member located in front of the fender has a toggle connection therewith to positively depress the fender when the trip is moved rearwardly.

821,352. Traction-Increasing Device for Street Cars; Harry H. Fox, Duquesne Junction, Pa. App. filed Dec. 5, 1905. Electromagnets on the car, the cores of which are arranged in close proximity to the rails whereby the traction is increased when the magnets are energized. The magnets are in circuit with the operating circuit of the car.

821,381. Signaling System; Wilmer W. Salmon, Buffalo, N. Y. App. filed May 22, 1905. A continuously rotating shaft and a magnetic clutch which engages a winding mechanism for hoisting the semaphore arm. Also has means for releasing the clutch to restore the arm to safety position.



PATENT NO. 821,279

821,385. Railway Switching and Signaling Apparatus; John D. Taylor, Buffalo, N. Y. App. filed Feb. 10, 1903. The objects of this invention are to guard against the bad effects of crossed wires and of an open common wire, to enable the operator to readily determine which wires are in trouble, and to reduce the effects of a fall in potential in the common wire on the safety apparatus itself.

821,386. Apparatus for Operating and Controlling Railway Switches and Signals; John D. Taylor, Buffalo, N. Y. App. filed June 20, 1903. Improvements on above.

821,400. Ball-Bearing Electric Trolley Wheel; Robert S. Bolye, Fort Branch, and Walter G. Cleveland, Cynthiana, Ind. App. filed June 16, 1904. Journal bearings of the trolley wheel are made in two parts so as to be capable of receiving the raceways of a ball-bearing, and which is thereby removable when desired.

821,435. Railway Switching and Signaling Apparatus; Wilmer W. Salmon, Buffalo, N. Y. App. filed March 28, 1904. A magnetic generator has a rack and pinion connection with the semaphore arm so as to be rotated and transmit a signal whenever the semaphore arm is moved to safety position.

821,495. Railway Switching and Signaling Apparatus; Winthrop K. Mowe, Buffalo, N. Y. App. filed Aug. 29, 1905. Details of construction of a motor connection for throwing the switch point, positioning the usual guard and transmitting a signal.

821,512. Trolley Wire Hanger; Adam J. Laverty, Athens, Ohio. App. filed April 21, 1905. The hanger is provided with grooves for the reception of the wire and a yoke with a screw connection for pressing it into the groove so as to bind the wire and hold it in place. The device is applicable to joining the ends of a broken conductor.

821,515. Railway Signal; John B. Lineback, Siloam Springs, Ark. App. filed Dec. 14, 1905. Electric lights are installed along the roadway in such a manner that one is constantly in view of the engineer. By means of a code of signals based on the fluctuations of the lamps, messages may be transmitted to the trains.

PERSONAL MENTION

MR. PHILLIP SWING, of Cincinnati, has resigned as secretary and general manager of the Cincinnati & Columbus Traction Company.

MR. EDWARD E. WINTERS, assistant to the president of the South Covington & Cincinnati Street Railway Company, is enjoying a European trip.

GEN. WILLIAM A. BANCROFT, president of the Boston Elevated Railway Company, was elected president of the Commercial Club of Boston at its annual meeting, held at the Parker House, on May 24.

MR. EDWARD H. RICHARDS has been appointed street aid for the Quincy division of the Old Colony Street Railway Company instead of assistant general manager of that division, as stated in the issue of May 19.

MR. M. J. MANDELBAUM, of the Pomeroy-Mandelbaum syndicate, has been elected vice-president of the Aurora, Elgin & Chicago Railroad, and will assume the active executive direction of the company's affairs in the absence of the president, Mr. L. J. Wolf, of the company, who will shortly take an extended trip abroad.

MR. ROBERT LONG, traveling engineer for the National Brake & Electric Company, of Milwaukee, Wis., sails this month for Buenos Aires, South America, where he will install eighty-five air-brake equipments for the Lacroze Tramways, which are being constructed by J. G. White & Company. Mr. Long expects to remain in South America about eight months, or until the cars are in operation.

MR. ROBERT H. DERRAH, who recently resigned as passenger agent of the Boston & Northern and Old Colony Street Railways, has accepted a similar position with the New Hampshire Electric Railways. Mr. Derrah was for ten years connected with the president's office of the West End and Boston Elevated Railways, of Boston, and was secretary to Mr. Samuel Little while the latter was president of the West-End Company.

MR. W. S. McCALL, formerly general sales agent for the St. Louis Car Company, has been appointed to the position of vice-president of the company, from which Mr. Henry F. Vogel resigned some weeks ago. Mr. A. H. Sisson, formerly assistant general manager, has been made general manager, and Mr. Walter S. Miller has been promoted from superintendent of tools and machinery to manager of works. Mr. Miller is also manager of the automobile department.

MR. GEORGE P. DOLE, formerly superintendent of the Providence & Fall River Street Railway Company, now of the New Bedford & Onset & Taunton & Buzzards Bay Company, was recently presented a handsome couch and pillow by the employees of the road from which he is retiring. The presentation was made in the presence of a large number of the motormen and conductors of the Old Colony and Rhode Island divisions, the speech being made by Foreman and Electrician Samuel C. Messenger. Mr. Alvah C. Dole, conductor on the Providence & Fall River Street Railway, has been appointed acting superintendent of the road to fill the vacancy caused by the resignation of his brother, Mr. George P. Dole. Mr. Dole, who is 30 years old, began railway work when he was 18, as driver-conductor on the bob-tail horse cars of the Haverhill, Merrimac & Amesbury road. He was later conductor on the Brockton, Bridgewater & Taunton, New Bedford, Middleboro & Brockton and Newton & Boston. He came to Swansea in 1901, and was employed at the car house until the opening of the Providence & Fall River, when he was conductor on the first car which went over the line. He has been with the Providence & Fall River Company since that time.

TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. * Including taxes. † Deficit.

Table with columns for Company, Period, Total Gross Earnings, Operating Expenses, Net Earnings, Deductions From Income, Net Income Available for Dividends, and corresponding columns for a second set of companies. Includes entries for AKRON, O.; AURORA, ILL.; BINGHAMTON, N. Y.; CHAMPAIGN, ILL.; CHICAGO, ILL.; CLEVELAND, O.; CLEVELAND & SOUTHWESTERN TRACTION CO.; LAKE SHORE ELECTRIC.; DETROIT, MICH.; DULUTH, MINN.; EAST ST. LOUIS, ILL.; FT. WAYNE, IND.; FT. WORTH, TEX.; GLENS FALLS, N. Y.; GREENSBURG, PA.; HANCOCK, MICH.; HOUSTON, TEX.; HUDSON, N. Y.; KANSAS CITY, MO.; LONG ISLAND CITY, N. Y.; MANILA, P. I.; MILWAUKEE, WIS.; MILWAUKEE LT., HT. & TR. CO.; MINNEAPOLIS, MINN.; MONTREAL, CAN.; OLEAN, N. Y.; PHILADELPHIA, PA.; ST. LOUIS, MO.; SAVANNAH, GA.; SEATTLE, WASH.; SYRACUSE, N. Y.; TERRE HAUTE, IND.; TOLEDO, O.