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## EDITORIAL NOTICE

*Street railway news, and all information regarding changes of officers, new equipments, extensions, financial changes and new enterprises will be greatly appreciated for use in these columns.*

*All matter intended for publication must be received at our office not later than Tuesday morning of each week, in order to secure insertion in the current issue.*

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## The Chicago Strike

Now that the terms of agreement between the Chicago City Railway Company and the Amalgamated Association of Street Railway Employees have been made public and an opportunity has been afforded to study the results and their bearing upon the labor situation, so far as they relate to the street railway field, it must be apparent to every unprejudiced observer that the strike, so far as the men were concerned, was a most dismal failure, and that while it entailed great financial loss upon the company, and, for a time, disorganized the system, it was not entirely without its compensating feature, as it enabled the company to secure a readjustment of affairs that had long been unsatisfactory and distasteful to the management.

First of all, it is interesting to note that the company did not recede from its position on any issue where it had taken a positive stand before the strike. The question of wages, which is left to arbitration, is not likely to be determined against the company, as the scale now in effect makes very liberal provision, and has been cited by unions throughout the country as a model of what should be adopted elsewhere.

On the question of employing union labor only the strikers were compelled to abandon their position, and the best terms they could secure comprised a pledge of non-discrimination against themselves. One thing is now certain. The company will no longer tolerate interference with the management and discipline of employees, and much of the annoyance that has been caused during the last year by "arbitration" boards will thus be entirely eliminated. In a word, the company will

manage the business and the men will attend strictly to the duties which they are paid to perform. The company will treat the men fairly, as has been its policy at all times, whether they are organized or not, but it will not, under any circumstances, reinstate the men who participated in the disorder which marked the strike. It has shown a generous disposition in taking back the firemen and others who went out on strike without any grievance whatever, and in direct violation of existing agreements which prohibited engaging in sympathetic strikes until arbitration had been refused by the company, and this is sufficient proof of its good will toward the great body of its employees. It is not likely, after the experience of last month, that Chicago street railways will be hampered with further strikes for some time. The union has had a severe lesson, not only in the loss sustained by members in the form of wages, but in prestige and in many valuable concessions which had been secured from the company during the present administration.

## The Proper Place for Block Signals

Notwithstanding the great amount of interest being manifested by street railway managers in block signals for inter-urban roads, the actual interurban mileage at the present time protected by such means is but a small percentage of the whole. The majority of the high-speed interurban lines of the Middle West, which would, naturally, be the first to utilize such systems, have as yet made but little headway in their adoption. This condition of affairs is likely to be materially changed in the course of the next five years.

It would seem almost too apparent to need repetition that the proper place of a block signal system in the operating routine of the ordinary single-track road is as an adjunct to the despatching system, or, in other words, as an additional precaution, acting as a check on the despatching system. It is entirely out of the question to attempt to operate a single-track line without a despatcher if there is more than one car running over the road. The function of the block signal system should be to prevent collisions due to a misunderstanding of orders or mistakes on the part of the despatcher. When it comes to a double-track road, where despatchers are not necessary, the block signals may be used as the means to keep the trains apart with a reasonable degree of safety; in fact, the block signal system is the only theoretically correct method of keeping a certain distance between trains operating over a double-track road, as the time interval, as a means of keeping trains apart, is very uncertain, and disappears altogether when a train stops between stations, which is just the time when protection is most needed.

## Steam Road Ideas

Electric railway companies have recently drawn extensively on steam railroads for managers and ideas. The use of steam road men and methods of operation has, of course, been more noticeable since the interurban roads increased in length and raised the schedule of speed, thus approaching more nearly steam road conditions of operation. It has become a trite saying that interurban roads can learn much from steam roads as to

methods of operation. This certainly ought to be expected, since steam railroads have been at the business for over half a century, and their standards are the result of a survival of the fittest during that period. It must never be forgotten, however, that there are many essential differences between steam and electric roads, and that the success of the electric road is due to the fact that it fills a new field unoccupied by steam roads.

It is for the manager to determine how far steam road methods are desirable in interurban operation, and, in this connection, it may not be amiss to call attention to some points where at the present time there seems to be a tendency to follow too closely steam railway practice in the operation of electric interurban properties. In steam railroad practice there is accumulated an enormous mass of red tape, an inheritance which steam railroad managers would be glad to get rid of if they could, and it is well for the electric railway manager to take a lesson from this and adhere to simplicity as far as it is consistent with safe operation and satisfactory service. It is notable that some railroad men who have become managers of interurban properties have abandoned steam railroad methods as completely as their brother managers who have entered interurban railroading from the street railway field have broken away from the lines of local service. Other steam road men have adhered to many of their old customs in the management of interurban roads. For example, in the matter of time-tables, there is room for discussion as to how much should be sacrificed to make a time-table according to the usual interurban custom, giving cars hourly or half-hourly, and always leaving a certain point at a certain number of minutes after the hour. Is the management justified, except under extreme conditions, in breaking up the regularity of the time-table and running cars on irregular intervals as on a steam road? Is the value of having a time-table which is easy to remember as great as is usually supposed, and is cost of operation for a fast schedule to be somewhat subordinated in order to secure such a regular time-table?

Another question is that of tickets, some managers believing that ticket complications should be avoided like poison, and that the simpler the ticket and fare system the better, while, on the other hand, many roads have adopted very elaborate ticket systems and a great variety of forms and prices of tickets, on the theory that special rate tickets help to create traffic.

It is generally admitted that steam railroad despatching methods should be followed as far as possible. Many former steam railroad men do not believe in using the telephone instead of telegraph for sending interurban orders, but are obliged by force of circumstances to do so nevertheless, and it is a question whether their preference for the telegraph is, after all, not due more to an operator's affection for his old familiar way of conducting business rather than to any inherent merit of the telegraph as compared with the telephone. In general, it may be said that the efficiency and discipline shown in interurban train despatching depends more on the vigilance of the management than on whether the manager has received his training as a street or steam railway man. In view of the many remarks that have been made recently in various conventions as to the adoption of steam railroad methods, it will certainly be in order during the next few years for the electric railway man to analyze thoroughly the question of how far steam railroad methods should be adopted in interurban railroading.

### The Peak of the Line Load

It has often been remarked that the load line of a city street railway plant gives a wonderfully precise idea of the general habits of the citizens. The movements of workmen, the habits of the business men, the matutinal migration of shoppers and their return, the homeward rush of belated workers, and the hours of opening and closing the theaters are plainly marked in the serrated line on the tell-tale sheet. The morning and afternoon peaks tower like the Alps, the former generally stretching into a ragged range, the latter rising sharp as the Matterhorn. These peaks are a source of constant sorrow and maledictions to the practical street railway man. If his cars are fairly well patronized during the dull hours they will be jammed long before the summit of the peak is reached, and if, by desperate activity, he can come somewhere near giving decent accommodations during the rush he must run empty cars, or take off cars, the rest of the time. Practically, the situation means that a large number of extra cars must be put in operation during the hours of maximum travel at morning and evening, and then one faces the dismal "tripper" problem, the cause of eternal kicking among the employees. In earlier times the trailer used to furnish some relief by doubling the capacity per trip when needful, but at present the trailer, for a variety of reasons, has fallen into disfavor in this country. There are some practical difficulties with it to be sure, but it strikes us as altogether preferable to the double-decked car of which something has been heard recently.

American skyscraping buildings have produced so acute congestion of traffic that the work to be done here is altogether more difficult than is found in foreign cities. Before we try the double-decker it would be well to consider the trailer in the light of modern conditions. It takes more length on the street, to be sure, but probably gains in time all that it loses in space. One of the troubles with trailers in the past has been the facilities for entrance and exit, but the ordinary trailer was merely an extra street car without motors, and was not at all specialized for its use as a trailer. We are inclined to the belief that if trailers were planned especially for this service and modified in design so as to meet some of the practical difficulties which have been found with them, they might become of great assistance in dealing with the peaks in traffic. What is wanted is not a mere car to hitch on behind a motor car, but a rear section to form a working unit with the motor car when attached to it. Its proper design would probably be a troublesome job, but any sort of relief from the present situation requires skill and hard work. The principal objection urged against the trailer is that it is more dangerous to operate, owing to the liability of accidents between the cars. We believe that this might be overcome by proper design, and also that when allowance is made for the reduction of the number of cars in the street by the use of trailers the total number of accidents will not appear so proportionately large. The statistics of street car accidents in Germany, which have been carefully compiled for a number of years back by the Verein Deutscher Strassen und Kleinbahn Verwaltungen, show that in that country, where trailers are very largely used, the ratio of accidents to car mileage is from 40 per cent to 50 per cent more with motor cars than with trail cars.

By designing a trail car especially for this use the liability to accidents might be materially reduced. A combined motor car and trailer would certainly be as manageable as an ordinary two-car train on a cable or interurban road, and upon the whole would economize track space, since the distance between trains

would certainly be less than double the distance necessary between separate cars. At any rate, a modernized trailer is certainly well worth trying again. From the street railway man's standpoint any way out of the tripper trouble is desirable in itself. Here is a good chance for the car builders, who are usually prompt to meet a public demand, to get down to work and evolve some construction that will increase car capacity faster than it increases first cost or labor of operation. It is a tough proposition, perhaps, but American industry has grown fat on tough propositions.

### Reform and Street Railway Extensions

A year ago a reform movement, headed by the Merchants' Association, swept over New York, and a spirited crusade was conducted by these moulders of public opinion against the transportation companies. There were loud cries for improved service, increased facilities, etc., and an investigation with several public hearings was held to devise ways and means of solving the recognized "congestion problem." In the end the public, the city administration and the State Railroad Commission were convinced that the fault did not really lie with the companies, that they were doing all in their power to meet the constantly growing demands upon them, and that they suffered chiefly through lack of co-operation on the part of the city and property owners in securing better facilities, extensions of lines and permission for establishing new routes.

The claim of the Interurban Street Railway Company that it was not given satisfactory support in its efforts to institute better transportation facilities in New York City was criticised at that time in several quarters, but the force of its contention has been emphasized in a very striking manner during the last week in connection with the proposed construction of a trolley line in West Street. There is probably no street in New York where there is a greater need for good traffic facilities, and on which at the same time the present service is so totally inadequate as on this street, which extends for some 3 miles along the Hudson River front. On West Street are located the ferry slips of all of the trunk railway lines to the West, the docks of all of the North River and of all of the principal Sound steamboat lines, also those of all of the transatlantic lines and most of the coast steamship lines that land passengers in Manhattan. The result is that there is a tremendous demand for transportation between and to these termini; added to this is the army of commuters, estimated at about 150,000 daily, who are landed at the several ferries from the Jersey shore. Many, if not most of these persons, would naturally take West Street as the shortest and quickest route to their points of destination, if anything like decent transportation service was provided, and the lack of it is a serious inconvenience to them and detriment to the welfare of the city.

The impracticability of building an underground electric conduit system on West Street has long been recognized. The street is only slightly elevated above mean high-water mark, and a conduit would frequently be flooded by salt water backing up through the sewer system. This is shown by the difficulties which have been experienced at the West Twenty-Third Street, Christopher Street and Cortlandt Street termini of the present underground conduit system. The Interurban Company would undoubtedly prefer to install a conduit system on West Street, if it were practicable, as the slight difference in cost between that and the trolley system would be more than counterbalanced in the economics of operation by the inconvenience of maintaining two sets of equipment, one for use on the con-

duit lines proper and the other on both lines. We have urged on several occasions the importance, from every civic standpoint, of establishing a modern and reliable transportation system (which means a trolley system) on West Street, and the Interurban Street Railway Company has finally offered to construct such a system and operate it with cars equipped with trolley poles and plows, so that they will be interchangeable with cars on other lines.

The principal property owners along the line, including the different railroad companies, the International Mercantile Marine Company, and others, have expressed themselves in favor of the improvement, but the objectors seem to be made up of those who have only a theoretical interest in the matter and no knowledge of practical railroad conditions.

Some of the arguments urged in print against the trolley system on West Street are of the most puerile character, and read as if they had been resurrected from the files of the Podunk "Herald" of fifteen years ago. The overhead wire is clothed with all manner of death-dealing properties; it is urged that every one of the thousands of commuters who passes under it on his way to and from the ferry is liable to electrocution; insurance rates are to be raised to fabulous percentages if the trolley is introduced, and a thousand and one other evils are to follow if the advent of the overhead system is permitted. Although we feel proud in many respects of New York City, we cannot help admitting that when it comes to a question of city improvement a host of kickers invariably puts in an appearance with arguments of the character quoted, which would disgrace an intelligent Hottentot.

In a recent interview, Dock Commissioner Hawkes gave out for publication a characteristic statement on this proposition, which may be accepted as fairly representing the attitude of the "reform" element toward this much-needed improvement:

The Metropolitan Company must prove to me beyond a shadow of a doubt that the underground system is impracticable, and then, before I would grant the consent to a change in the power of the line, I should have to know that the best interests of the city demanded this change before I would consent to an overhead trolley system, and I am not sure that I should give my consent even then. An overhead trolley system is the most undesirable thing in the world, and they will have to be very weighty considerations that cause me to consent to such a system.

Such a statement is simply absurd on its face. "I am not sure that I would give my consent," says the Dock Commissioner, even if the overhead trolley proved to be the only practicable system and its construction was for the best interest of the city. This expression prepares one for the next pronouncement of this official regarding the "undesirable" character of the overhead trolley, which concludes the quotation.

The proposed improvement on West Street will not only be a benefit to passenger transportation but it will also add enormously to the trucking capacity of the street. It is one of the striking accompaniments of a line of electric cars through a city street that it directs and promotes the amount of vehicular traffic possible. Without its two lines of cars on Broadway the traffic on that street would soon become very congested, and the investigations of the Royal Traffic Commissioners, of London, show that there is an actual gain in traffic capacity in a street from the introduction in it of a double line of electric cars. We anticipate a revulsion in sentiment over the proposed West Street franchise soon, and that the proposed change will be carried out to the great improvement of the West Side of New York City.

**THE SYSTEM OF THE CAMDEN & SUBURBAN RAILWAY COMPANY**

Several extended articles have appeared in the columns of this paper during the last two or three years discussing

exhibits in many of its features a harmonious scheme of construction and operation; partly because the company has developed an important suburban business which has had a most important bearing on the earnings of the property, and partly because the system is being operated under improved methods



THE FEDERAL AND MARKET STREET FERRY, CAMDEN,—FROM THE RIVER

analytically the operating practice of different large city railways. The value placed upon these articles by operating managers has been evidenced by the favorable comments received by the editors in regard to them, and the request has been made that similar articles discussing the operating practice of smaller companies should be published. In many respects the methods required on the smaller road differ from those on a large proposition, and practice cannot be bodily transferred from one to the other. For this reason it is proposed in a series of four articles to take up in detail the methods employed by the Camden & Suburban Railway Company, of Camden, N. J. The present article will be devoted to a description of the physical

and is in a high state of efficiency. The operating report of the company for the last four calendar years is given below:

	1899	1900	1901	1902
Receipts from passengers . . .	\$296,471	\$332,467	\$394,163	\$473,826
Receipts from other sources . . .	33,338	15,482	16,839	19,479
Receipts total . . . . .	329,809	347,949	411,002	493,305
Operating expenses . . . . .	158,155	166,582	185,608	217,557
Earnings from operation . . .	171,654	181,367	225,394	275,748
Exp. for repairs (ordinary) . . .	61,760	49,716	39,724	64,912
Exp. for repairs (extraordinary) . . . . .	155,918	47,197		
Net income . . . . .	*46,024	84,453	185,670	210,836



FOOT OF MARKET STREET, CAMDEN, SHOWING FERRY TO PHILADELPHIA

condition of the system; the second article will take up the method of handling the men and assigning runs; the third will describe the system of blanks and forms used by the company, particularly in keeping its operating records, while the fourth will be devoted to a discussion of the repair shop operation, with costs of essential operations in the repair work.

The city of Camden has been selected partly because it has been under one management for some eight years, and hence

Operating ratio not including repairs . . . . .	53.3	50.1	47.1	45.9
Operating ratio including repairs . . . . .	126.8	79.2	61.7	59.6
*Deficit.				

LOCATION AND POPULATION

The city of Camden is located on the Delaware River directly opposite Philadelphia, with which it is connected by three ferries. It is the site of a number of large manufacturing

plants, including that of the New York Ship Building Company, which are the largest in the country and one of the largest in the world, one of the works of the Diamond Match Company, large gas and coke plants belonging to the Public Service Corporation of New Jersey, and other manufactories. The population of the city proper is 67,000, but as the city boundaries have recently been extended the actual population of what might be called "Greater Camden" is 83,000 people.

TRAFFIC POSSIBILITIES

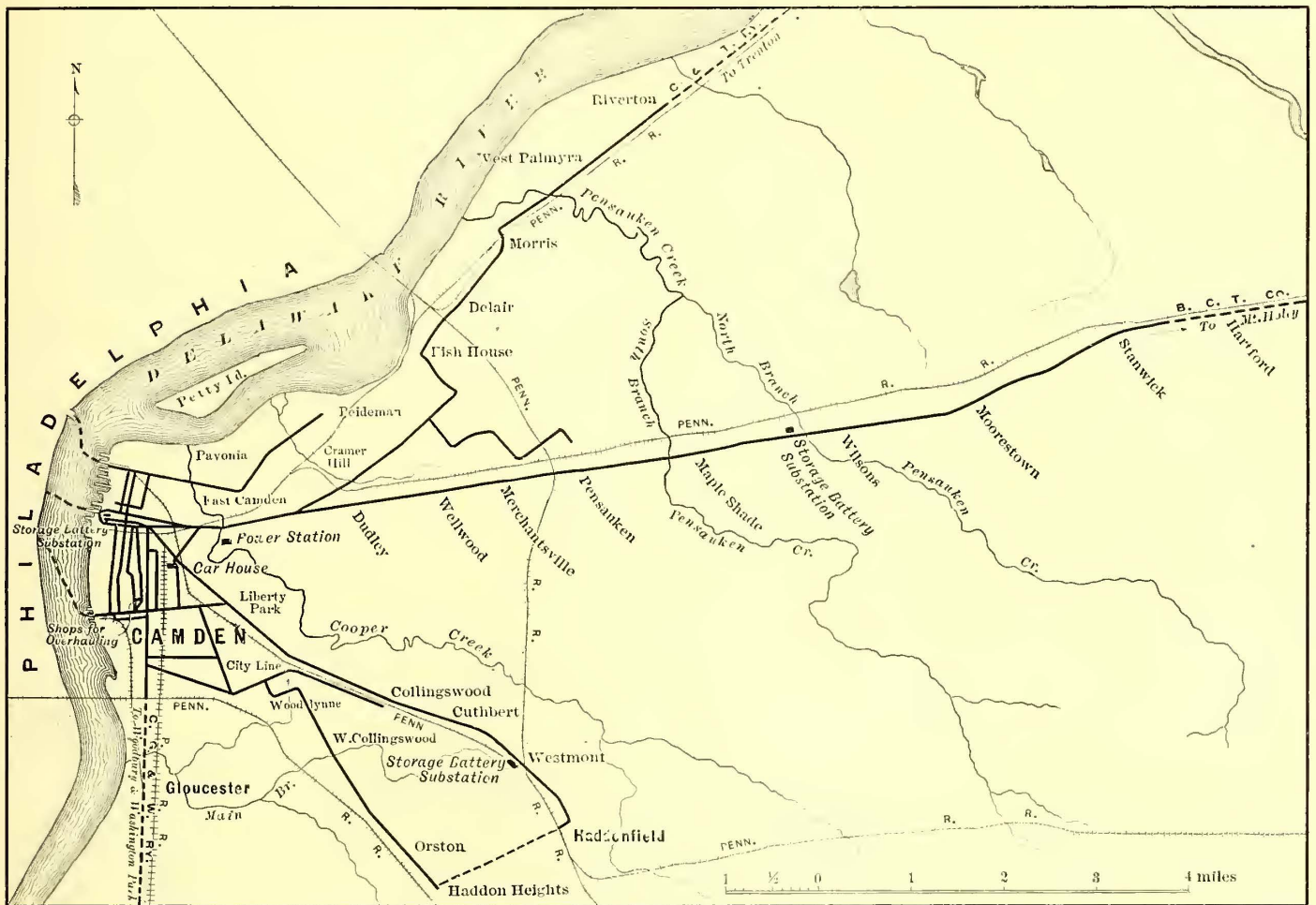
The layout of the city is not such as to be especially conducive to a large amount of street railway traffic. The three ferries to Philadelphia are about a mile apart, and the growth of the city has been radially from each ferry. The result is there are practically three "centers of population," all of which are within one-half mile to three-fourths of a mile from one

suburban extensions to the Camden city system were necessary to develop the business, and a very successful policy was adopted of building up the sparsely settled territory to the east, northeast and southeast of the city.

Up to the time that this plan was begun, or until about 1896, approximately 90 per cent of the traffic was to and from the ferries. Since the construction of suburban extensions, to which reference will be made shortly, this condition of affairs has changed, and only about 42 per cent of the traffic is now due to Philadelphia, the balance being internal traffic. In a subsequent article in this series the amount of traffic secured by the suburban extensions will be considered. In this number the physical condition only of the system will be discussed.

THE EXTENT OF THE SYSTEM

Reference to the map on this page will indicate the general



MAP SHOWING SYSTEM OF THE CAMDEN & SUBURBAN RAILWAY COMPANY

of the ferries. Another fact which affects the riding in Camden is that while it is a suburb of Philadelphia it does not have the proportional amount of commuter or pleasure traffic which is usually associated with suburbs of large cities. The most attractive suburban districts of Philadelphia lie to the north and west of that city, and as Camden is largely a manufacturing town, one great inducement, perhaps the principal one, which it can offer to commuters from Philadelphia is cheapness in transportation. For this reason a large proportion of the passengers from the ferries do not use the cars but walk to or from the ferries, to save car fare.

The layout of the city also prevents it from obtaining the usual amount of local patronage. As the city extends along the water front for 2 miles or 3 miles, and is only about 1 mile wide, there is plenty of building sites, and most of the workmen in the factories live in the vicinity of their places of work. It soon became evident to the management, therefore, that

arrangement of the system of the Camden & Suburban Railway Company, which now comprises 83 miles. The system extends northeast as far as West Palmyra, where a connection is nearly completed with the Camden & Trenton Railway, with which a traffic agreement has been made by which the cars of the latter road will enter the city of Camden. Only 2500 ft. of this connection now remains to be finished.

On the south, the system extends to the city line, where a connection is made with the system of the Camden, Gloucester & Woodbury Railway, whose cars now enter the city over the tracks of the Camden & Suburban Railway under a traffic agreement. This line touches Washington Park, which is one of the large summer resorts of Philadelphia, but which is also served by a steamboat line from that city.

To the east the Camden & Suburban Company has three lines, one reaching to Haddon Heights, 6½ miles; one to Moorestown, 11 miles, and one to Haddonfield, 7 miles. At

Moorestown connection is now being made with the line being built by the Burlington County Traction Company, which will extend to Mt. Holly, 9 miles further to the east.

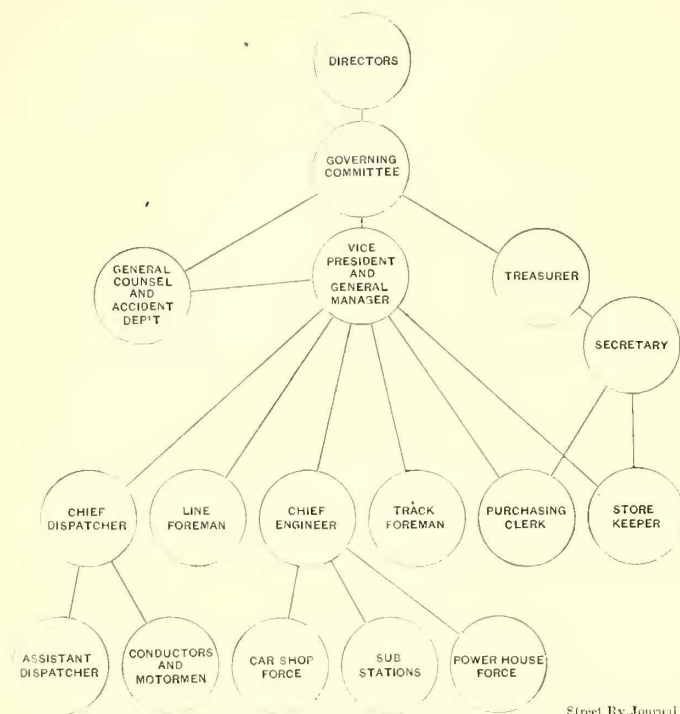


CHART SHOWING ORGANIZATION OF THE COMPANY

Street Ry. Journal

The Camden & Suburban system is operated in eight divisions, the gross receipts of which average throughout the year about as follows:

Line Number	Gross Receipts per cent
1—South Fourth St. and South Fifth St.....	5
2—Second St. and Third St.....	7
3—Broadway .....	19.5



VIEW AT END OF MOORESTOWN LINE, SHOWING SIGN ON SPAN WIRE INDICATING SECTION INSULATOR

4—Haddonfield .....	17
5—Haddon Heights.....	8
6—Kaighn's Avenue.....	3.5
7—North Cranmer Hill.....	10.5
8—Merchantville and Moorestown.....	29.5
<b>Total .....</b>	<b>100</b>

The following table gives the car miles and car hours from April 1 to Aug. 31, 1903, or the first five months of the fiscal year 1903:

Period	Gross Receipts	Car Miles	Car Hours
April 1 to August 31, 1903.....	\$241,424.56	1,218,998	148,973
April 1 to August 31, 1902.....	218,958.01	1,159,153	146,131
Per cent increase 1903 over 1902.	10.5	5	2

TRACK MILEAGE

The company has 83 miles of track, laid as follows: Forty-four miles of 7-in. 80-lb. girder rail, 21 miles of 9-in. 90-lb. girder rail, 15 miles of 70-lb. T-rail, 3 miles of 6-in. 70-lb. girder rail.

Of the 83 miles, 35 miles of track are laid with rails of 60-ft. length and the balance with 30-ft. rails.

PAVING

The company is obliged by its franchise to do a certain amount of paving, and has laid 47,146 sq. yds. of asphalt paving, 30,000 sq. yds. of brick paving, 11,800 sq. yds. of belgian blocks on concrete foundations, 9547 sq. yds. of 8-in. macadam, 16,000 sq. yds. of 6-in. macadam, and 6676 sq. yds. of Telford paving. It has also laid 10,000 sq. yds. under its own tracks of broken stone ballast to a depth of 4 ins.

JOINTS AND BONDS

In making joints, both angle-plates and cast-welding have been used. Market Street, which is one of the principal lines, was originally cast-welded by William Wharton, Jr., & Company. Later the railway company purchased its own cast-welding outfit, and has cast about 621 joints. The results have been very satisfactory, as only about 1 per cent of the joints have broken. Outside of the cast-welded joints the company is also using a considerable number of Churchill and Atlas joints.

The subject of bonding has been very carefully gone into, as the general manager of the road, Mr. Harrington, is an expert on this subject. A number of bonds have been used, several of Mr. Harrington's own design, and as a result the company has practically settled on a bond which is known as the "Cam-

den & Suburban Bond No. 2." Each terminal of this bond consists of a cast-copper plate, 4 ins. x 6 ins., with two grooves in it, each of which is of proper diameter to take in a 0000 wire. On top of the wires is placed a cast-iron plate with corresponding grooves, and both of these plates are drawn up tight to the web of the rail with two 1-in. bolts. The bond wires, of course,

span the angle-plate. In applying the bond the web of the rail is first ground down until it is bright and the surface is then treated with Edison-Brown alloy. The contact surfaces of the copper plates and of the wires are also amalgamated with the same material. A similar construction of bond is used on T-rails except that the terminal plates are disc-shaped, and only one connecting wire is used. This wire is carried around between the terminal plates in a circular groove. Both types of bonds are illustrated herewith.

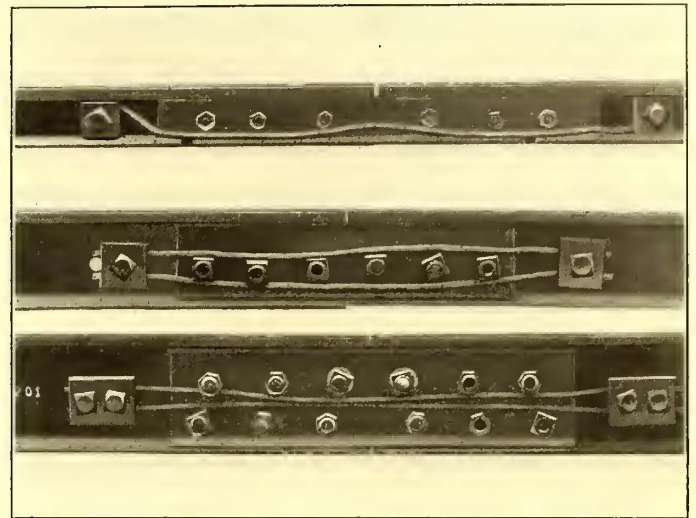
The company has found from tests that a joint bonded in this way has a lower resistance than the same length of a straight track; in fact that the resistance of the bonded rail, including the double-wired joint, is only 45 per cent of that of a solid rail section. The company also has a few Ajax bonds which were used before this new type of bond was developed.

The track construction possesses a number of very novel features. For instance, opposite and supported joints are used on practically all of the track. There is one section of about 3 miles in length laid with staggered joints, but the rail has been ground out in spots opposite the joints, and the management is very positive in its opinion that opposite joints give much greater satisfaction under the conditions existing in Camden. The ties used are 6 ins. x 8 ins. x 8 ft., and combination brace and base plates are used in keeping the track to gage instead of tie-rods.

T AND GIRDER RAIL

For a large part of the suburban line T-rail is used, but on certain sections a girder rail was employed, because the authorities through which these lines ran insisted upon its use. For certain cross-overs on this class of work a split girder switch has been installed. This split switch was made by the

insisted upon the use of the girder rail, sharing the common belief that the track would be of considerable use to vehicles in furnishing them a metal highway. Under this pressure the



THE CAMDEN & SUBURBAN RAIL-BOND NO. 2. THE UPPER VIEW SHOWS BOND ATTACHED TO T-RAIL. SECOND VIEW SHOWS BOND ATTACHED TO A 5-IN. GIRDER RAIL, AND THE LOWER VIEW, TO A 9-IN. GIRDER-RAIL

company was obliged to install considerable amount of girder rail, but decided to conduct a count, at frequent intervals, of the number of vehicles which used the track for this purpose. It was found that when the track was laid in the centre of the street the rails were used largely by vehicles, but that when the track was laid at the side of the street, as in most of the suburban work, the use of it was much less frequent. In fact, a record which extended over considerable time showed that under these conditions only 12 per cent of the vehicular travel was on the track. The rest of the vehicles either straddled the track or used the turnpike. As a result of this investigation the company has been allowed to install T-rail on its recent extensions.

When the T-rail is laid in macadam the macadam is brought up on the outside nearly flush with the top of the rail and within about 1 1/2 ins. on the inside. When so built the track is considered much easier for a vehicle to drive over than where girder-rail construction is used.

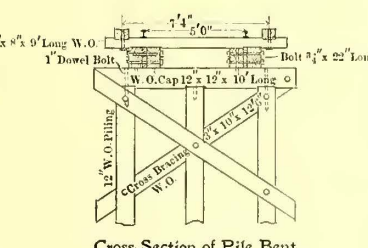
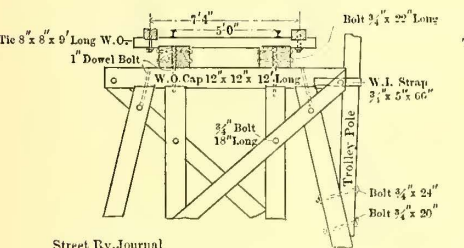
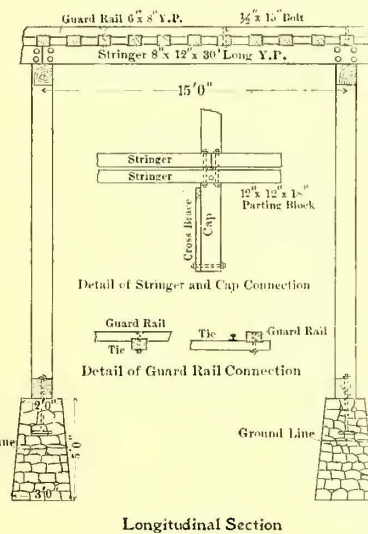
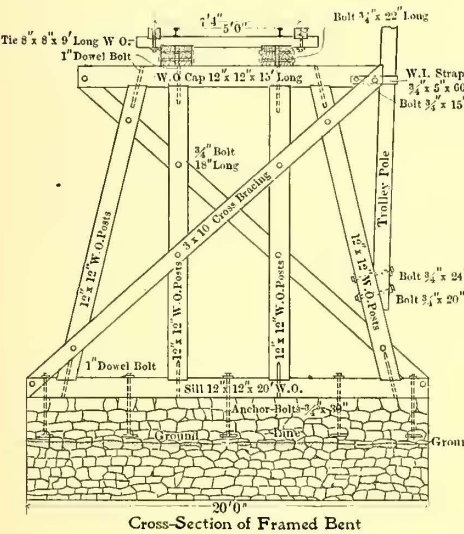
All of the suburban extensions of the company are built with double track, although on two of them only a half-hour service is run.

BRIDGES AND TRESTLES

On the suburban turnpike, where the track crosses a stream, the company has in every case built its own bridge, so as to be independent entirely of the Board of Freeholders, as far as their supervision over bridges is concerned.

All drawbridges over which the lines run are operated by electric power with current from the railway circuits.

On its West Palmyra line the company has been obliged to build a large amount of



SECTIONS OF TRESTLE CONSTRUCTION ON WEST PALMYRA BRANCH

Pennsylvania Steel Company, and is one of the very few split girder switches in use.

The question of T vs. girder rails for suburban extensions has been one which has attracted considerable attention in the neighborhood of Camden. Although the gage of the track is 5 ft., most of the vehicles used in Camden are of this gage, and the authorities of many of the neighboring towns originally

trestle, and a section is given of one of the bents. The bent consists essentially of yellow pine stringers, 8 ins. x 12 ins. and 30 ft. long, mounted on white oak caps, 12 ins. x 12 ins. and 15 ft. long. The posts and sills are of white oak, 12 ins. x 12 ins., and the cross-braces of white oak, 3 ins. x 10 ins. The guard rail is of yellow pine, 6 ins. x 8 ins., the part-

ing blocks of yellow pine, 2 ins. x 12 ins. x 18 ins., and the ties of sawed white oak, 8 ins. x 8 ins. x 9 ft. The piles are of white oak, 12 ins. in diameter. The trolley poles, which are

were installed in twenty-four hours. The work included putting on the bells and clips, but did not include stringing the span wire. This work was carried out with one construction car, fitted with a tower and manned by two men and a line foreman.

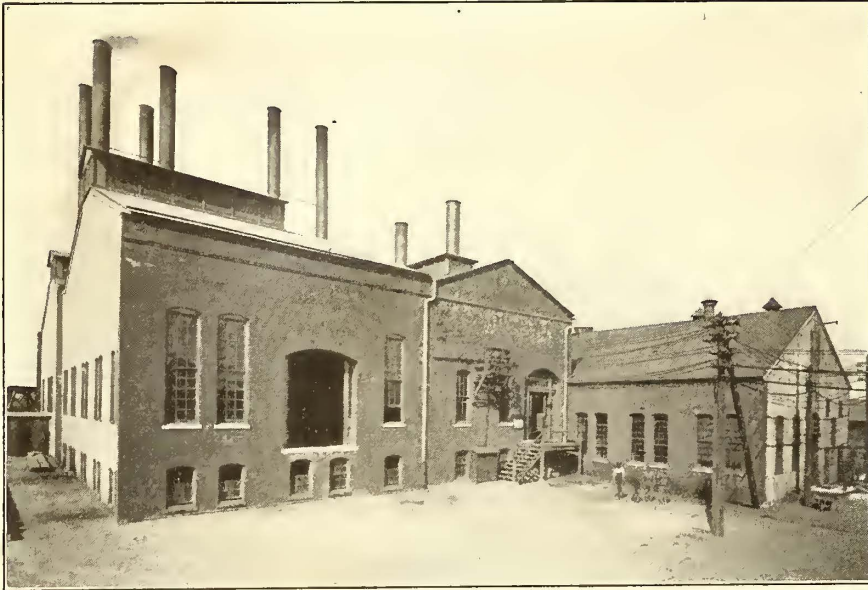
The trolley line appliances used for the most part are of the Johns-Manville type, and the heaviest material has been adopted, as it has been found to pay in the long run. The bells used are the galvanized iron No. 100 and 107, with insulated inside bell. Soldered ears, 15 ins. long, are employed on straight track, and No. 00 clips are used, even when No. 0 trolley wire is used.

For feeder taps the line department uses a solid insulated No. 0000 feeder wire as a span. The wire is stripped at the center, and a solid brass bell or curve yoke is clipped onto it to hold the trolley wire. The feeder is tapped into the trolley wire every 500 ft.

For both feeder and trolley connectors brass tubes are used, as copper tubes have been found to deteriorate, and the wire is soldered in place in them. In this connection it might be interesting to note that the tubular trolley wire connector was originally patented by Mr. Harrington, manager of the Camden & Suburban Railway, and the patent was sold by him to the General Electric Company eight years or nine years ago.

#### STOPPING AND SECTION INSULATOR SIGNS

On the suburban lines the points at which cars stop are indicated by stopping signs. They are made of sheet-iron, with the words "Cars Stop Here" in black letters on a white ground,

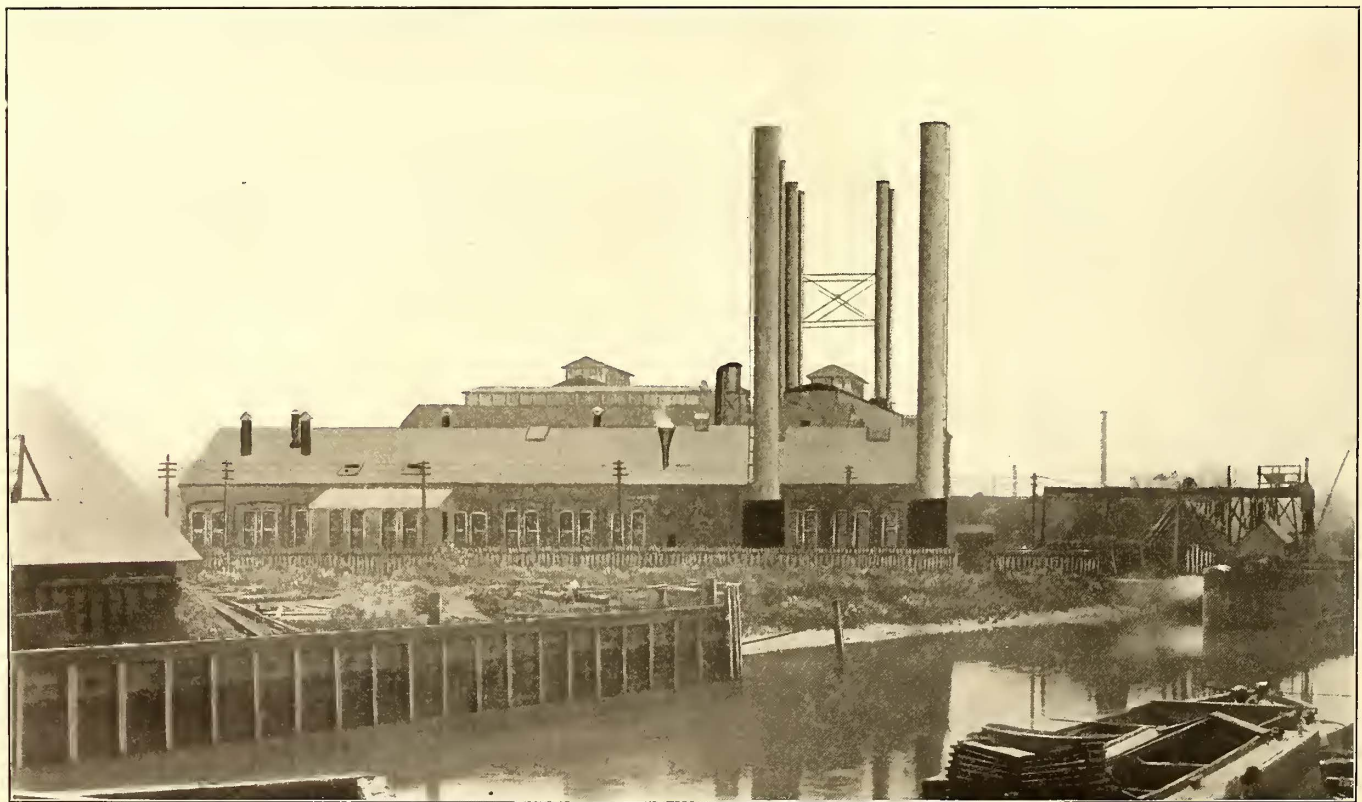


EXTERIOR OF POWER STATION, FROM EAST

fastened by straps and bolts to the bent, are 8 ins. in diameter at the top.

#### OVERHEAD LINE

The trolley wire is mostly No. 0, although in all recent construction a No. 00 trolley wire has been used. It has been found that the latter size is no more costly to install; that is, the same number of men can string the same amount of No. 00



VIEW OF POWER STATION FROM COOPER'S CREEK

wire as quickly as No. 0 wire, and, of course, it is much more durable. On curves the company is using No. 0 phono-electric wire. The record of the line gang in stringing trolley wire is probably some recent work done on the Haddon Heights extension, when  $3\frac{1}{2}$  miles of trolley wire, including twelve curves,

the sign being hung on the span wire. In addition, every section insulator in the trolley wire is indicated to the motor-man by a sheet-iron sign painted white with a red circle, to call the attention of the man to the necessity of running over the insulator slowly.



FEED WIRES

In running its feed wires the company has adopted the practice of many companies of tapping in the feeders to the trolley wire at distant points, largely to permit boosting it necessary. The average voltage at the outlying points is 500, which is 70 volts lower than the power station voltage. The feeders are tied together at the ends of circuits through automatic magnetic circuit breakers, so that they can assist each other, but the breaker will open in case of short circuit. The company carries a 500,000-circ. mil cable to the end of each of its lines, also one directly to each of the battery sub-stations.

The feeders are mostly No. 0000, although there are some 500,000-circ. mil cables, and the latter are being used largely in new work. Owing to the method of tying in, described above, the investment in copper on the Moorestown line, 11 miles long, and with a car headway throughout the day of twenty-four minutes, was less than \$30,000. This is partly owing to the fact that two positive bus-bars are used, one of higher voltage than the other, as described in connection with the power station.

For splicing the No. 0000 feeders a very long soldered and



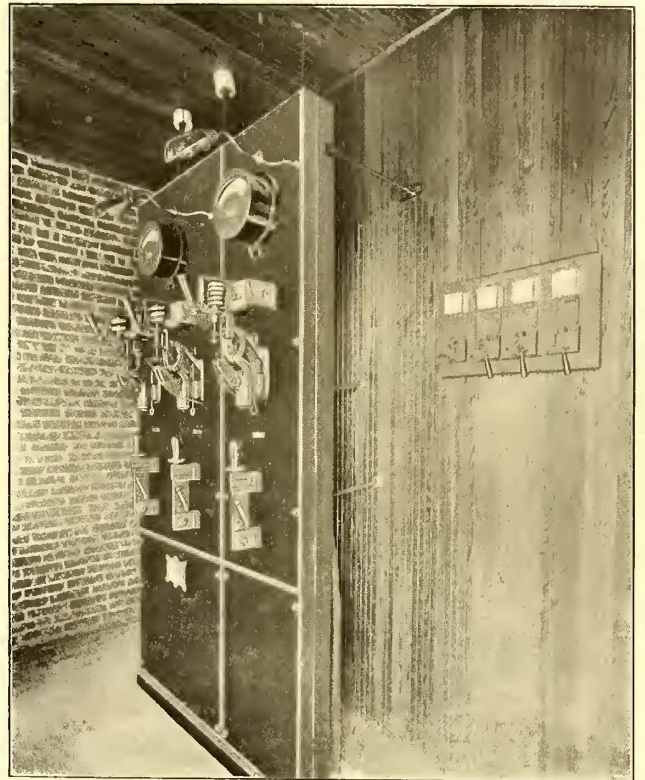
INTERIOR OF WESTMONT BATTERY SUB-STATION

twisted joint is used. The ends of the wires are first stripped for about 2 ft. and clamped together side by side. They are then twisted under strain and soldered. For splicing the 500,000-circ. mil feeders a stranded connection is used. The strands are cut back for a distance of 6 ins. to 12 ins., and a regular sailor's splice is made, after which the entire joint is soldered and taped. So well is the splice made that at a little distance it is almost impossible to see the joint. In fact, this same practice has been followed for 1,000,000-circ. mil cable and 2,000,000-circ. mil cable connections in the power station with very satisfactory results so far as appearance is concerned.

In recent work the company has been stringing a considerable amount of 500,000-circ. mil feed wire by electric power in mile lengths. The feeder is laid first over the cross-arms and is then drawn taut by the construction car, which receives its current from the trolley wire, which is erected first. The feeders are then slipped onto the insulators. This makes a very taut feeder construction and one which is very attractive in appearance. The insulators used have toggle holders, which do not let the feeder slip, even if there is a break in it. The practice, as stated above, is now toward the use of 500,000 circ. mils as a standard feeder, and it has been found that this sized feeder will stay up longer without getting slack than a No. 0000 feeder. The construction gang mentioned above, with the electric construction car, has erected 3 miles of No. 0000

feeder in a day of ten hours, including putting on the pins and insulators and making all joints.

The company has installed recording voltmeters at six dif-

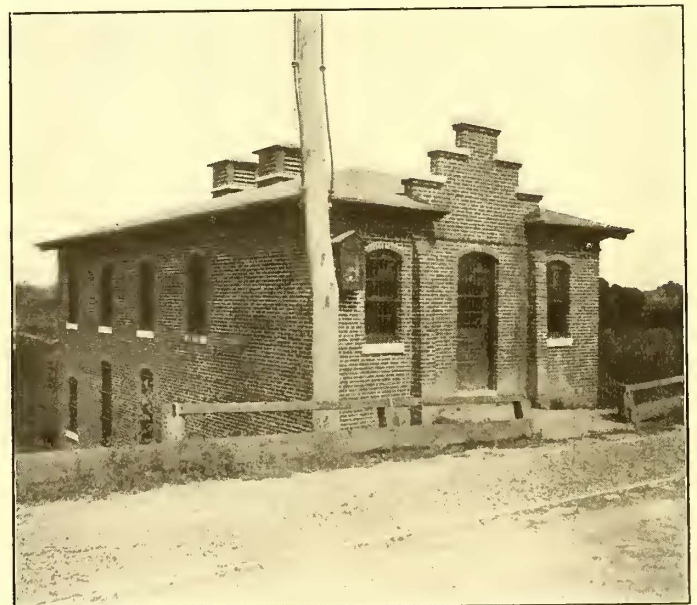


SWITCHBOARD IN BATTERY SUB-STATION

ferent points on the line. Daily records from each point are filed at the power station. These instruments are placed at each of three battery stations, also at the Kaighn's Avenue Ferry, at Woodlyn and at the power station.

CONSTRUCTION FORCE

The construction force consists of two track and line wagons, of which one is used in new construction and one in repairs.



EXTERIOR OF WESTMONT SUB-STATION

The usual force per wagon consists of two men, supervised by a foreman. The line foreman has charge of the repair of the line, construction of line, the block signal system and the telephone system.

The block signal system is used on single track, and is of the usual double-lever switch type.

TELEPHONE SYSTEM

The telephone system, which also forms part of the overhead

during snowstorms, as the crews can call up the main office from time to time and report how they are getting along. The system has also been found of great convenience in permitting the assistant dispatchers to report to the main dispatcher at

The Camden & Suburban Railway Co.

STORAGE BATTERY WEEKLY REPORT

Station Number ..... Location .....

Reading began, } A. M. P. M. Discharging } Time taking ..... hrs ..... min. Swinging }

Date ..... Last Watt Meter Reading ..... Charge ..... Discharge ..... Difference ..... Present " ..... Difference .....

Cell	Sp. g.	Volts	Condition	Cell	Sp. g.	Volts	Condition	Cell	Sp. g.	Volts	Condition	Cell	Sp. g.	Volts	Condition	Cell	Sp. g.	Volts	Condition	REMARKS
1				51				101				151				201				
2				52				102				152				202				
3				53				103				153				203				
4				54				104				154				204				
5				55				105				155				205				

FORM FOR RECORDING WEEKLY TEST OF STORAGE BATTERY

line department, is quite complete, and consists of thirty-eight telephones with twenty drops. Instruments are located at the terminals of all lines, also at other important points along the lines, such as the offices, power stations, repair shops, etc., of the company, and at the residences of the operating officials and department foremen. The central is in the dispatcher's department at the repair shop.

There are 38 miles of telephone line, all constructed of duplex, twisted, braided, rubber-insulated wire. The whole system is laid out so that phones can be introduced on the system by bridging. There are 1600 ohm ringers on the

different points as to car movements. These reports are afterwards submitted in writing.

LIGHTNING ARRESTERS

Lightning arresters are located every 1000 ft. The ground side is connected directly to the rail with a No. 0000 wire. Ground plates have been given up absolutely, as the connection has been found to deteriorate. The company burns out from fifteen to eighteen lightning arresters a year.

STORAGE BATTERIES

There are three storage battery sub-stations, as indicated on the map. As all are practically alike, except in the type of cells used, it will be sufficient to illustrate and describe one, and that at Westmont has been selected.

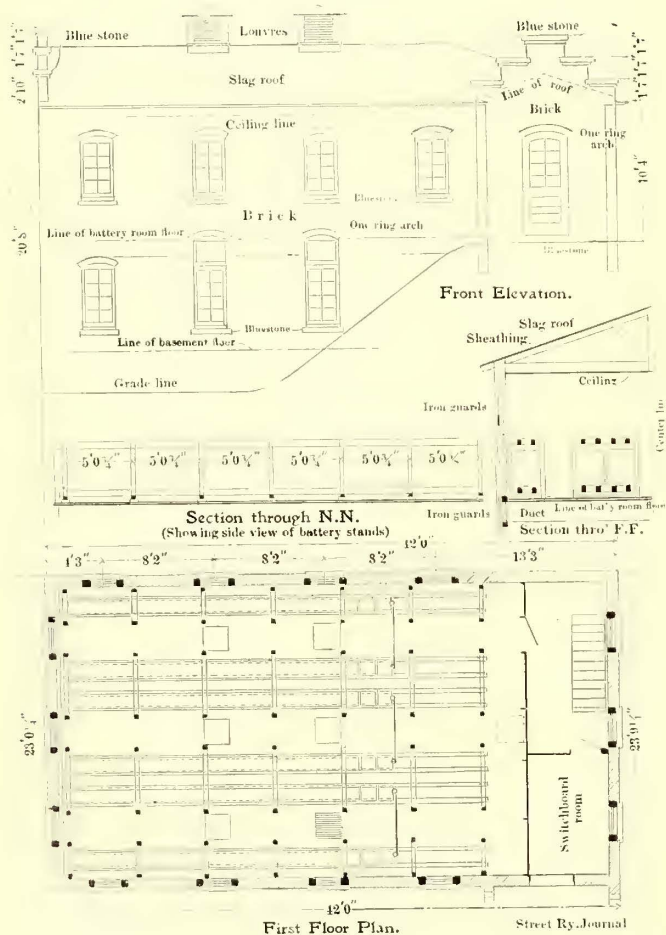
The battery station is of brick, with wooden girders and plank roof. It measures 25 ft. x 37 ft., and contains a battery of 240 cells of the chloride 9-F type, manufactured by the Electric Storage Battery Company, and having a capacity of 160 amps. at a one-hour discharge. The batteries are in glass jars on wooden racks, and the station is arranged to permit of 100 per cent increase in the capacity of the sub-station. The Moorestown storage battery installation consists of 240 cells, of the 11-S type, and with 200 amp.-hours capacity, while the Federal Street storage battery sub-station consists of 265 17-F type cells in lead lined wooden cells, and with a 300-amp.-hour capacity. The general experience of the company in the use of these storage battery sub-stations has been that the cost of the battery installation has been less than that of the cost of equivalent copper for obtaining the voltage results secured by the battery, and that the battery possesses the additional advantage of equalizing the load on the station and in part providing for the extra demands for power so frequent in railway work. The load line at the power station is noticeably uniform.

The cost of battery depreciation has been very low. The first battery, that at the Federal Street sub-station, has been in use for five years. Its original cost was \$14,000, and the depreciation up to date has amounted to \$872. The Westmont storage battery has been in use for three years, and the Moorestown battery for one year, with no depreciation account up to date.

The batteries take care of themselves, and are visited only once a week, when a careful voltage and specific gravity test is made of each cell. This is done by two men, who make their report on blank No. 70, reproduced herewith, one man taking the readings while the other puts down the results. The time required to test each complete battery by the two men is about one hour. It is found that each battery evaporates about 50 gals. of water a week.

POWER STATION

The power station shown in the illustrations on page 968 is located on Cooper's Creek, at approximately the center of gravity of distribution. It has been extended twice during the last four years, but both extensions have been made on a har-



PLAN AND SECTIONS OF WESTMONT STORAGE BATTERY SUB-STATION

phones and 50,000 ohm magnetos. The drops on the switchboard also have a resistance of 1600 ohms.

The telephone system is not used in general despatching, but on the night trips all crews are required to call up the car house on their arrival at the terminals. The telephone system has been found very useful in emergency work, especially

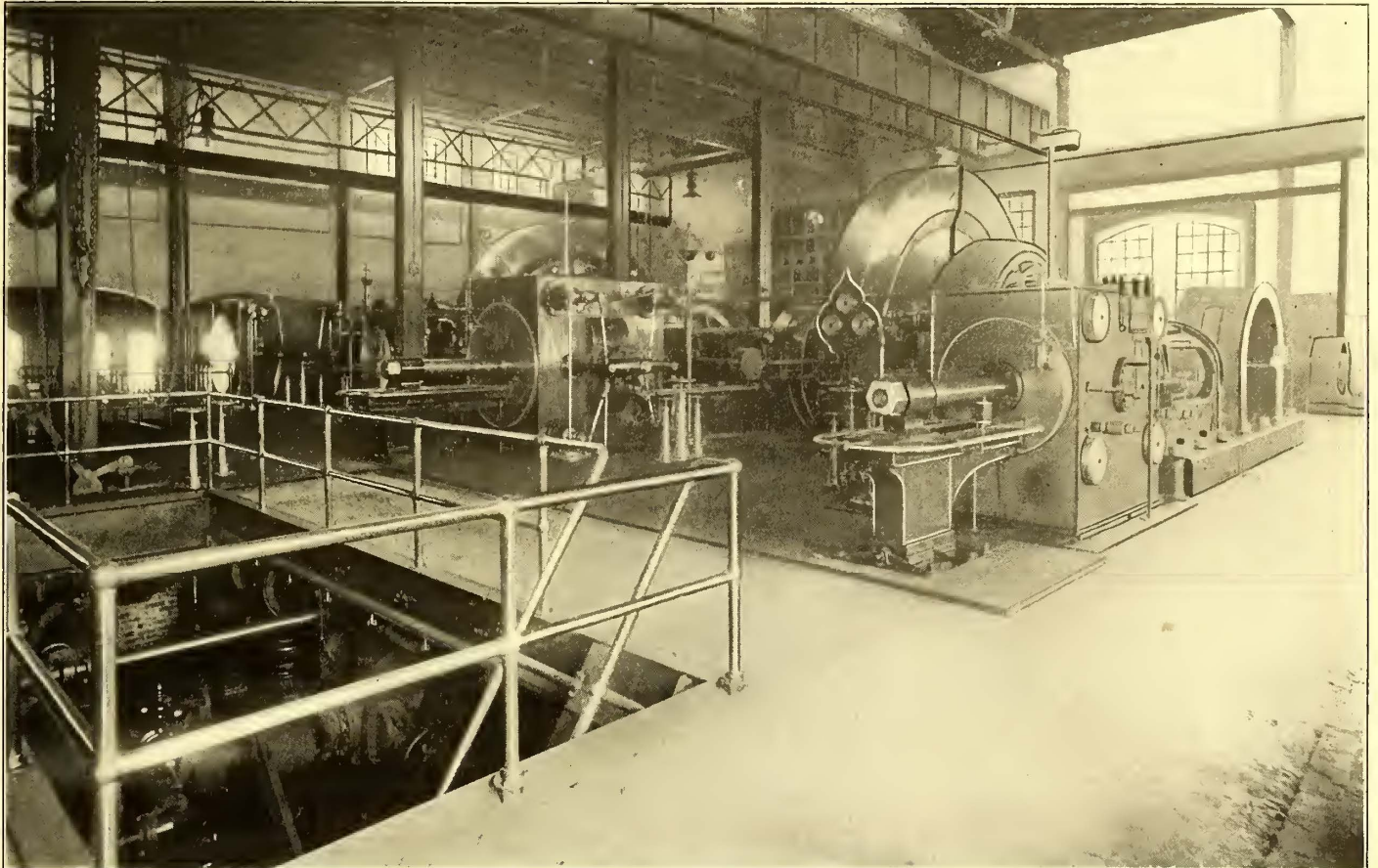
monious plan, so that with the exception of the original installation in 1896 the station is quite modern.

The station is in three parts. The old part has an engine room 44 ft. 6 ins. x 131 ft., and contains two Westinghouse compound engines, 20 ins. x 20 ins. x 10 ins., each belted to a 100-kw Edison bi-polar generator, and two vertical cross-compound Ball engines, 16 ins. x 16 ins. x 18 ins., belted to a General Electric 200-kw generator, and a 225-Westinghouse M P generator. These old machines are wired to the new switchboard in the later extension. A small independent switchboard is located in this room, and is connected to the bi-polars, and is used for lighting the company's park at Wood-Lynne. The boiler room of the old station contains four horizontal Coatesville return tubular boilers, 17 ft. x 18 ft.

by a 36-in. brick wall. The engine room faces south and east, and the boiler room south and west, and as the windows are ample there is plenty of light and air at all times. The drip pumps and condensers are located in the basement. The basement walls are lined and sealed to prevent tide-water from entering the basement.

#### FOUNDATIONS

Located in the center of the basement are the foundations for the engines and condenser. The sub-foundation consists of 1500 piles, driven on 3-ft. centers. These piles are capped and tied together with 30,000 ft. of capping. Above this capping are laid 18 ins. of concrete. Above this foundation is a grid of old railroad iron laid in concrete. From the top of the capping and to the first layer of brick foundations is a dis-



INTERIOR OF ENGINE ROOM

with sixty tubes  $4\frac{1}{2}$  ins. in diameter, and fire boxes 6 ft. x 6 ft. 6 ins. The boilers are piped with a duplicate system of 12-in. mains, to feed the engines in the old station, and also with a branch main to the new engines in the later extension. They have brick flues leading to two self-supporting stacks, 85 ft. high and 70 ins. in interior diameter.

Located outside of this building is an artesian well, 6 ins. in diameter and 160 ft. deep. The water from this well is pumped to a reservoir or tank of 1800 gals. capacity. The water is used for drinking purposes, priming the pumps and condensers, and as an emergency supply in the event of accident to the regular pipe lines which draw water from Cooper's Creek.

#### NEW EXTENSION

In July, 1900, a new extension was started directly south of the above described plant. The building is a brick and stone structure, 114 ft. long and 36 ft. 8 ins. wide. The main floor of the new station is 8 ft. above the floor of the old station. The new station is divided into two rooms, the engine and the boiler rooms. The engine room is 36 ft. 8 ins. x 76 ft., and the boiler room is 36 ft. 8 ins. x 37 ft. 3 ins. The two are separated

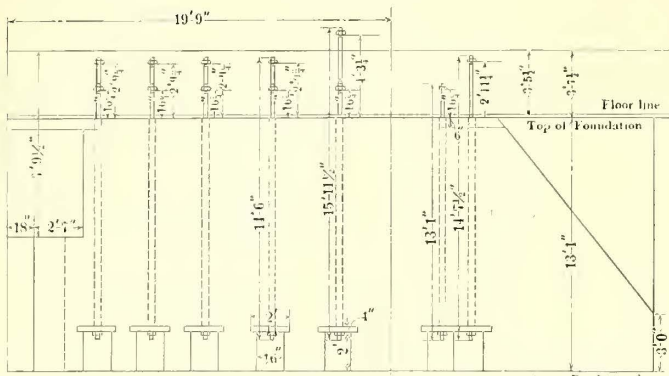
by a 36-in. brick wall. The engine room faces south and east, and the boiler room south and west, and as the windows are ample there is plenty of light and air at all times. The drip pumps and condensers are located in the basement. The basement walls are lined and sealed to prevent tide-water from entering the basement.

On the brick arches supporting the brick angle plates is a solid brick structure, walling in the generator and fly-wheel pits and supporting the engine bed at the floor level, all laid in Portland cement. The arrangement for the anchor bolts used for fastening down the engine and generator base plates is quite different from that usually employed. The bolts are not bedded in the concrete but slipped through tubes left in the structure, the novel feature consisting in the fact that arches are left in the sub-foundation by which there is always access to the nuts on the ends of the foundation bolts.

#### BOILERS, PUMPS AND CONDENSERS

The boiler room is at present equipped with six 300-hp vertical Berry boilers, with independent stacks. The boiler feed pumps in the first extension are of especial design, are Barr duplex outside end packed, and have cylinder dimensions 10 ins. x 6 ins. x 12 ins. Those in the second extension are of the Snyder-Hughes duplex outside end packed, brass lined, duplex type with balanced valves. The rest of the equipment of the boiler room includes three Goubert feed-water heaters.

one between each engine and the condenser of 1200-hp capacity, and another of 2400-hp capacity in the boiler room, through which the steam from the auxiliaries exhausts.



SECTION OF ENGINE FOUNDATIONS, SHOWING OPENINGS WHICH GIVE ACCESS TO FOUNDATION BOLT NUTS

All of the piping connections are made by a special screw flange, illustrated in section herewith. As will be seen, at the end of the thread the shoulder of the flange is provided with a groove for caulking purposes. A special copper ring is used for caulking, as illustrated. The outside of the flange is then cut away for the bolts and a copper gasket is used. In this connection it might be said that the company has never had any leaks in its steam piping. Each unit division of the station is piped and wired separately, so that it can be operated independently.

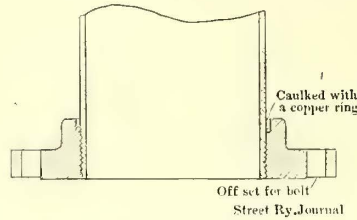
The condenser in the first extension is of the single-acting fly-wheel type, with rotating steam valve and throttle governor, and that in the second extension of the double fly-wheel type with Corliss valves. The condensers are so piped that the exhaust can be thrown into the condensers themselves or through the auxiliary heaters. The water supply for the condenser is drawn from the creek and is discharged into the creek or into the hot well. In the basement is a drip pump and receiver, 3 ins. x 2 ins. x 3 ins., which automatically delivers the live steam drip to the boilers. An independent gravity oil system is used in which the oil is filtered and used over again.

CONDENSING TANK

A very novel and economical feature of the oiling system is an arrangement both for recovering the cylinder oil and utilizing the latent heat in the water in the hot well. The overflow from the condensers discharges into a large concrete and masonry tank, 60 ft. long x 14 ft. wide x 6 ft. deep, set the level of the boiler room floor.

This receptacle, a rough section of which is shown on page 974, is divided by barriers into four compartments, the barriers being so arranged that the water has to flow over the first, then under the second, over the third, and so on. The overflow from condensers is led into the first of these compartments, and as it flows under and over the barriers of the tank the cylinder oil collects on the surface of the water in each compartment. In this position it is automatically skimmed off by funnel-shaped drain pipes, about 6 ins. in diameter at the top, as illustrated. It has been found possible in this way to recover about one-fifth of the oil used in cylinder lubrication. It has also been found not only practicable but

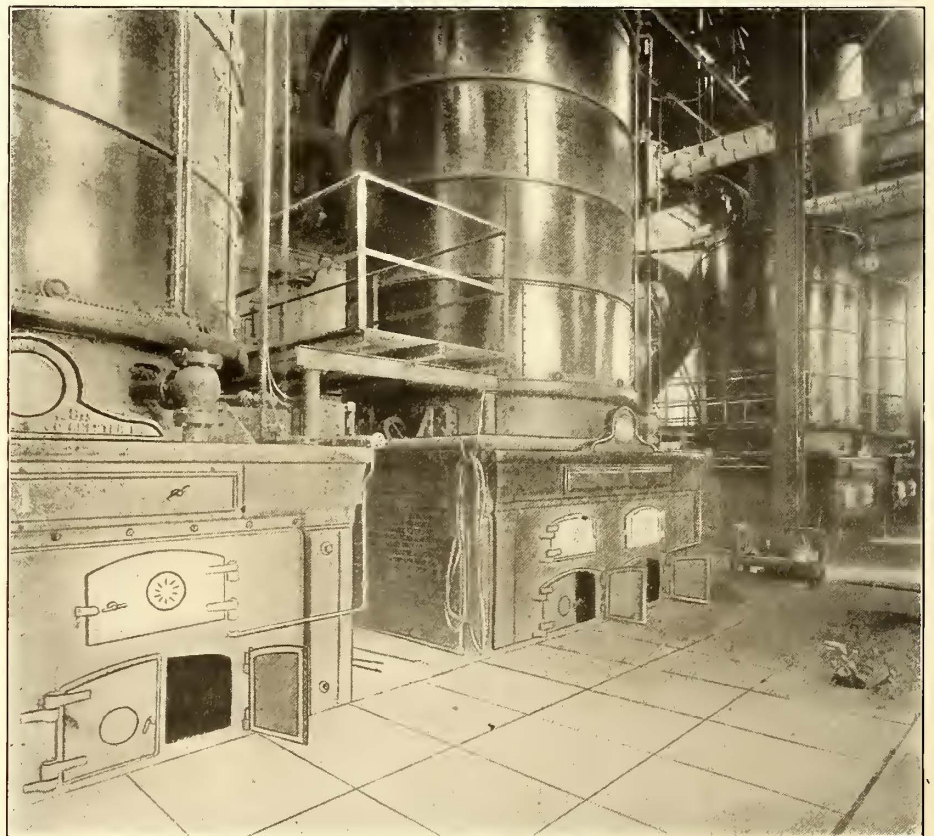
desirable to use the overflow of this tank for boiler feed purposes. The temperature of the water averages about 115 degs. F., and the little oil that is mixed with the water seems to act as a boiler compound and be just enough to precipitate the mineral matter in the water; in fact, since the introduction of this water the boilers have been entirely free from scale or corrosion. No other boiler compound is used except occasionally a little soda, which is mixed with the feed-water to coat the interior of the pipes.



SECTION OF PIPING, SHOWING METHOD OF MAKING JOINT

ENGINES

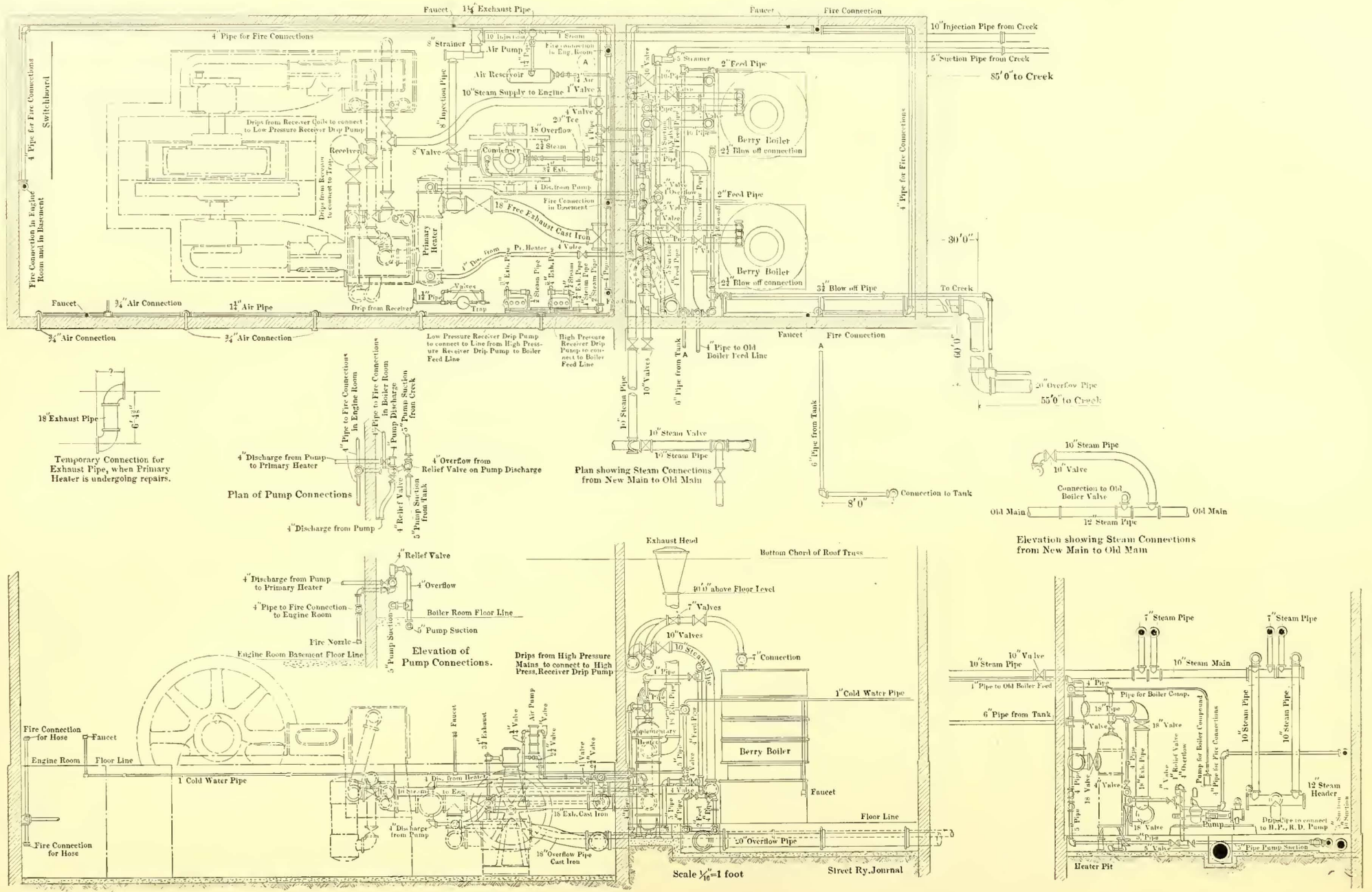
Taking up now the engine room, the new engines are two in number and of the horizontal cross-compound condensing Corliss type. They were made by the Pennsylvania Iron Works Company, and have cylinder dimensions 30½-in. and 52-in. x 42-in. stroke. They operate at 80 r. p. m., and are fitted with double-ported Corliss valves with rocker arms and double-eccentric motion. The governor is operated by an positive-motion gear and shaft. There is also an auxiliary governor, which is belted to the main shaft of the engine, and which runs idle at about ten turns lower than the operating governor. This governor is so arranged that if the operating governor fails to work, an increase in speed of 10 r. p. m. will throw in operation a trip releasing a heavy weight and closing



INTERIOR OF BOILER ROOM

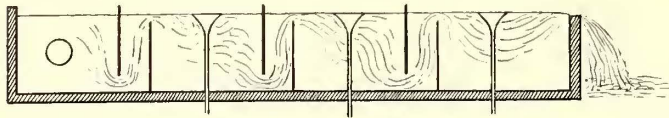
a butterfly valve, thus shutting down the engine. Both of the engines are of the 1200-hp capacity, and have been made especially heavy. For instance, the fly-wheel weighs about 160,000 lbs., which is about 60 per cent heavier than the fly-wheel usually furnished for this size of engine.

The engines are practically identical except that in the second engine tail rods have been adopted, supported on ad-



PLAN AND SECTIONS OF EXTENSION NO. 1 OF POWER STATION

justable tail bearings. The use of tail rods is quite novel in this country, although very common in Europe, and they were introduced to remove the strain which otherwise falls on the bottom of the cylinder. While the reduction in pressure on the bottom of the cylinder from the piston does not amount to very much during light loads, it is considerable during heavy loads, on account of the fact that the steam enters on top of the piston. Experience with tail rods in this station indicates



SECTION OF HOT-WELL TANK, SHOWING SKIMMERS FOR RECOVERING CYLINDER OIL

that it is possible to work the engine equipped with tail rods at about 10 per cent greater capacity than the other engine.

As will be seen in the illustration on this page all of the fly-wheels have been encased in metal housings. The object of doing this was threefold. The first is that the current of air generated within the housing is led up through the armature to the generator and so keeps the latter cool and clean. Second, there has also been found to be a gain in horse-power of about  $1\frac{1}{2}$  per cent. The third advantage is the general appearance of the engine room, cleanliness and safety to the attendants. The fly-wheel metal housings as well as the crank shaft housings and the lubricator system employed in the station were manufactured by Bingham & Company, of Camden.

Each engine is directly connected to a Westinghouse 800-kw, ten-pole generator.

#### SWITCHBOARD

The switchboard is located at the eastern end of the station on a gallery commanding a view of the entire engine room, as shown in the illustration showing the interior of the station. The switchboard connections are shown in the accompanying schematic diagram, and, as will be noticed, are quite novel. Two positive bus-bars are used, and the equalizer is on the negative side of the generators. This has the advantage of reducing the possibility of short circuits between the equalizer and the ground, as there is a very small difference of voltage between them. It also reduces the complications on the board, as one switch only is required instead of two or three, which are needed when the equalizer is on the positive side. The current can also be run directly to the instruments, and the arrangement of the lightning arresters is also simplified. The switchboard is of the single-pole type, the negative pole being grounded and the positive put to the trolley. The negative equalizer switches are not placed on the board but are carried on a small panel mounted on a post directly in front of the generators, as shown in the view of the generators. The board is also provided with a five-point switch, which can unite any two or more of the machines, independently of the remaining machines. By following out the connections on the diagram, it will also be seen that by this switch any group of machines can be connected to any feeder or feeders, either with or without the booster, by an independent circuit not connected with the bus-bar.

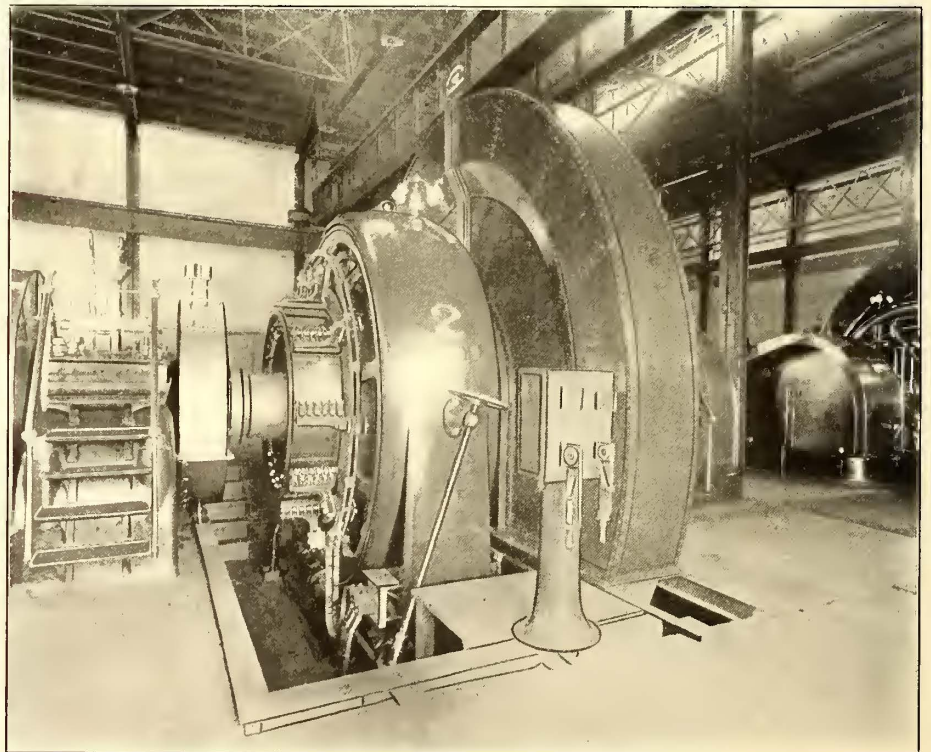
In the diagram *W*, *A*, *B*, *C* and *D* are booster feeders, *W* being the lighting feeder to Wood-Lynne Park. Booster feeder

*B* goes directly to the Delaware Avenue storage battery without any taps, feeder *C* to No. 2 battery at Westmont, and feeder *D* to No. 3 battery at East Pensauken. Feeder *A* is for the Riverton branch.

The switchboard itself is of the double-deck type. The lower deck is devoted to the five generator panels, one main negative panel and two small panels with booster outfit. The upper deck comprises the five panels for the ten line feeders and the two panels for the four booster feeders. Another interesting feature of the circuits, and one which has been in use for two years, is the employment of two automatic magnetic circuit breakers of the General Equipment type, connected in multiple on each machine before tapping to the bus-bars. The opening of these two circuit breakers has been found to be, to all intents and purposes, simultaneous. By using two in multiple the arcing is divided between twice the number of contacts, thus reducing the destructive effect of the arc to a minimum. A further advantage of the use of two circuit breakers is in the ability to operate if one should fail to act; another is that it is possible to employ a cheaper type of circuit breaker and one that is more readily repaired.

The double-throw switches permit the connection of any machine to the upper or lower potential bus-bar, and the former can be run at any voltage within the limits of any machine. The main negative panel carries the main station ammeter and wattmeter.

The booster is connected in an ingenious way to the switchboard. One of the usual troubles with a motor-driven booster is that if the circuit breaker of the motor opens the booster will run as a motor, and being a series machine will rapidly accumulate speed. There are, of course, various plans for opening booster circuits, but the management believes that nearly all of these have failed, as their electrical operation



METAL HOUSING AROUND ENGINE FLY-WHEEL

depends upon magnetism. For this reason the motor circuit breaker on the station switchboard is interlocked with the circuit breaker of the booster; so that when the motor breaker goes out it automatically opens the booster breaker. The interlocking connection prevents the switchboard attendant from closing the booster breaker until the motor has again been started.

The building is protected by a double battery of lightning

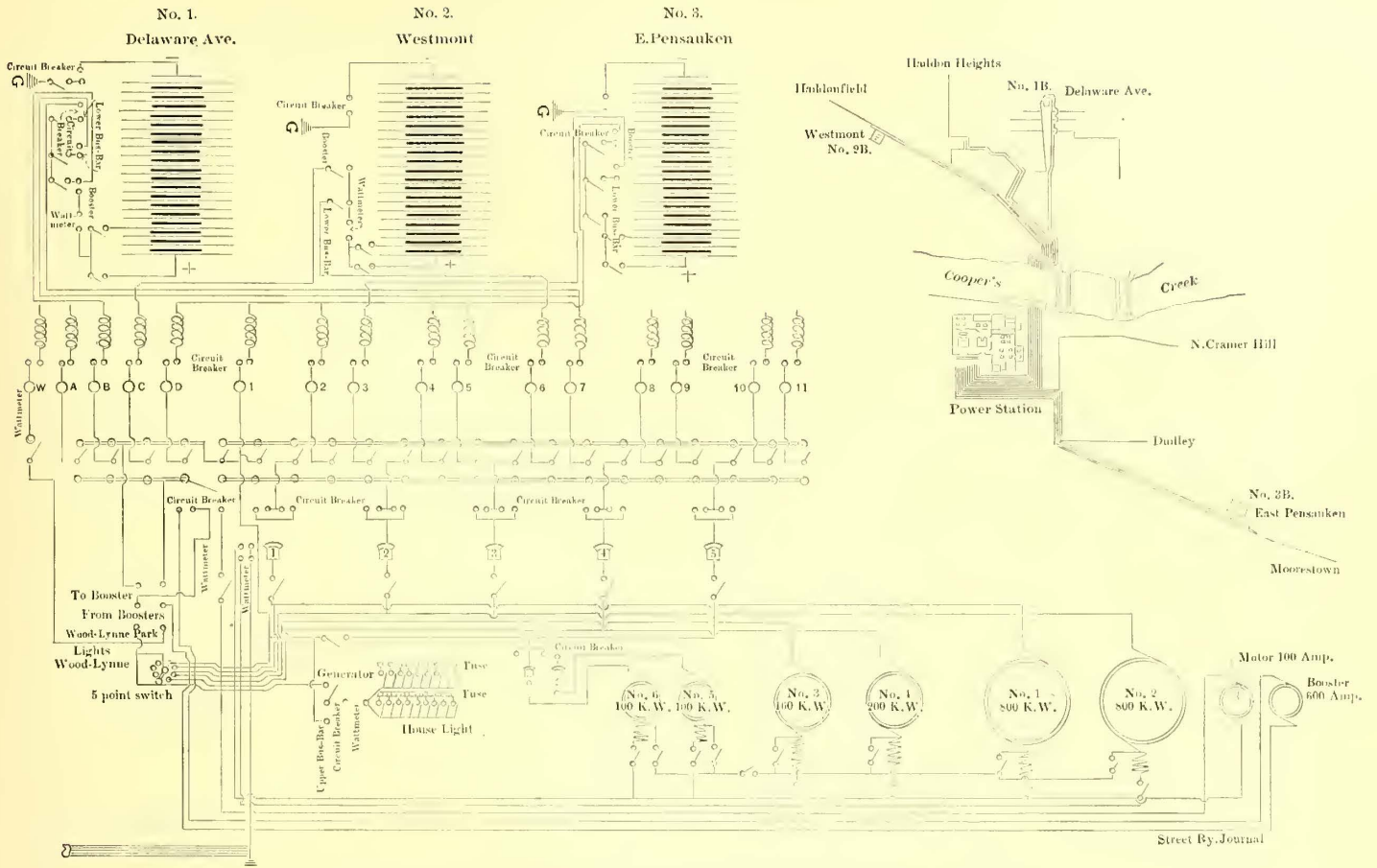
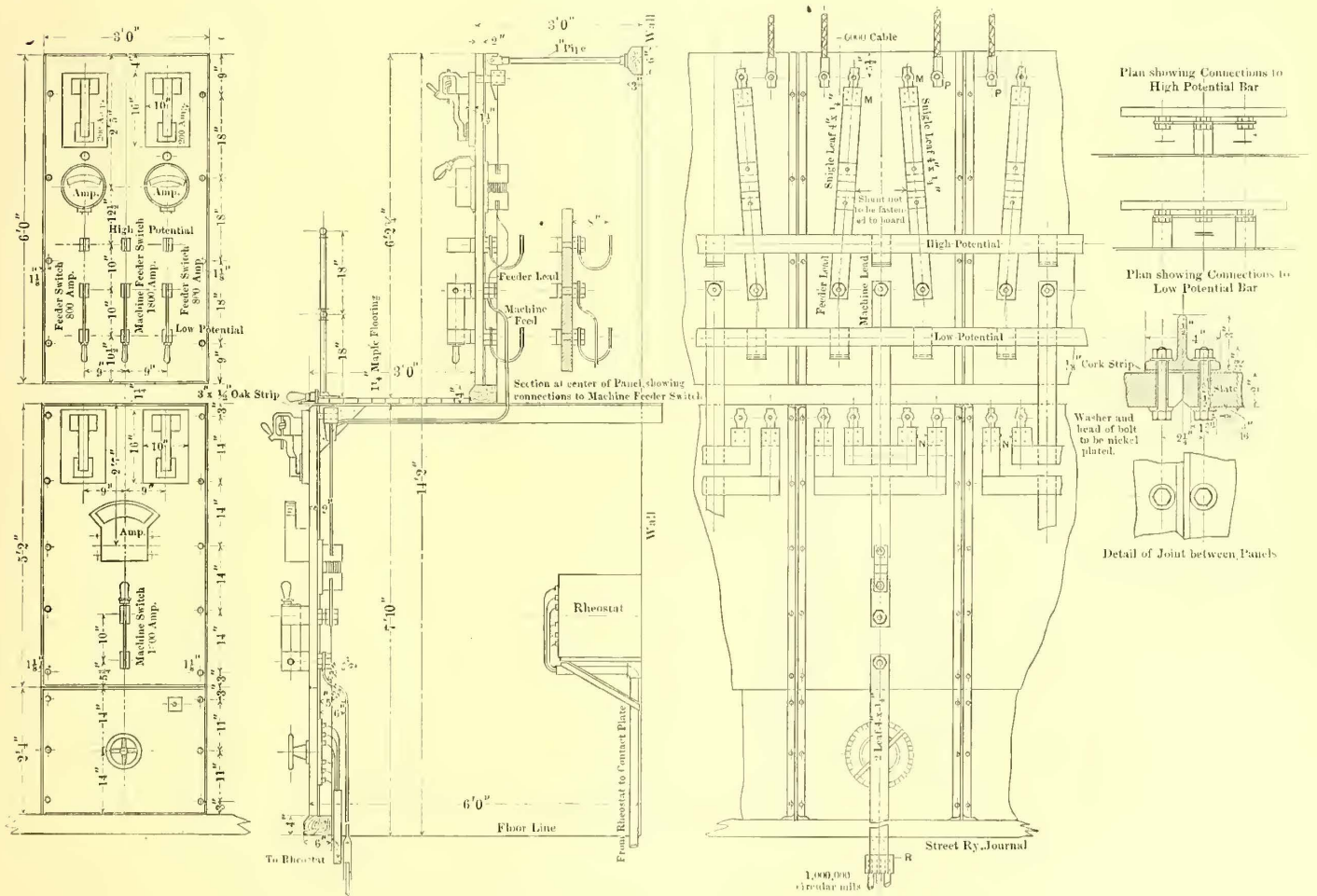


DIAGRAM OF SWITCHBOARD CONNECTIONS, MAIN POWER STATION



SECTION OF SWITCHBOARD AND DETAIL OF PANEL

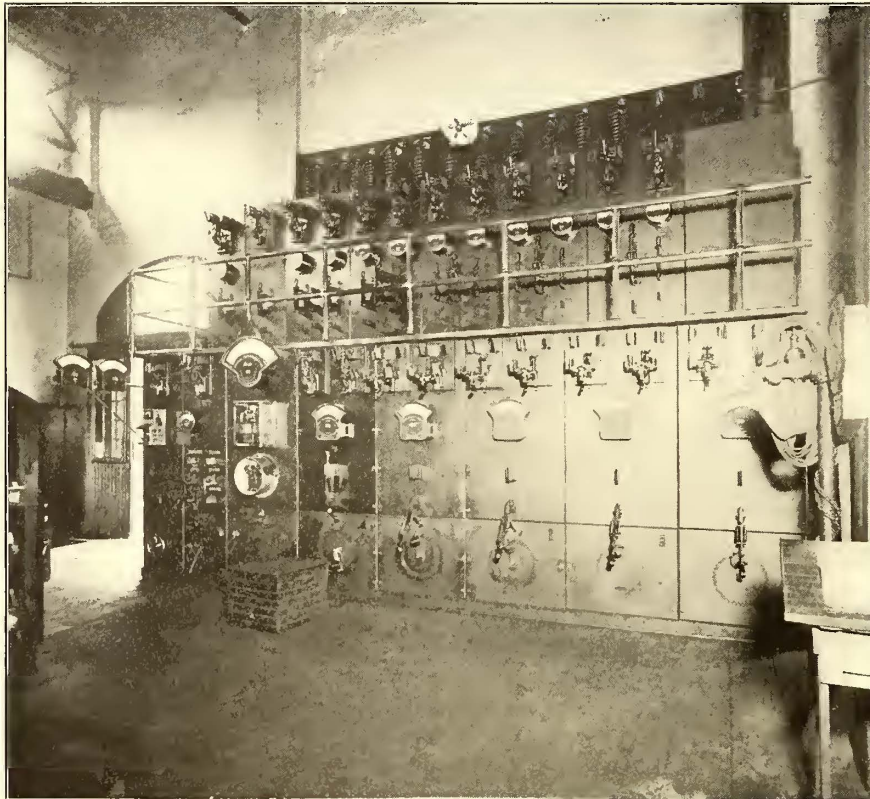
arresters, one on the inside of the building, and choke coils and Ajax arresters on each feeder, and on the inside of the building each feeder is protected by Garton-Daniels lightning arresters.

#### ROLLING STOCK

A record of the rolling stock apparatus and equipment is entered on a tracing kept up to date by adding additional equipment when purchased. This tracing contains thirty-five columns, giving the following statistics:

#### Car Body—

Truck No.  
Open Car, No.  
Box Car, No.  
No. of Benches,  
Make,



SWITCHBOARD AT MAIN POWER STATION

Length of Body—  
Platform  
Body,  
Over all.

Extreme Width.  
Height Trolley Base to Rail,  
Seating Capacity,  
Windows on Side.

#### Motors—

Type,  
Horse-Power,  
No. on Car,  
Gear Ratio.

#### Trucks—

Make,  
Wheel Base,  
No. Under Car,  
Wheel Diameter: Driving,  
Pony,

Axle Diameter: Driving,  
Pony.

Journal Lubrication.

Brakes: Automatic,  
Hand.

Track Scraper,

#### Miscellaneous Electrical Equipment—

Type Controller,  
Type Resistance,  
Type Circuit Breaker,  
Type Fuse Box,  
Type Trolley Base,  
Lightning Arrester,

Headlights: Arc,  
Oil.

This record also contains a summary of the rolling stock, viz., total number of 16-ft., 18-ft., 20-ft., etc., cars, total number of trucks of each type, motors of each type, controllers, circuit breakers, fuse boxes, trolley bases, lightning arresters, headlights, extra armatures, controllers, etc.

Briefly, the equipment consists of 122 car bodies, of which twenty-three are of the ten-bench open type, and thirteen of the eight-bench open type, sixteen are ten-bench semi-convertible, twenty are double-truck 28-ft. box cars, 40 ft. over all, with a smoking compartment, twenty are 10-ft. single-truck box cars, twenty-one are 18-ft. single-truck box cars, and nine are 20-ft. single-truck box cars.

The company has 102 single trucks, principally of the Brill make. It has twenty double-truck equipments, seven of which are the Brill 27-G type, eight of the St. Louis maximum-traction type, and five of the Peckham 14-B-3 type. In this connection it might be said that in its open cars the company is giving up the use of side steps and is changing its open cars to center-aisle cars, principally on account of the danger of accidents.

The company has 209 motors, most of them of the Westinghouse No. 3, No. 49 and No. 38-B types. All new double-truck cars are equipped with Westinghouse No. 56 motors, and the company has five 4-motor equipments using this type of motor.

The company also has as a snow-fighting equipment five sweepers, one Peckham-Ruggles rotary snow-plow and two sprinklers. The track on all the suburban lines is sprinkled once a day. All of the cars are equipped with United States fenders, manufactured by the United States Fender Company, of Camden, and are heated with Spear stoves.

All new minor car apparatus, such as carbon brushes, gears, patent ventilators, etc., are tested on the same car. In this way they can be watched very easily, and records can be kept more certainly as to their service. This is car No. 143. The total number of cars available for service in 1903 was eighty-four, of which thirty-six were open cars, twenty double-truck, and the rest single-truck box cars.

#### NEW STANDARD CAR

The company is now engaged in the design of a standard double-truck car. This car will have a 30-ft. or 33-ft. body, with 5½-ft. platforms and 6-ft. wheel bases. It has a smoking compartment, which is fitted with longitudinal seats, and takes in two windows. The seats in the main part of the car are cross-seats, except at the end, where there are two longitudinal seats which take in two windows. The aisle is 21 ins. wide at the narrowest point, that is at the seat bases. Between backs of seats the aisle is 24 ins. wide. The interior side lining of the car is omitted so as to permit of a seat 36 ins. wide. The sash lintel will be only 25 ins. from the floor. The outside width of the car is 8 ft. 2 ins. As there is no interior lining to the car the sash will be stationary in the winter and will be taken out in summer,



The car is equipped with a monitor roof. The vestibule will also be lighter than usual, as it will be mounted on the ordinary dash, and its side sash will be stationary. The center sash will be made to open laterally by being mounted on rollers, which move on a horizontal rail somewhat after the practice sometimes used with vestibuled doors. The car will be equipped with four 56-Westinghouse motors, K-14 controllers and air brakes. All cars will also be equipped with arc headlights, which the company has been using for four years, and which have now been adopted as standard on all of the divisions except those operating entirely within the city limits.

#### AIR BRAKES

The company is now proposing to equip all of its double cars with air brakes, and is now conducting a competitive test between Christensen air brakes, as made by the National Electric Company, of Milwaukee; Standard Traction brakes, as made by the Westinghouse Traction Brake Company, of New York and Wilmerding, Pa., and the brakes of the Philadelphia Air Brake Company. The Westinghouse equipment is of the new type, in which the motor and controller are completely enclosed. The air valve is of the slide valve type, instead of the rotary valve employed on the Christensen equipment. A duplex air gage is also used, with two hands.

The Christensen equipment is of the usual type.

In the Philadelphia air brake equipment the compressor is driven with a worm instead of by gearing. The brake cylinder is of the duplex type with pistons at each end. The air is admitted at the center, and each piston operates the brake rigging at one end of the car, thus, of course, dispensing with the usual equalizing lever.

#### TAIL LIGHTS

In this connection it might be said that all of the cars of the system are equipped with red tail lights. These are oil lights, and are considered very important for safety purposes. They are distributed at dusk to the cars at the different terminals by a special lamp car, illustrated on this page.

#### PARKS

The company owns a park at Wood-Lynne, which is part of an old estate acquired some-time ago. It contains 13 acres, with a lake, shrubs and trees and a rolling character of ground, which makes it very attractive for park purposes. The former owner was very much interested in arbor culture, and some of the trees in the park are quite rare. Several other varieties of rare trees and shrubs have been added since the railway company has been the owner of the park.

The special attractions at the park consist of a pleasure railroad, carousel, pavilion, dancing pavilion, theater, swings, boats, shooting gallery, monkey cage and band-stand. The former residence in the park has been remodeled with large porches, and makes an attractive center of attraction. The park is within the 5-cent limit of the center of Camden, and the attendance during the year aggregates over 100,000. The park is not operated directly by the railway company, as this was found to be very unsatisfactory, as it interfered with the regular duties of the company's force. It is leased for a nominal rental to a park manager.

#### CAR HOUSE AND REPAIR SHOPS

The main car house and repair shop of the company are located on Newton Avenue, not far from the power station. A full discussion of the repair methods followed will be given in a subsequent article. The tools in the carpenter shop are

operated by one 5-hp motor, and consist of one joiner, one circular saw and one band-saw. The machine shop is also operated by a 5-hp motor, and its equipment comprises one 22-in. swing 15-ft. bed lathe, a 28-in. swing 14-ft. bed lathe, one 16-in. swing 8-ft. bed lathe, one vertical drill press, capable of drilling up to a 1 $\frac{3}{4}$ -in. hole, one small drill press, one shaper with a 14-ft. sweep, one emery wheel, one baking oven, heated by electric boilers, one large car-house jack, swinging jib-crane, etc. The blacksmith shop consists of two forges and blowers. All repair work is done by contract with the repair shop foreman, at a certain specified price for each essential operation. Some of these prices will be given in a later article.

#### NEW REPAIR SHOP

The company is planning to install a new repair shop at Fourth Street and Kaighn Avenue, and this shop will not be used for ordinary repairs but exclusively for the thorough overhauling of cars.

The management believes that the two operations, that is,



INTERIOR OF LAMP CAR USED FOR SUPPLYING HEADLIGHTS AND TAIL LAMPS TO THE CARS AT TERMINALS.

minor repairs and thorough overhauling, should be kept thoroughly distinct, and periodically the cars will go to the new repair shop for the work which it is necessary to do. In this shop the car bodies will be painted and varnished, or varnished only, as the case may be, the motors and trucks will be run out and all parts carefully inspected and repaired.

Some idea of the magnitude of the business of the Birmingham Railway, Light & Power Company may be gained in knowing that on circus day recently the company handled 150,000 fares, with 10 cars in service as a maximum, without an accident. The entire street railway population is not more than \*125,000. The circus had something like 12,000 at two performances, who were hauled 2 miles from the city proper. This required that each car carry during the day 1250 fares, or at sixty to the car make twenty trips. This required also 240 motormen and conductors, and at least ten inspectors and dispatchers. The company has been engaged for the past two years in making some very extensive improvements to its system, including power stations, rolling stock and track work. It has now about completed this new construction, having spent, during this time, in the neighborhood of \$2,000,000.

RECONSTRUCTION OF OLIVE STREET TRACKS IN ST. LOUIS

The reconstruction of the tracks on Olive Street, in St. Louis, as recently carried on by C. A. Moreno, chief engineer of the St. Louis Transit Company, is remarkable in several

operated over it, at thirty-second headway, morning and evening.

The track to be reconstructed was an old cable track, Fig. 1, consisting of a 4-in. girder rail set in yokes. The distance between track centers on this street was only 4 ft. 4 ins., and as

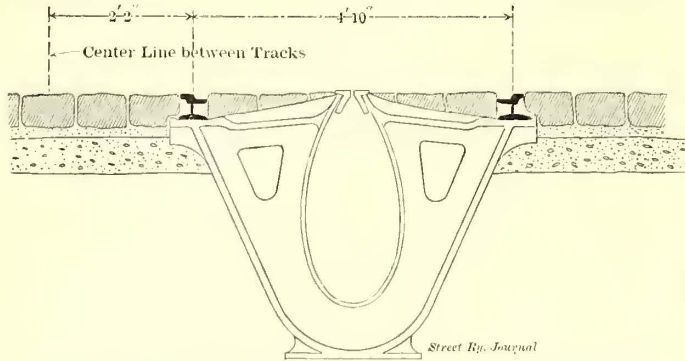


FIG. 1.—SECTION OF OLD CABLE TRACK IN ST. LOUIS

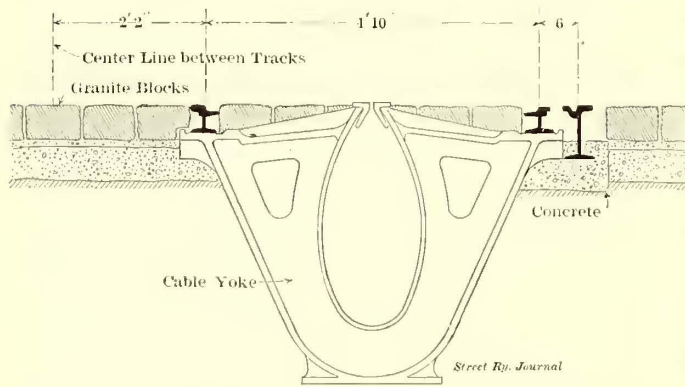


FIG. 2.—SECTION SHOWING 9-IN. RAIL OUTSIDE CABLE YOKE



FIG. 3.—VIEW AFTER LAYING OUTSIDE 9-IN. RAIL

respects. The problem was to take up an old cable track and lay in its place an electric track. It was also necessary to rebuild this track without interfering with the regular operation of cars, as the traffic on the Olive Street line is very heavy. It is one of the company's most important lines, and cars are

the cars which are now being operated over these tracks are wider than the old cable cars, the distance between the new cars was uncomfortably small. It was, therefore, decided to move each track out 6 ins., increasing the distance between the track centers 1 ft. To accomplish the reconstruction the outer rail of the new track was first laid, as shown in Figs. 2 and 3. This outer rail is 9 ins. high and of the grooved pattern, which has been adopted in St. Louis. To lay this rail a trench was excavated just outside of the old cable rail, 12 ins. wide and 15 ins. deep, except at the joints, when an additional 2 ins. were excavated, to give that much more concrete under the joints. The outer rail was then laid, surfacing it on blocks placed 12 ft. apart. Concrete was placed under and around the rail, allowing 6 ins. of concrete under the rail, except at the joints, where there were 8 ins., and the concrete was brought up 3 ins. above the base of the rail. For joint fastenings, twelve-hole angle-bars, 32 ins. long, were used, and joints were bonded with four No. 6 copper bonds, 42 ins. long.

So far the work interfered in no way with the existing track for the operation of the cars. It was all completed independently, and allowed to remain ten days undisturbed in order to give the concrete a chance to set thoroughly. The granite blocks with which the track was paved were then removed, together with the slot rails of the cable conduit, as shown in Fig. 4. The sand was cleaned off the old concrete which supported the yokes. The top of this old concrete was 6½ ins. below the grade of the street. To avoid having to dig up this concrete to accommodate a 9-in. rail similar to that used on the outer rail of the track, a grooved rail only 6 ins. in height was used for the inner rail. The "owl" cars were taken off this section of the line from midnight until 5:30 a. m., to give a chance to break out the yokes, throw out the old rail and lay the



FIG. 4.—VIEW AFTER REMOVAL OF SLOT RAIL

new 6-in. inside rail. The inner rail was secured by tie-rods to the 9-in. outer rail, already imbedded in concrete, as shown in Fig. 5. The track could then be operated upon the next day, and the balance of the work completed during the daylight. The top of the old concrete in the cable track being level and

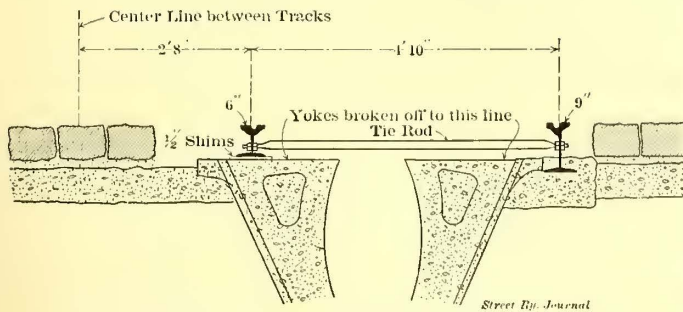


FIG. 5.—SECTION WITH ELECTRIC RAILS IN PLACE

the inner rail, which rested on this concrete, having a flange width of 6 ins., it was held securely in its position without difficulty, but to increase its stability metal shims, 8 ins. wide and from 1¼ ins. to 1 in. in thickness, were laid every 3 ft., to bring the head of the rail up to the grade of the street. This left the base of the rail between shims from ½ in. to 1 in. above the surface of the old cable track concrete foundation. To take

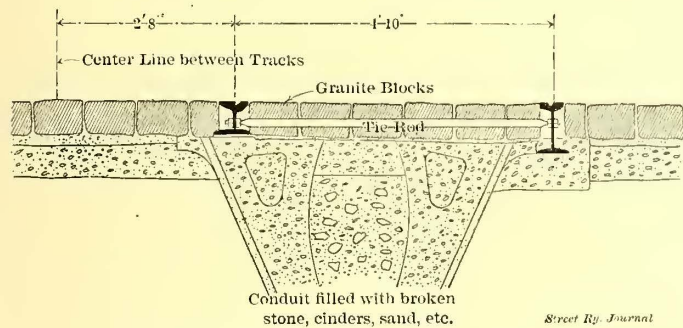


FIG. 6.—SECTION OF COMPLETED TRACK

up any movement in that portion of the rail between the metal shims, iron borings from machine shops were tamped under the rail. As this tamping was done the borings were kept constantly wet with salt water, which caused them to rust quickly, and make what is known as a rust joint between the beds of the rail and the concrete. The old cable conduit was filled up



FIG. 8.—VIEW AFTER BORINGS HAVE BEEN RAMMED UNDER RAIL



FIG. 7.—VIEW OF TRACK WITH CONDUIT FILLED

with cinders, sand, broken stone and other debris that happened to be at hand. This was thoroughly rammed and flushed with water. The filling was carried up to within 6 ins. of the top of the old concrete. The remaining 6 ins. was filled with new concrete to support the paving. The paving was then laid to complete the track, as shown in Fig. 6. In Fig. 7 is shown a view of the track in which the cable conduit has been filled,

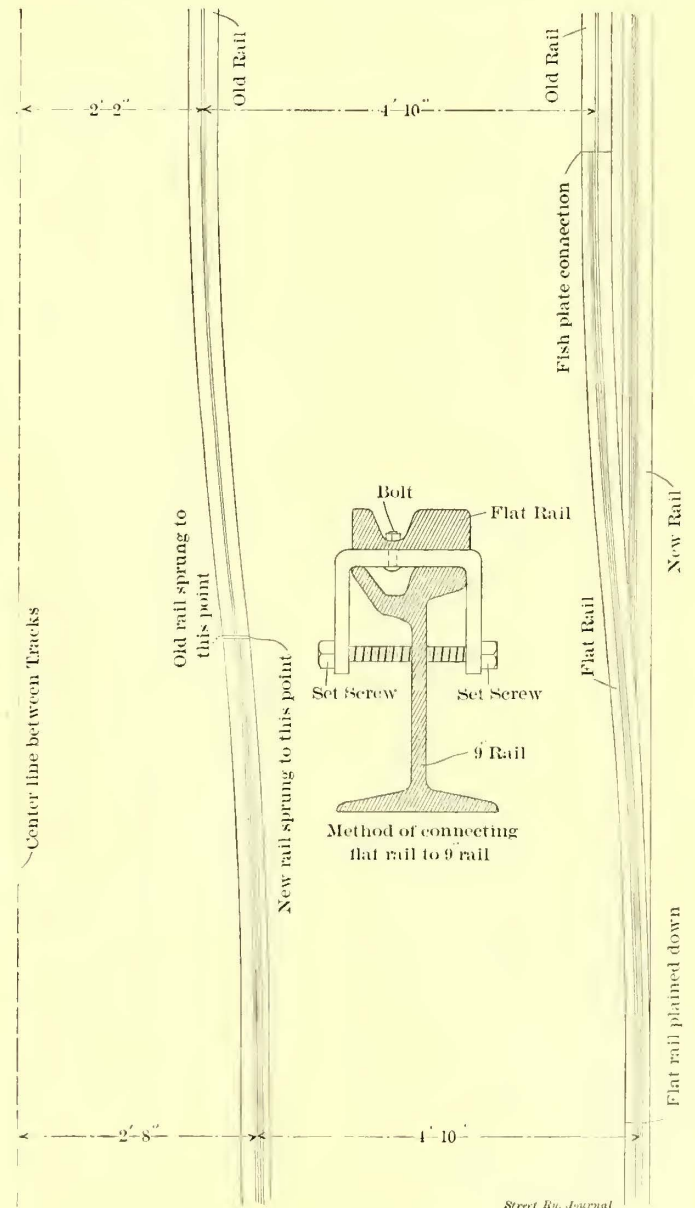


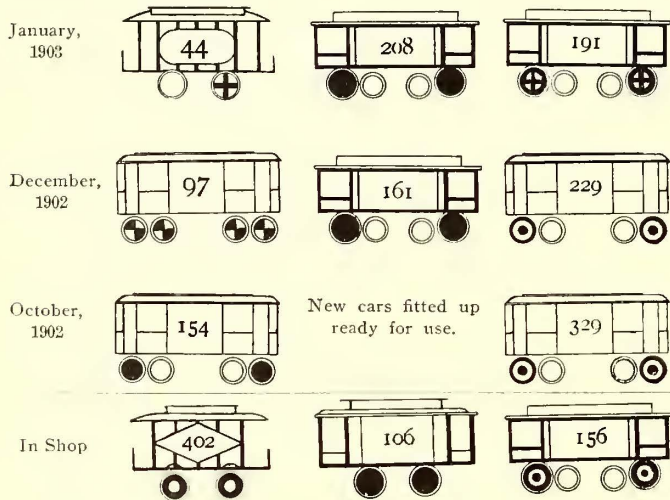
FIG. 9.—CONNECTIONS BETWEEN OLD AND NEW CONSTRUCTION

but the steel borings have not been rammed under the 6-in. rail. In Fig. 8 the cable conduit has been filled ready for the last 6 ins. of concrete, and the borings have been rammed under the 6-in. rail.

When each night's work was finished the old track was connected with the new by means of connecting rails, details of which are shown in Fig. 9. This connecting rail was moved ahead from day to day until the work was completed. Several gangs of men were worked on this job in order to complete it as rapidly as possible, and it was found that with a gang of forty men about 1500 ft. of track could be laid each night in 5½ hours. This, of course, did not include the daylight work. For breaking out the tops of the old cable yokes lengths of old rail were used as rams.

SHOP RECORD FOR CARS IN LOS ANGELES

An ingenious system of shop records is kept by General Manager Muir, of the Los Angeles Railway Company, for his own private and instant information, concerning all of the company's cars, showing the last date each car passed through the shops for general overhauling, painting, varnishing and re-



REPRODUCTION OF PART OF REPAIR-SHOP RECORD

building. The type and equipment of all cars are also shown graphically on this shop record; in fact, every time a car enters the shops (except for running repairs) the fact appears on the record.

While the accompanying chart shows a wide range in type of cars, it is only fair to the Los Angeles Railway Company to say that its standard is the combination double-truck, and that but few of any other style remain in the service at this time, owing to the rapid work of standardizing and rebuilding now going on in the Los Angeles shops.

The record hangs on the wall in a case, 3 ft. x 4 ft., covered with glass conveniently attached so as to open. Inside are twenty grooves, running horizontally. To fit these grooves are flat blocks of wood, 2 ins. x 1¼ ins. On these blocks are pasted blue prints, showing number of car, style of car, whether it be trailer, open, closed, single-truck combination or double-truck combination; whether longitudinal or cross-seats are used, and the type of equipment used.

At the beginning of each groove, on the left-hand side of the case, is a block bearing a date (month and year), and following this block are the blue-printed blocks, to represent cars that passed through the shops during that month. Furthermore, when new cars pass through the shops during any month a block is inserted in that month's groove, reading: "New cars fitted up ready for use."

Thus, for January, 1903, Mr. Muir's shop record shows: "Overhauled, etc.," cars Nos. 25, 26, 33, 34, 36, 38, 230, 231,

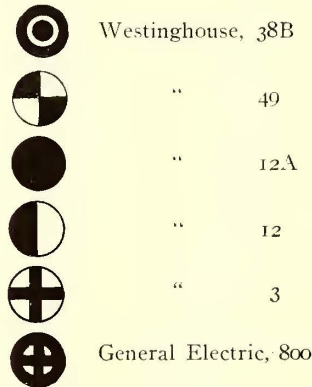
232; "fitted up ready for use," cars Nos. 289, 290, 291, 292, 293, 294.

Reserving the two lower grooves in the case for cars in the shops a block is inserted reading, "In shops." When a car is ordered out of service and into the shops, the block representing this car is taken from its place in the grooves above and put in the shop groove, where it remains until the car is ready for service again. It is then taken out of the shop groove and put in the proper groove above, which will show the month when the work was done.

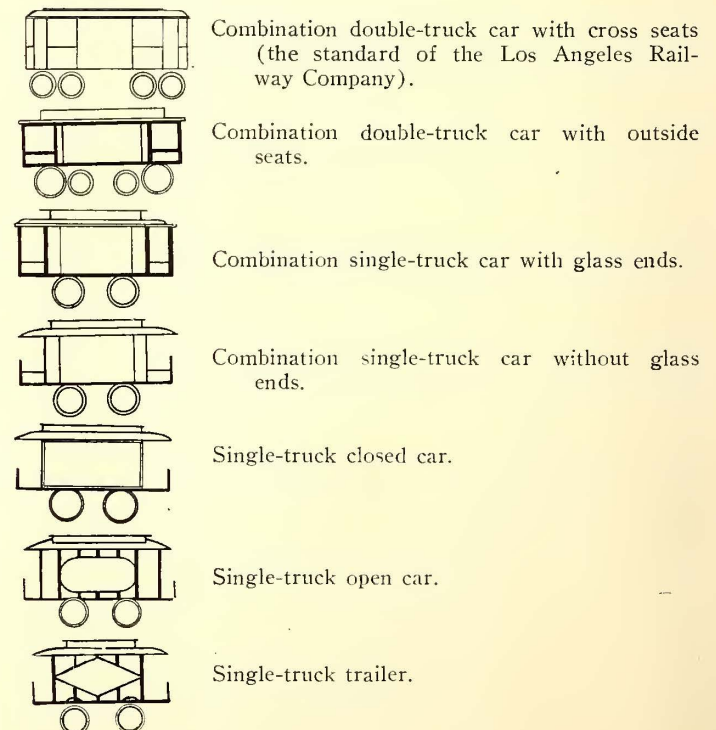
As an instance showing how accessible is information contained in this shop record, assume the inquiry is concerning the status of car No. 44. First, the manager looks on the chart for a block carrying that number. This block is found in the groove headed "January, 1903," indicating that month as the last time car No. 44 passed through the shops.

The appearance of the blue print indicates that the car is a single-truck open car, equipped with one Westinghouse No. 3 motor.

The motor equipment of any car is shown in the wheels of the blue-print cars, according to the following chart:



The following conventional diagrams, to illustrate the different types of cars used, have been adopted:



In each case the number of the car is marked on the side, as shown in the reproduction of the shop record.

A similar record has just been installed by the Pacific Electric Railway Company, to show at a moment's glance the number of cars in service on its various lines and full particulars concerning these cars.

**MOTORS AS EMERGENCY BRAKES**

BY CALE GOUGH

It is a generally known fact that by throwing the reverse lever of a four-motor equipment, or by moving the controller handle to the multiple position and throwing the reverse lever of a two-motor equipment, the motors may be used to brake the car.

Just why this braking action takes place is probably not clear to many who, in cases of emergency, have repeatedly used this method of avoiding accidents. The explanation usually given is that the motors "generate," or that they "buck" each other, and while this may be sufficient for many, there are others probably who desire a more thorough statement of the conditions governing this action. It has for its foundation the difference in the magnetic properties of the iron composing the fields of the motors.

With line current cut off and the controller in the multiple position, the connections of a two-motor equipment are as in Fig. 1, that is, two motors are close-circuited in series with each other. The connection at A is made on the controller cylinder. The fact that both motors are grounded on the car framing makes the junction at B.

On the off position of the controller, a four-motor equipment, as usually wired, is interconnected as in Fig. 2. The connec-

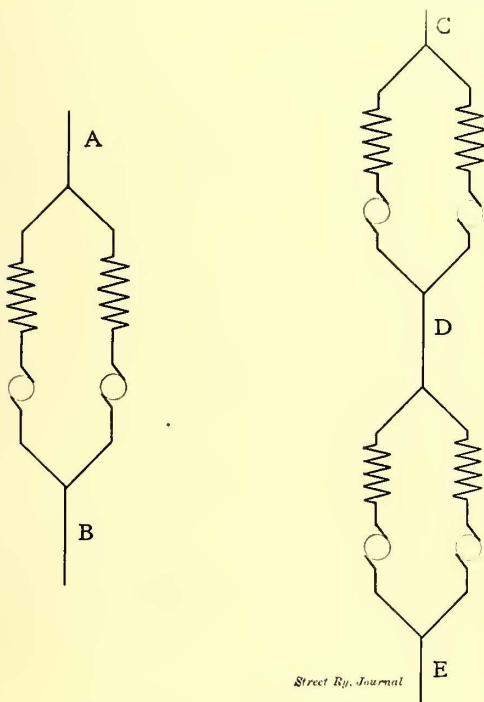


FIG. 1.—CONNECTIONS OF TWO-MOTOR EQUIPMENT.

FIG. 2.—CONNECTIONS OF FOUR-MOTOR EQUIPMENT.

tion at C is formed through the common trolley for No. 1 and No. 2 motors, which separate at the reverse cylinder of the controller. The common return wire forms the connection at D, and the ground that at E.

When the line current is cut off by throwing the overhead switch, the difference in the hardness of the iron of the fields causes the fields of one of the two motors in series to retain considerable more residual magnetism than its mate.

The counter e. m. f., generated in a motor armature, varies directly with the number of magnetic lines of the field, or, in other words, the strength of the field, and since the motors under a given car have the same number of conductors in their armatures and are revolving at the same speed, the motor with the stronger residual magnetism will generate the greater e. m. f. when the current is cut off.

Let motor No. 1 of a two-motor equipment be the one re-

taining the stronger residual magnetism. Assume the line current to have been in the direction of the arrows in Fig. 3, and the direction of the rotation of the armature as indicated. The back e. m. f. of the motor, when supplied with power from the trolley, was such as to oppose the flow of the line current; that is, it was in the direction of the dotted arrows. When the reverse is thrown, since the direction of rotation has not changed, the e. m. f. is generated in the armature in the same direction as before. But throwing the reverse lever so changes the armature terminals relative to the field terminals that when circuit is completed, through motor No. 2, the generated e. m. f. of No. 1 sets up a current in the fields of No. 1 in the direction of the original or line current. This, of course, strengthens the weak fields and correspondingly increases the generated e. m. f. and the resulting current.

Motor No. 2, all of the connections of which are the exact duplicate of those of No. 1, likewise sets up an e. m. f. This tends to oppose the current forced through by No. 1, but it is not strong enough to prevent the flow.

At the instant any current does flow, this opposing e. m. f. is eliminated by reason of the fact that the current flows in the fields in a direction opposite to the original line current; this completely destroys the residual magnetism, and with it the opposing e. m. f. of motor No. 2. The e. m. f. of motor No. 1, now receiving no opposition, sets up a larger current, which builds up the fields of motor No. 2 with reversed magnetism. The direction of the original opposing e. m. f. of motor No. 2 is now reversed so that it aids the flow of the current. Both motors now act as generators, power to operate them being derived from the moving car, which is eventually stopped. The limiting value of the current that would be built up is

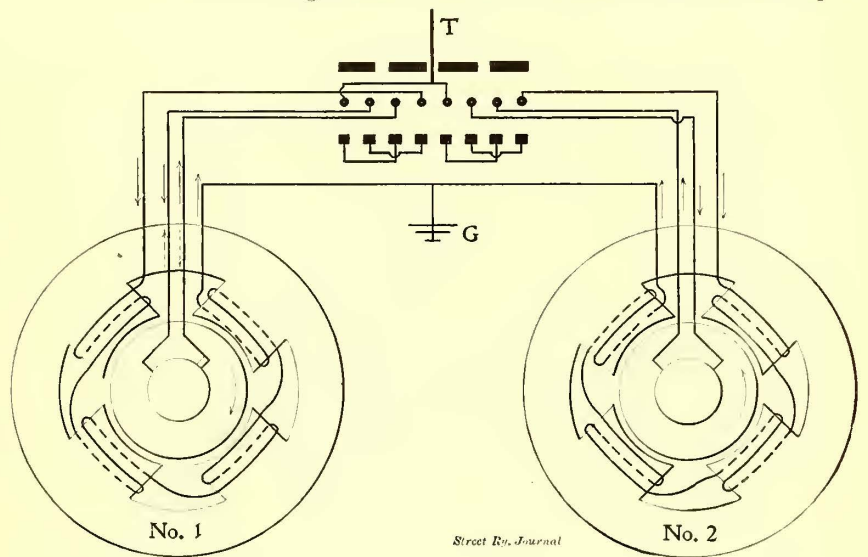


FIG. 3.—CURRENT CUT-OFF IN TWO-MOTOR EQUIPMENT.

determined by the tractive effort required to slide the wheels on the rail. The current increases until the power required to turn the armatures becomes so great that the wheels slide. When this takes place, the armatures ceasing to revolve, the entire e. m. f. is destroyed and the current stops. The wheels again take hold of the rail, current is again generated, and the operation is repeated several times or until the car stops. The amount of current which would cause sliding of the wheels may be obtained approximately by assuming a car of given weight and studying the characteristic curves of the motors.

Assume a car weight of 14,000 lbs. The weight on each axle is 7000 lbs. With a coefficient of friction of 0.90 the tractive effort to slide the wheel would be 6300 lbs. The characteristic curves of a motor suitable for such a car, as given by the manufacturers of the motor, show it as producing, with 110 amps., a tractive effort of 2250 lbs. at the tread of a 33-in. wheel.

Assuming that this current is sufficient to saturate the field magnet, the tractive effort will increase directly with increased current, so that 308 amps. will be required to produce a tractive effort of 6300 lbs.

A question which might reasonably be asked is why do not the motors generate with the reverse lever forward; that is, where the car is running under normal conditions and the trolley leaves the wire? A reasoning similar to that just given will readily explain this point. When the trolley flies off, the e. m. f. of motor No. 1, which we will assume retains the stronger residual magnetism, tends to send a current through

## SHOP KINKS ON THE MUNCIE, HARTFORD & FT. WAYNE RAILWAY

The shops of the Muncie, Hartford & Fort Wayne Railway Company, at Eaton, Ind., while not elaborately fitted up are well arranged for taking care of the repairs on an eight-car interurban road while not involving heavy investment. Some of the "kinks" made use of in this shop by H. J. Lake, master mechanic, are here illustrated. Figs. 1 and 2 are views of an armature hoist which can be used for removing armatures in the pit, and can also be used as an armature truck for carrying

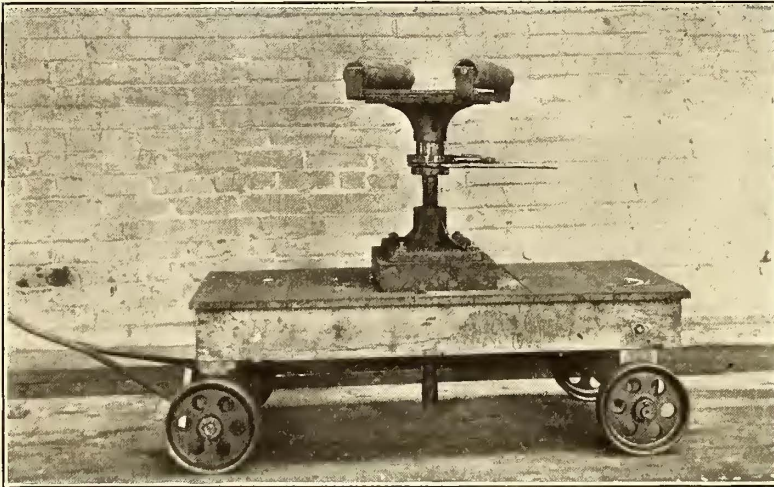


FIG. 1.—ARMATURE HOIST WITH ROLLERS ON TABLE

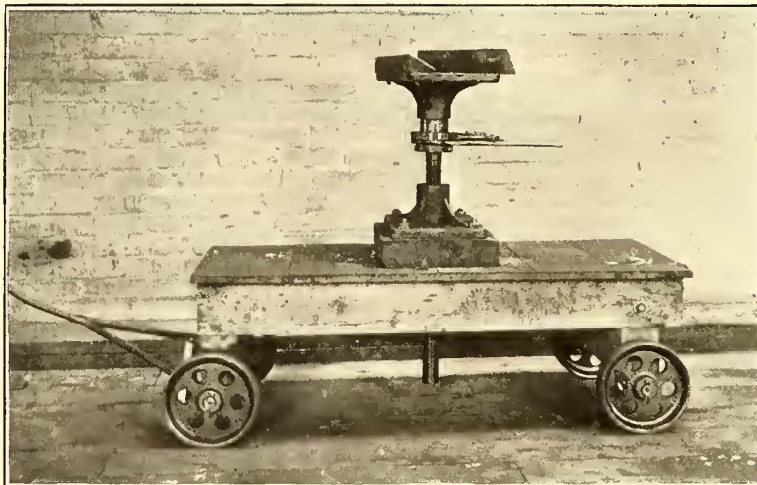


FIG. 2.—ARMATURE HOIST WITH WEDGE-SHAPED BLOCKS ON TABLE

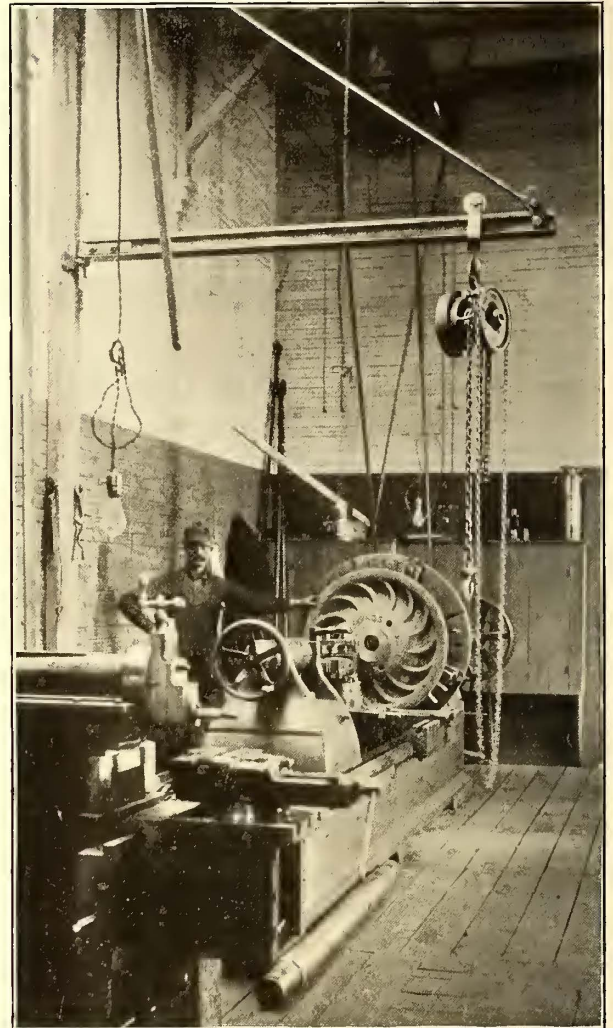


FIG. 3.—SWINGING CRANE OVER BORING MACHINE

both armatures and fields in a direction opposite to that of the original line current. Any current so flowing acts against the residual magnetism, destroying it, and, consequently, the e. m. f. creating the current. At the same time this generated current would flow through motor No. 2 in the direction pursued by the original line current. This would build up the field magnetism of No. 2, and create a counter e. m. f.

It will thus be seen that with the reverse lever forward any current generated will build up an opposing magnetizing force which destroys the cause of its own creation.

In the reasoning here given special reference has been made throughout to a two-motor equipment. This theory, however, applies equally well to a four-motor equipment, the only difference being that with the latter equipment, instead of one set, there are two sets of two motors each in series.

The Los Angeles Railway Company is taking down its poles on the principal streets and attaching the supporting wires to the building walls.

armatures around the shops. It is homemade. The jack is worked with a ratchet, which can be thrown either way to screw up or down. There are two top pieces which can be put on this jack to hold the armature, one with rollers, as in Fig. 1, and the other with removable wedge-shaped blocks. In Fig. 2 the latter is shown with one of the blocks removed and placed on edge to show the dowel pins.

The lathe for boring wheels and turning down commutators is served with a swinging crane, as shown in Fig. 3. Similar cranes serve both ends of the repair pit in an adjoining room. The wheel press is in the repair pit room, and wheels are rolled in and out of it without the use of a crane.

For testing engineers' valves and other parts of air brake equipment compressed air is piped into the shop through a wall from the storage reservoir of a car in the car house to testing connections, as seen in Fig. 4. Attachment can be made to this piping for blowing out dirt and dust from motor cases and armatures. Compressed air from the brake reservoirs is used in cleaning cars. It is especially useful for starting dust from

cracks behind hot-water pipes and in cane seats, though, of course, it does not remove the dust after it has dislodged it.

Mr. Lake has recently equipped the cars of this road with pilots similar to those used on locomotives, as it is becoming

but no length of time is specified. The next city administration, if it sees fit, can order the interurbans to vacate, because, as a matter of fact, the interurban roads have no official standing or recognition in Cleveland, and their cars simply run into the city as the leased cars of the Cleveland Electric Railway Company. The agreement provides that nothing except tickets may be sold in the station, and a check room, which will probably be included, will have to be maintained free of charge.

The building, a sketch of which is presented herewith, will be similar in appearance to other waiting sheds now on the Public Square, but it will be considerably larger. The structure will be 13 ft. x 62 ft., the roof extending 12 ft. on the ends and 4 ft. on the sides. On one side the roof will extend over the sidewalk, while on the other side it will extend to the curb. The city company will be permitted to lay a third track long enough to accommodate several interurban cars at a time, immediately next to the curb, so that in wet weather a passenger can step directly into a car. A ticket office and check room will be located so as to divide the interior into two rooms; the smaller room to be a smoking room and the larger the passenger room. Doors at the ends will open to stone steps leading to the basement, where there will be toilet rooms for both men and women.

There will also be a furnace in the basement, to supply heat in winter. The partition on the track side will be made so that it can be removed, making the station open for summer weather. The exterior will be brick with stone coping, the framework structural steel, and the roof will be of tile. The building will cost about \$10,000, and the city company will pay two-sevenths of the cost, and each of the five interurbans one-seventh. The consummation of the project is due largely to the persistent efforts of President Warren H. Bicknell, of the Lake Shore Electric Railway, and Secretary H. J. Davies, of the Cleveland Electric Railway.

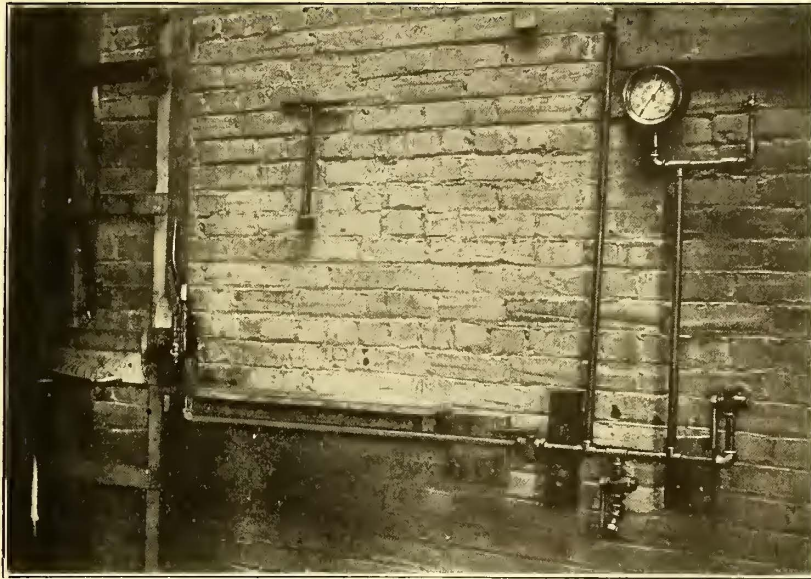


FIG. 4.—AIR COMPRESSOR FOR CLEANING MOTORS AND CARS

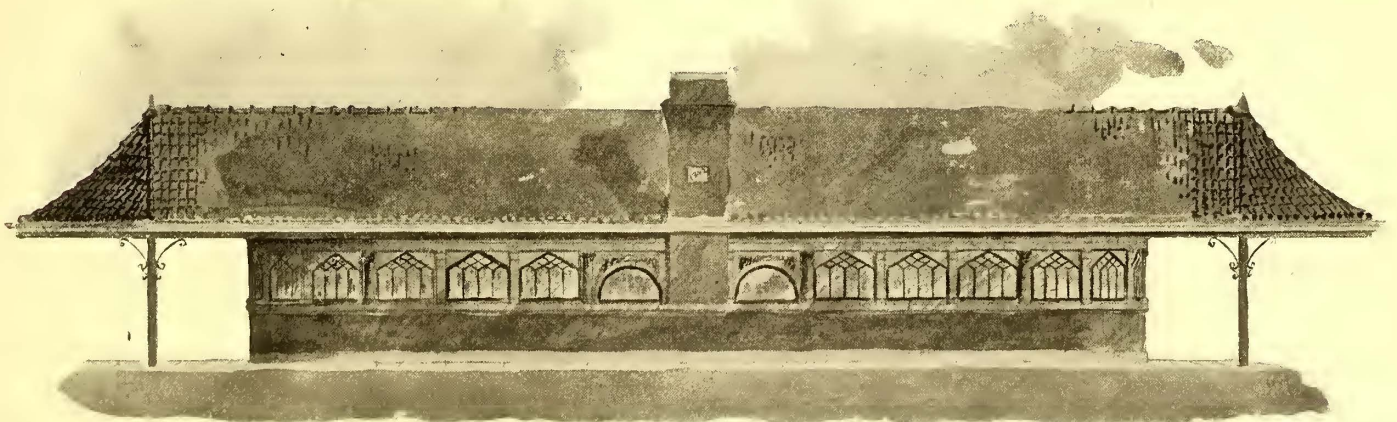
daily more apparent that a pilot is a good safety precaution on a high-speed road to prevent cars from being derailed by animals on the track.

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**PUBLIC SQUARE WAITING ROOM, CLEVELAND**

The plans for the suburban station to be erected on the Public Square, Cleveland, have been completed and formally approved by the city and the interested companies. Work on the structure will begin at once, as it is desirous of having the station ready before cold weather. The arrangement under which the structure will be erected is a peculiar one. The city officials have long felt the need of public toilet rooms on the Public Square, and the railroad officials, appreciating this, offered to erect and maintain a building fitted with these conveniences if the city would permit it to be erected on the Public

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**ANOTHER INTERURBAN LINE TO ENTER CINCINNATI**

The Cincinnati Traction Company has submitted a proposition to the Cincinnati, Lawrenceburg & Aurora Electric Rail-



WAITING STATION FOR TROLLEY CARS ON PUBLIC SQUARE AT CLEVELAND

Square and used as a waiting room for the interurbans. The agreement, which was informally closed without any action by the City Council, provides that the station be erected after plans approved by the city, but without any expense to the city treasury, either for construction or maintenance, the building to become the property of the city as soon as completed. The railroads are given the right to use the station by sufferance,

way Company for a traffic arrangement whereby its cars may enter the center of the city over the tracks of the city company. At present the interurban road operates only to Anderson's Ferry, 5 miles from the center of the city. The interurban road has standard gage, while the city company has 5-ft. 2½-in. gage. It is proposed that the traction company secure a permit from the city to lay a third rail, as has been done in Columbus.

## CORRESPONDENCE

## TRAMWAY DEVELOPMENT IN THE WEST OF LONDON

16 Great George Street, Westminster, London.  
Oct. 22, 1903.

EDITORS STREET RAILWAY JOURNAL:

You ask me to furnish you with some notes on what we are doing in tramway and kindred matters in London. My first inclination in view of the condition of suspended animation in which the great problem of London traffic now remains, was to suggest that you should allow me to postpone my letter for a time, so as to have something more definite to write about. But, in truth, I am getting very tired of that same word "postpone," for London has in the past suffered and still suffers from the tedium of this kind of waiting. And while the existence and the long-drawn out proceedings of the Royal Commission on London Traffic has reduced nearly all of us to a position of inactivity, I am glad to feel that it has not wholly stifled our progress in several important directions, and that I and those with whom I am associated can put in evidence, not only a condition of "masterly inactivity," in view of what the Royal Commission may do, but also some masterly activity in directions where our hands are still free and our powers received from Parliament are still unexhausted.

I think that we shall at some day, now not far distant, spring an agreeable surprise, but still a surprise, and one of whose extent few have any idea, upon the community of this great metropolis. But before I can bring into prominence the nature and extent of this as yet unanticipated boon we propose to confer on London, some detail as to what has been achieved in the past must be set forth. I have used the phrase "heart breaking," on several occasions when writing of the obstacles and oppositions we have had to encounter in this "tight little island" in the course of the past fifteen years or twenty years. And it has often been really heart breaking to find that the legislation of the past seemed so often to have "marshalled its forces" on the side of delay and difficulty, rather than of encouraging healthy and progressive enterprise in the direction of useful public improvements. I do not allege that this has been done of deliberate purpose, but from sheer fatuity as to the probable effects of the legislation. What, for example, could be more soul-depressing than that "standing order" of Parliament which has enabled municipal and other local authorities, antiquated in mind as regards public needs, or, worse still, as competing promoters, or seeing a chance of driving a hard bargain, to withhold assent to great projects of public usefulness, and so prevent (or at least try to prevent) the case being even brought before Parliament. In every other case than tramways—railways, even light railways, gas, water or electric lighting—the power to demand a Parliamentary decision on the merits of the measure has been enjoyed, and in the evidence already given before the Royal Commission the case for the removal of this veto has been abundantly shown. Not without opposition, however, for the gentlemen who have come up to represent the London County Council have urged, forsooth, the maintenance of the veto in their own case, and the refusal of the veto for all others. Most sensible people hope that the London County Council will be disappointed in the result.

But this is an old story, as is also the tale of my own efforts to triumph over all the many difficulties of the London United Tramways in the past ten years. Let us take courage, and to-day content ourselves with the story of accomplished facts, and of achieved success, in the western and southwestern suburbs of London, and especially with the great prospects soon to be opened up, and now to be described.

Two years and a half ago the first electric tramway was opened in London. This will, to the American mind, seem

almost incredible, but it is nevertheless true. I might have been able to add almost two years to the story, for, in fact, we had a considerable mileage ready for inauguration, and the power house standing idle, the while that the savants talked away about magnetic currents and the observatories. It was not till our then chairman, George White (in whose praise much could be said), determined to beard the treasury in its den, and paid down £10,000 out of our own funds alone, that stagnation was at an end. There was a startling transformation scene on April 4, 1901, and the first 16 route miles of electric tramway in London were brought into successful operation.

The London United Electric Tramways commence at the western terminus of the Metropolitan District Railway—part of the original "underground" line—at Hammersmith, and from the Shepherd's Bush terminus of the Central London (tube) Railway. The 16 miles originally opened are now increased to 30 miles, and we have in progress of construction about forty additional miles. We occupy, and hold against all possible opposition, the finest and historically the most interesting portions of suburban London. Even at the risk of being tedious I must mention the chief points on our lines, as to which see the diagram enclosed. From the terminus at Hammersmith we proceed to Chiswick and Kew, and on the Surrey side, a little beyond the new bridge leading to the world-famous Botanical Gardens there, the line bifurcates, the northern portion leading through the quaint old town of Brentford to the not less famous Hounslow Heath. Extensions of the system are in progress, or authorized, to Cranford, and others projected in the present session as far along the Thames Valley as Slough, Maidenhead and Staines. The southern line seems to include names that might be set to music. The routes include Teddington, Twickenham, Hampton Court, Hampton Wick, Kingston-on-Thames, Bushey Park. When the extensions now in progress are completed we shall get through Kingston-on-Thames to Wimbledon, Surbiton, Esher and the Dittons, and many other places whose names not only embody much of the history, poetry and art of our land, but include centers devoted to our national sports. Our system will soon embrace Richmond, Mortlake, Barnes and other familiar centers of attraction with connection across the new King Edward VII. Bridge at Kew. The lines serving all these districts from Hammersmith are also accessible by cross lines by Goldhawk Road to Shepherd's Bush, and the Askew Road to the District Railway, Hammersmith, from which point also will run our northern branch from Acton, Ealing, Hanwell, Southall, Hayes, Hillingdon, Uxbridge.

If your readers follow me thus far, they will naturally ask—especially when they read that our annual number of passengers already reaches 50,000,000—what do we propose to do to carry those crowds into London, and this really opens up the second chapter of the story. The Metropolitan District Railway occupies the southern section of the original Underground Railway of London. Although hitherto working in unison with the Metropolitan, which occupies the northern half of the circle, the two lines are separate properties, and in course of time both have greatly extended their boundaries. The district line has lately entered into close alliance with the London United Tramways, both systems being joined up in union with the London Underground Electric Railways, now to be noticed, and which are (like the London United Tramways) under the chairmanship of Charles T. Yerkes. The Metropolitan District has several outlying branches to the west of London—besides running powers over other lines—these branches extending to Hounslow, Ealing, Harrow, etc. On the east of London extensions and alliances have also been made, so that there will eventually be a clear unbroken connection from Harrow and Hammersmith right across London from west to east, the eastern termini being Bow and Bromley, with running powers over the city portion of the Tilbury & Southend Rail-





such a nature as to supply the long-felt want in the way of north and south connecting lines. The City & South London Tube, which I assisted in promoting some seventeen years ago, and which till the opening of the Central or "Twopenny Tube" in 1900, was the only line of the sort in London, is not in the combination, although it serves a most useful end, and since its extension to Islington, has helped to open up the north with the Surrey side of the water.

The line from Waterloo Station, under the Thames, to Baker Street, is now nearly completed, and will, when opened, offer a most important link in the connection north and south, besides giving much needed access to South London. Next in importance, as partly filling up the long-felt want, are the two lines, Charing Cross, Euston & Hampstead and Great Northern & Strand. Then the Great Northern, Piccadilly & Brompton affords a splendid new railway connection east and west, about midway between the existing underground routes, and interchanging traffic with the north and south connections, already named, while the deep level of the District Railway will supplement and increase the means of travel over a much congested district. When brought into use in combination with the tramways and the converted railway already described, there will be found such an extensive system of through booking and through connection as Londoners have never enjoyed or even dreamed of enjoying. And in nothing of all this is anything being done that need discount or embarrass the labors of the Royal Commission, who will find, in other directions, plenty of scope for good work on behalf of the public of London, and may, moreover, find in those operations which we have been fortunate enough to carry through, an "object lesson" in unified through working of which London stands so much in need.

I fear I have exhausted your patience in the foregoing narrative, so that I cannot go into detail of any other of the numerous schemes being carried out or proposed for London. The County Council has assumed the ownership of extensive tramways, and tentatively they have introduced the conduit system on a part of their line in Surrey—the only authority in Great Britain having the temerity to do so. The unreasoning opposition to the use of the only real economical method of electric traction, that by overhead trolley, which has caused this doubtful method of conduit traction to be introduced, with all its adventitious glamor of superiority and heavy comparative expenditure in construction and operation, is to my mind a huge error, and what may follow cannot be foreseen. Not being wholly free agents, however, the London County Council has been compelled to introduce the overhead trolley over above one-half of the next 50 miles of horse tramways to be converted to electricity. Perhaps we may yet hope to see the Council satisfied of their error and adopting common sense methods hereafter, even to the surrender of their aspirations in the way of amateur tramway administration and management.

J. CLIFTON ROBINSON.

## CHANGING TO STANDARD GAGE IN TACOMA

TACOMA RAILWAY AND POWER COMPANY.—PUGET SOUND ELECTRIC RAILWAY.

Tacoma, Wash., Nov. 14, 1903.

EDITORS STREET RAILWAY JOURNAL:

The enclosed is true, and may be an interesting story for you. We are changing to standard gage all our city lines (some 86 miles) in order that the city tracks may conform to the Puget Sound Electric Railway interurban line (third rail system between Tacoma and Seattle), as both lines do a large freight business, interchanging with each other.

W. S. DIMMOCK, Manager.

[The enclosure referred to by Mr. Dimmock is a clipping from the Tacoma "Daily News" of the same date, under the

head, "How Five Miles of Street Railway was Changed from Narrow to Standard Gage in Two Hours." The account is in the breezy style of the daily newspaper reporter, but is, nevertheless, of considerable engineering interest and is reprinted here in full.—EDITORS.]

(FROM THE TACOMA "DAILY NEWS")

"I'll fire any man that ain't sweating in half an hour!"

The speaker was a small, wiry man, but with a squareness about his chin and shoulders that denoted considerable determination. Around him were gathered a number of workmen. They had just shed their outer wraps ready for the work in hand. Some of them shivered, for the day was cold, with a suspicion for snow in the air.

"Mind what I'm saying now," and the eyes of the leader traveled critically along the line. "This track has got to be ready for the cars in two hours. Them's the orders of the Old Man. Now get in and hustle, and the devil take the hindmost."

And every man in that gang had "turned a hair" in less than half an hour. The same thing held true of nine other gangs, twenty-five men to each gang, and in charge of a foreman. They were strung out along the South Tacoma line from Holy Rosary Church to Thirty-Eighth Street. Like an army well officered all details had been arranged in advance. From General Manager Dimmock to the last man on the tail end of the force, each knew what was expected of him. And the dominating energy of the head officials seemed to electrify the whole line of workmen.

It was a race against time.

Over all of the foremen was General Foreman George Bichsel, mounted on a horse. Wm. Bosworth, the civil engineer, who had laid out the work, was on hand to help things along. Superintendent Franklin had established telephone connections at Thirty-Eighth Street and the South Tacoma end of the line with the car houses. Train Master Haskell was on guard at the car houses, subject to Mr. Franklin's call, and Assistant Train Master J. Russell was the connecting link at Thirty-Eighth Street. Nothing was left to chance.

The civil engineer declared that five miles of track could be standardized in two hours if the men did their part. Each gang had half a mile to cover. The general foreman said his men could do the work in the time named. Mr. Franklin said he would attend to his part and have the standard gage cars ready to run over the track the minute it was ready. But there were some skeptical ones who laughed at the idea. They said both rails of a narrow-gage track could not be changed in that time. They admitted it might be done by moving one rail, but not otherwise.

Every other spike fastening the rails had been pulled in advance so as to lessen the work as much as possible. The men were placed along the track like squads of soldiers along the firing line. The last car came off the old track at 10 o'clock. That was the signal to go to work and a whirlwind of activity agitated the long line into a concentrated energetic force, where every lick told. It seemed like the wildest confusion to the spectator, but from out of the apparent confusion rapidly grew tangible results. The general foreman galloped up and down the line. And woe to the foreman who was not working his men to the best advantage.

The narrow-gage rails were 3 ft. 6 ins. apart. Each rail had to be moved 7¼ ins. for the 4 ft. 8½ ins. necessary for the wide gage track. A line had been spiked the day before on one side of the track the whole distance as a guide line for one of the standard gage rails.

Previous to the starting of the work Superintendent Franklin had had the new South Tacoma standard gage cars brought from Puyallup Avenue and placed on the side track in the order in which they would go out on the track as soon as it was ready. These cars are fitted with four large motors to each car, air brakes and other modern improvements, the same as on those now running on the Point Defiance line. Relief crews were held for the cars to take them out as soon as the track was ready.

Just a minute before 12 o'clock Foreman Bichsel galloped up to Superintendent Franklin and stated that the track was ready for the cars. Mr. Franklin sent a message over the telephone and a wrecking car in charge of Master Mechanic Glenn promptly turned out and slowly and carefully picked its way over the new track, feeling every inch of the space. It served as a pilot for the first passenger car which followed in its rear. The rails bore the strain and the standard gage track was open for traffic. True, it was not in such shape that cars could speed over it and keep on schedule time, but it answered the purpose and was ready in time to handle the immense afternoon and evening traffic on the line. A small gang of men is still busy spiking up the rails and ballasting the road. Just as soon as it is in shape the company will give a fifteen-minute service to South Tacoma.

## RECENT ENGLISH ALTERNATING CURRENT MACHINES

A recent trip through the works of Dick, Kerr & Company, at Preston, England, disclosed great activity in the alternating-current and other departments of these large works. This work has compelled the extension of the works by a new bay 450 ft. long and 60 ft. wide. The company's direct-current machinery has been thoroughly described in previous issues, but it may also be a matter of general interest to state that important developments have been carried out in the alternating-current department, including the manufacture on a large scale of machinery and high-tension switchboard gear with alternating-current motors. Among the orders for polyphase plants which Dick, Kerr & Company are completing may be mentioned the following:

London County Council, two 1500-kw alternators, twelve motor generators of 300-kw, and three of 50-kw.

Horndean Tramways, two 200-kw motor generators.

Portsmouth Corporation, two 200-kw motor generators.

Sydney, one 300-kw alternator, two 600-kw alternators, and six 300-kw motor generators.

Stalybridge, three 500-kw alternators.

Osaka, one 210-kw alternator.

Durban, one 500-kw alternator.

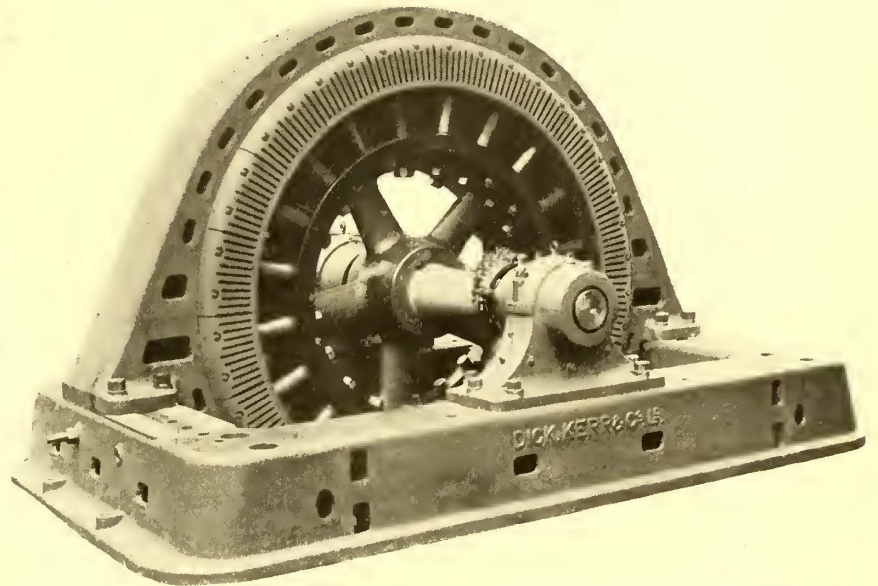
Shawinigan Water & Power Company, Montreal, Canada, one 3750-kw alternator.

The following description covers the main features of the standard Preston alternator:

The rotor spider is of cast-iron. The hub is provided with

size of ventilating spaces being dependent on the width of the stator.

The pole pieces are made of laminated steel, held together between two cast-steel end plates of strong construction. The upper part is constructed of T-shape, in order to hold the field



1000-KW ALTERNATOR FOR SHAWINIGAN FALLS POWER COMPANY

coils securely in position. The lower part of the pole piece is dove-tailed for fixing on the rim of the rotor, and is then held in position by means of keys. The removal of field coils is effected by sliding the pole piece from the dove-tailed groove parallel to the shaft without disturbing any other part of the machine, such an arrangement being of extreme convenience not only when it is necessary to remove a field coil but also for the removal of a stator coil. It should be added that the design and shape of the pole pieces gives a distribution of lines of forces in the air gap to produce an approximately sinusoidal shaped wave of e. m. f.

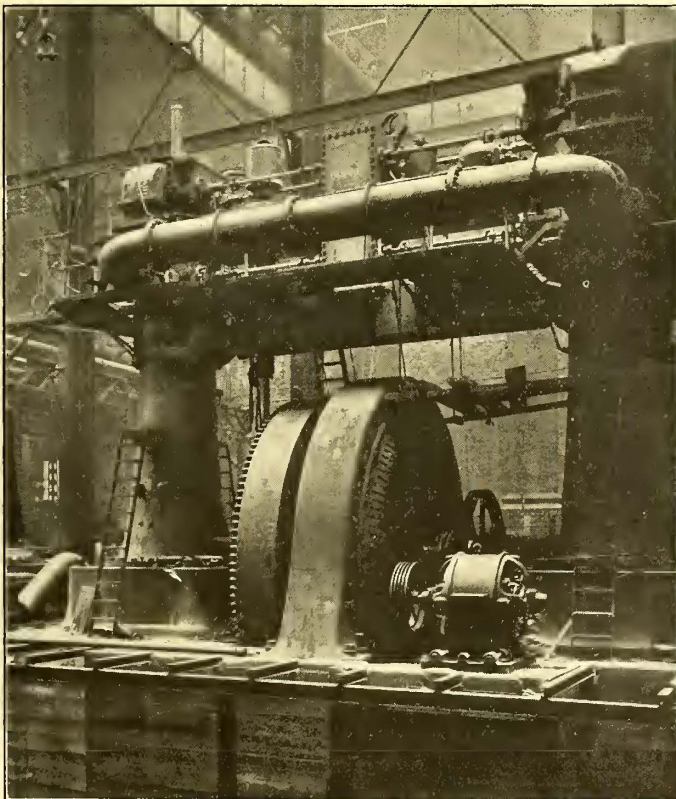
In the winding of the field coils it is obviously a mechanical advantage to use edge-wound strip, and whenever the excitation voltage permits, the field coils are wound with a single layer of copper strip wound edgewise and insulated between the turns by means of specially prepared fibrous material. The external surface of the windings is left practically bare, being protected merely by insulating varnish, which allows a rapid radiation of heat.

The stator frame, even in the largest type, is built in two halves, which are securely bolted together by means of finished bolts. The lower half of the frame is provided with feet which rest upon the foundation bed-plate. In the larger size machines the lower part of the underframe is provided with a special screw for vertical and horizontal centering of the stator relative to the rotating field. The general construction of stator frame is shown in the accompanying engravings.

The frame is made of high grade cast-iron, and is designed to allow complete ventilation of the laminations and at the same time to secure rigidity of the frame.

The core is made up of thoroughly annealed soft iron laminations, the individual laminations being well insulated from each other, to minimize eddy current losses. The laminations are held in position in the frame by means of retaining machined bolts.

The winding is formed of separate coils, thoroughly insulated, having great rigidity and a well-defined mechanical shape. The coils are form-wound, and embedded in rectangular slots, and held in position by wooden wedges, and can be easily and quickly replaced. The connections between the stator coils are



ENGINE AND ALTERNATOR FOR DEPTFORD STATION, LONDON COUNTY COUNCIL TRAMWAYS

a flange for bolting to the engine fly-wheel, and is pressed on to the shaft by hydraulic pressure, and then key seated. On the spider rim, dove-tailed laminations are fixed by means of machined bolts and cast-iron flanges, the pole pieces being then bolted on. The laminations are built up in such a way that ample spaces are provided at defined positions, the number and

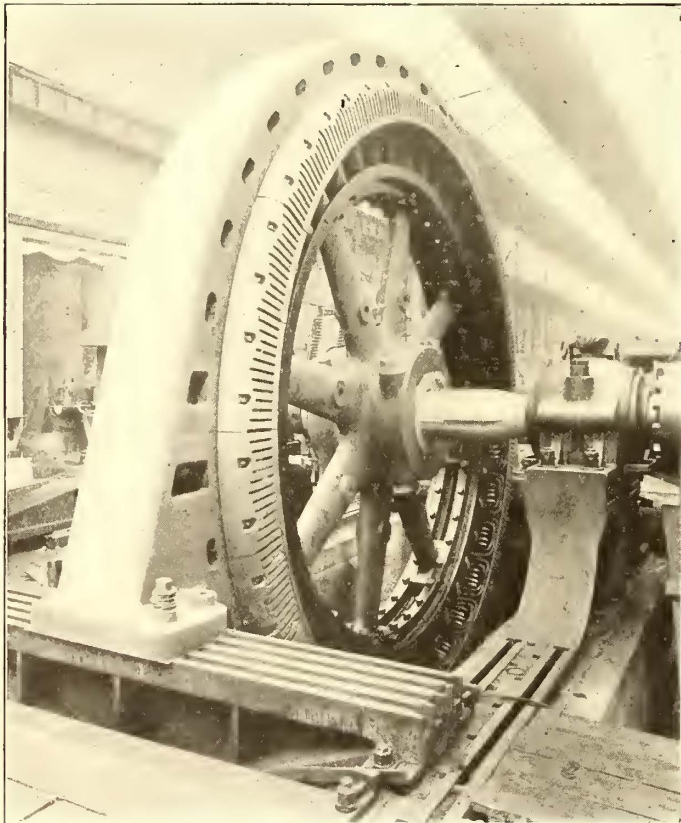
made by means of highly insulated cables, and are easy to trace and locate.

The coils are protected outside the laminations by means of a cast-iron shield, cast in sections, bolted to the frame and easily removable. This shield is of a perforated design, and does not interfere with the ventilation of the stator winding. The collector is composed of rings of suitable metal, fixed to the shaft next to the rotor by means of a spider and insulated pins, ample provision being made for free air circulation around the same.

The brushes are made of carbon, of ample surface, are in duplicate, and can be set and replaced while the machine is running. The brush holders are so constructed that the current will not pass through moving joints or tension springs, and will allow for tension adjustment.

The leads carrying the current from the collector rings to the field coils are firmly attached to the spider of the rotor by means of strong insulated clips, and are of ample capacity.

The question of testing completed alternators is of the utmost importance, and every machine is subject to the closest test before leaving the works. Moreover, it should be stated that if a generator passes the high potential test on the coils which is always imposed, it is extremely unlikely to break down after erection, because the humidity of the atmosphere in the neighborhood of the works is so marked—a condition extremely suitable for the staple industry of the district, viz.,



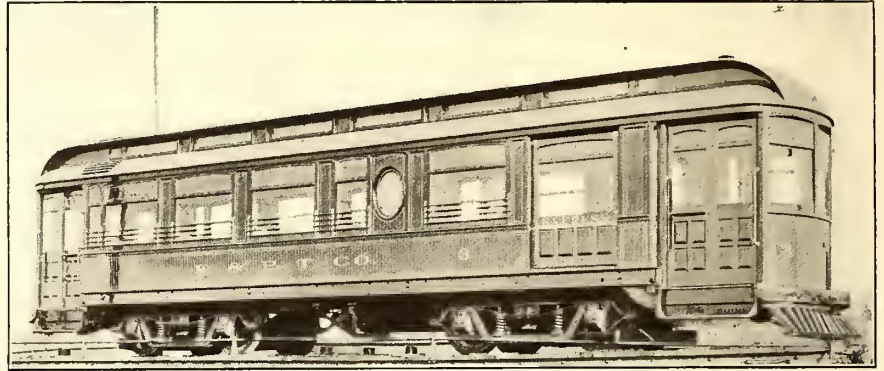
1500-KW GENERATOR FOR LANCASHIRE & YORKSHIRE RAILWAY

cotton spinning, it means that very high insulation is necessary to meet the rigid tests.

One of the three machines illustrated herewith is a 1500-kw three-phase alternator, for the electrification of a portion of the Lancashire & Yorkshire Railway, between Liverpool and Southport; the machine is to be coupled to a horizontal engine

by Yates & Thom, of Blackburn, and gives its full output at a voltage of 6600 and a periodicity of 25. A second view shows a two-phase alternator, of a capacity of 3750 kw, constructed for the Shawinigan Falls Power Company, Canada. It is to be coupled to an Escher Wyss turbine, running at 180 r. p. m., the periodicity being 30 and the voltage 2200. Quite a number of machines have been built at Preston for export to Canada, and the third illustration shows a 400-kw alternator, recently built at Preston for the Shawinigan Falls Power Company.

It remains to be added that the alternators have been constructed to the design of A. P. Zani, who, possessing unique experience in alternator design, gained both in the United



EXTERIOR OF EVANSVILLE & PRINCETON CAR

States and on the Continent, has had the co-operation of a very able staff of engineers.

### EVANSVILLE & PRINCETON CARS

The interurban cars recently turned out by the St. Louis Car Company for the Evansville & Princeton Traction Company,



INTERIOR OF EVANSVILLE & PRINCETON CAR

of Princeton, Ind., are of the semi-convertible type built with the familiar steel channel side sills so commonly used in the construction of the long city cars built by this car company. These cars are of the combination passenger and baggage type, the bodies being 31 ft. 4 ins. long and having roofs of steam coach pattern. They are mounted on St. Louis No. 23 trucks.

An exterior and interior view of one of these cars is shown in the accompanying illustrations.

The vestibules have double doors, and, as is usual in steel channel bottom construction, the car platforms are low. The front end is equipped with a cow-catcher or pilot. The saloon is located in the main compartment, the finish is mahogany with brass trimmings and with mirrors in the panels between the windows. Seats in the baggage and smoking compartment are longitudinal, and can be folded up to accommodate baggage. The hot-water heater is placed in the motorman's cab on the front platform.

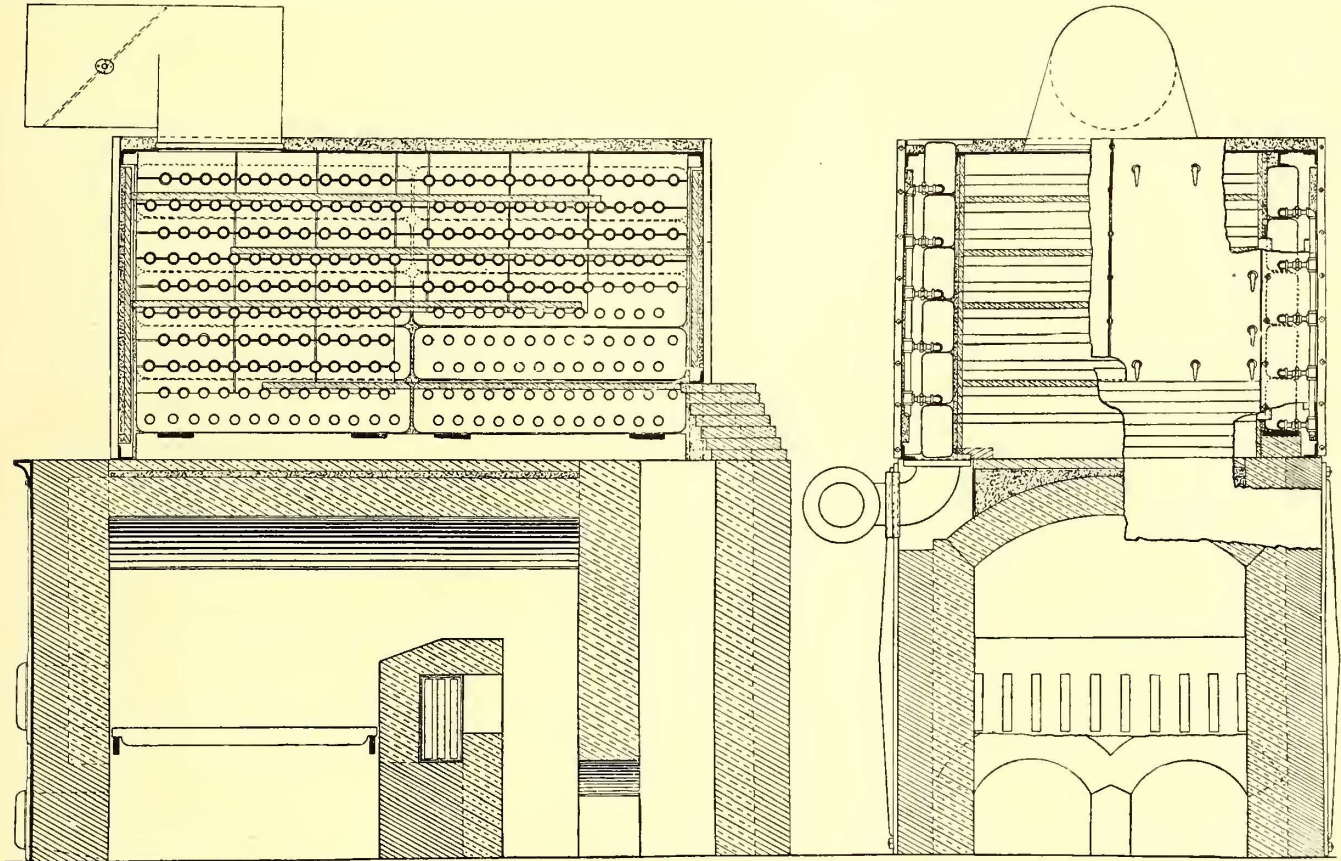
The operating and controlling equipment consists of four motors, air brakes and St. Louis vertical hand-wheel brakes. The headlights and sand-boxes are also of the builder's manufacture.

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**A SIMPLE SUPERHEATER**

Although the advantages of using superheated steam have been long recognized the complex and inefficient construction of the early superheaters deterred most engineers from trying to realize in practice the saving indicated by theory. In recent

The products of combustion, after leaving the furnace and passing through the brick-lined chambers, traverse the tubes backward and forward and emerge at the top, their direction of flow being guided through the superheater by refractory tile baffle plates. A damper in the smoke bonnet is provided to regulate the flow of the gases, and a register on the side of the setting allows admission of air through the hollow bridge wall for the purpose of tempering the initial heat. It has been found that the desired degree of superheat can be closely maintained under conditions involving rapid fluctuations in the quantities of steam superheated. Drip connections from the lowest point in each header allow the water condensed while the steam is being formed in the boiler to be drawn off. Access is had to the sides and ends of the tube system by the removable casing plates.

The reverberatory form of furnace, which is practically smokeless, embodied in the design of this superheater, insures high efficiency of combustion, and the ample volume and design of the mixing and combustion chambers promotes the thorough mingling of the products of combustion before they reach the tubes, while the large area of exposed firebrick surface acts as a fly-wheel in absorbing and giving out heat, thus



SECTIONAL SIDE AND END ELEVATION OF SUPERHEATER

years, however, research has been renewed along this line, and after careful experiments extending over a number of years the American Steam Superheater Company, of Boston, Mass., has perfected a superheater which it believes to be both simple and economical.

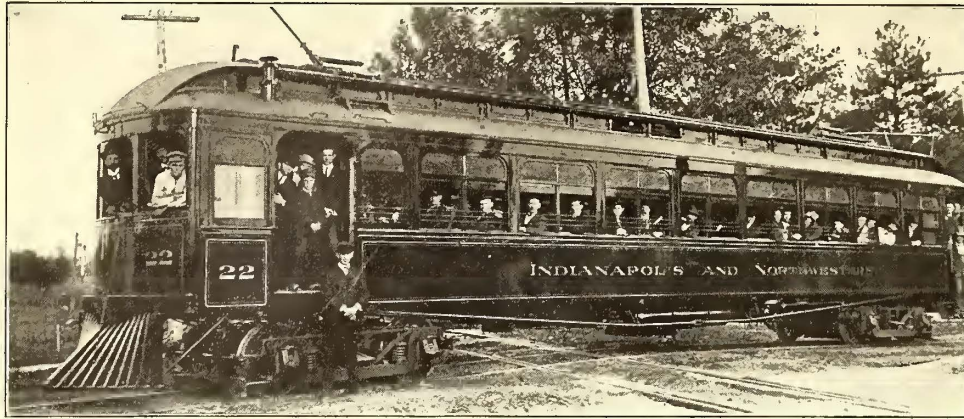
The construction of the superheater in the form known as the "separately" or "independently fired" type is shown in the accompanying illustration. It consists of a furnace, surrounded by brick work, combustion and mixing chambers, and a system of straight steel tubes and headers. The steam from the source of supply, entering the topmost header, flows across through the first pass of tubes to the opposite header, from whence it flows through the next lower row of tubes back again, and so on back and forth, finally leaving the bottom header through the outlet connection.

maintaining excellent uniformity of superheat under varying operative conditions.

The tubes are straight and of standard commercial sizes. They are expanded into the steel headers, and the joints are not exposed but are protected from direct heat of the products of combustion as shown; the superheating surface comprises, therefore, the net exposed tube surface only. In designing the superheater the manufacturers have obtained a construction of headers and tubes which gives perfect freedom for expansion and contraction, a simple and effective heating surface occupying little space and affording a long dwell of the steam in the track of the combustion products, as well as a thorough mingling of all the steam particles at their entry into each succeeding header; this periodic intimate mixing action producing a condition which is a necessary one for rapid and

economic transfer of heat through the tube surfaces. The vertical fire tiles protect the asbestos blocks from any abrading action of the impinging products of combustion, while the non-conducting material between the tiles and the headers

The under truss is made of 1 3/8-in. round iron, with a 1 1/2-in. turnbuckle in the center and M. C. B. anchors over the bolsters. The bolsters are made of steel plates and cast fillers, M. C. B. style of construction. The body framing throughout is made of white ash and the construction is of the steam coach type. The vestibules are what is known as the Jewett wide vestibule, with double folding doors at each side and automatic trap-doors over steps.



EXTERIOR OF INDIANAPOLIS & NORTHWESTERN CAR

affords insulation of the header surfaces. The "dead-air" space between the headers and outer casings of the superheater, combined with the above-described insulation, produces a degree of header temperature in operation but little above that of the steam itself, while the thick non-conducting lining of the casing plates reduces the heat loss by external radiation to a minimum.

Superheaters of this type are delivering steam at temperatures of 600 degs. F., and it is said that the cost of repairs has been practically nil, although the superheaters have been in use for about three years, under frequent and sudden variations of steam. The company is prepared to fill all requirements of capacity, pressure and temperature.

The flexibility of design admits of the superheater being placed in positions where either the floor space or the head room is limited.

**COMBINATION INTERURBAN CARS FOR THE INDIANAPOLIS & NORTHWESTERN TRACTION COMPANY**

The Jewett Car Company, of Newark, Ohio, has just shipped several combination interurban cars on an order of twenty to the Indianapolis & Northwestern Traction Company. The fine appearance and handsome design of these cars are very striking, and they are equipped with all modern conveniences.

As will be seen from the accompanying floor plan the cars are unusually long, the total length over buffers being 60 ft. 8 3/4 ins. The other principal dimensions are: Width over posts, 8 ft. 4 ins.; width over all, 8 ft. 8 ins.; total height from rail to top of roof, 12 ft. 9 ins.; distance center of trucks, 40 ft. 7 1/2 ins. The bottom framing consists of six yellow pine sills, the side sills being of compound construction, composed of one

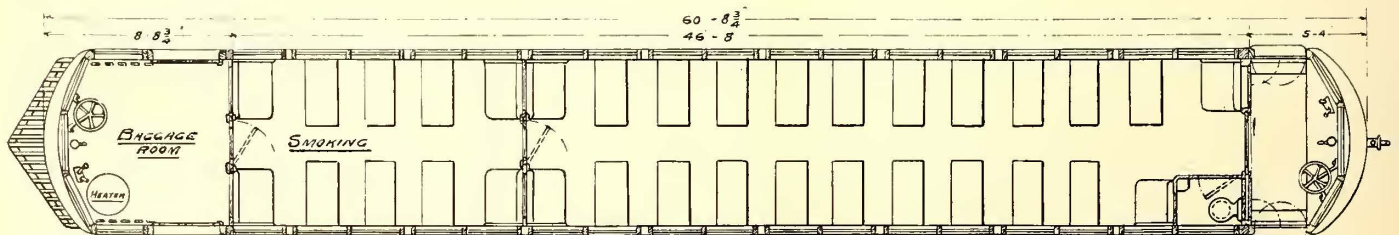
and in the smoking compartment is inlaid with neat marquetrie. The ceiling is of the semi-Empire type, and is painted green with gold decorations.

The seats in both main and smoking compartments are of the



INTERIOR OF INDIANAPOLIS & NORTHWESTERN CAR

walk-over type, with high roll-top backs, and are finished with green plush in the main compartment and with green leather in the smoking compartment. They were manufactured by Hale & Kilburn.



FLOOR PLAN OF INDIANAPOLIS & NORTHWESTERN CAR

piece, 5 ins. x 8 ins., and one piece, 2 ins. x 6 ins., with a 6-in. x 1/2-in. steel plate sandwiched between. The end sills, cross timbers, buffers, etc., are made of best quality white oak, and are strengthened by steel plates and angles wherever necessary.

Polished plate glass is used throughout the car, except the gothics and deck lights, which are of green opalescent leaded glass. All trimmings are of solid bronze; curtains are of pantasote, of the Forsyth type.

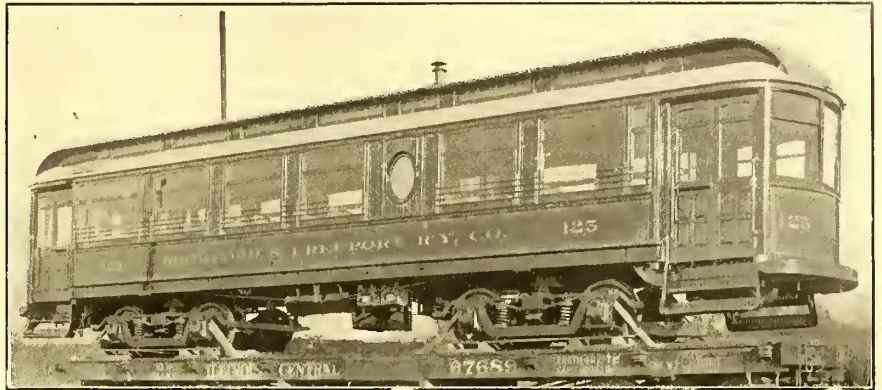
The cars are lighted by forty-five incandescent lamps, which are so placed that they form arches of five lamps each across the ceiling. This gives a beautiful effect and also distributes the lights equally through the car. The lamps are of the frosted globular type.

The cars are mounted on Peckham M. C. B. No. 36-B double trucks, 5½-in. axles, 4¼-in. x 8-in. journals, locomotive-type of wheels, steel tired. The motor equipment consists of four General Electric No. 73, 75-hp motors, geared for 72 m. p. h., operated by the General Electric multiple-unit control system. The cars are heated by the Peter Smith hot-water heater system, and are equipped with Westinghouse straight air brakes, as well as hand brakes, Van Dorn draw-bars, locomotive-type of pilots, Mosher arc headlights, Knutson trolley retrievers, toilet room, water cooler and De France air blast sanders, manufactured by the Newark Air Sand Box Company, of Newark, Ohio. This sander, which has just been put on the market, was described in the *STREET RAILWAY JOURNAL* of Nov. 7. It is regarded by railroad men, who have cars equipped with it, as an excellent sander for cars with air brake equipments, as it delivers the sand the instant the air is applied directly in front of the wheels, even on the shortest curve.

The circuit breaker, all the switches necessary to operate the car, and all other equipments are located on a switchboard in the motorman's cab. The wires are run in waterproof conduits, and no two wires of different potential are run in the same compartment. There are no joints or splices made inside of these conduits. Rubber cushions are used between trolley boards and roof to deaden the sound of the trolley. The installation of the entire electrical equipment was under the supervision of James Wilkens, master mechanic of the Indianapolis & Northwestern Traction Company. The Indianapolis & Northwestern Traction Company runs from Indianapolis to Lafayette, a distance of 56 miles, via Lebanon and Frankfort,

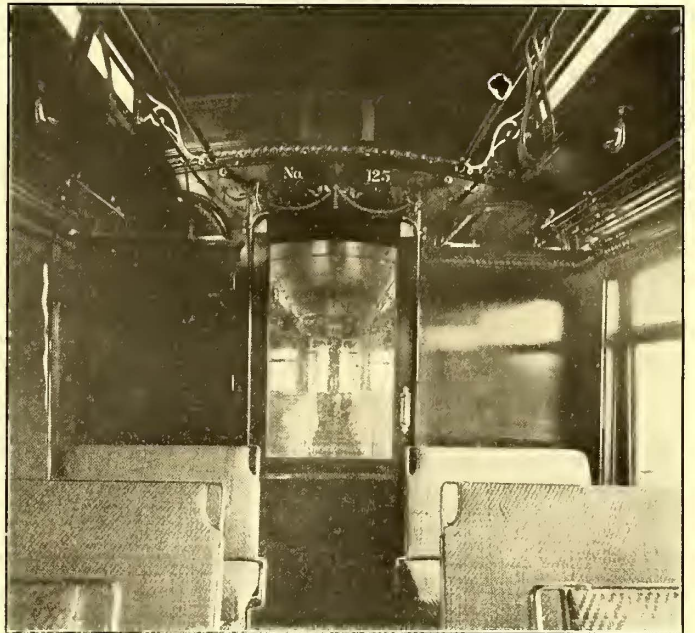
**ROCKFORD & FREEPORT INTERURBAN CARS**

The St. Louis Car Company has recently completed a number

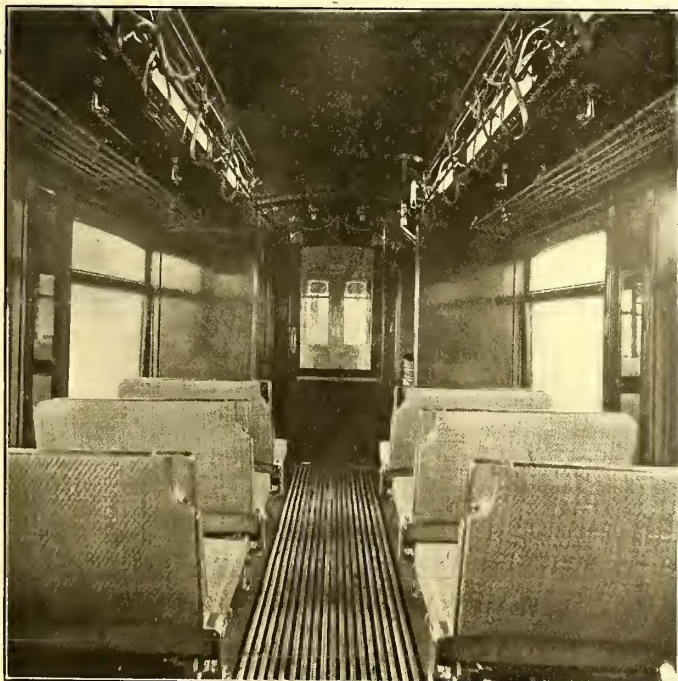


CAR FOR ROCKFORD & FREEPORT RAILWAY COMPANY

of fine interurban cars for the Rockford & Freeport Electric Railway Company, of Rockford, Ill., which operates an interurban line 29 miles long. Three views of one of these cars are shown in the accompanying illustrations.



SMOKING COMPARTMENT OF ROCKFORD & FREEPORT CAR



REGULAR PASSENGER COMPARTMENT OF ROCKFORD & FREEPORT CAR

and has a branch from Lebanon to Crawfordsville, 24 miles long. Townseed, Reed & Company, of Indianapolis, are largely interested in this line as well as being the builders of same.

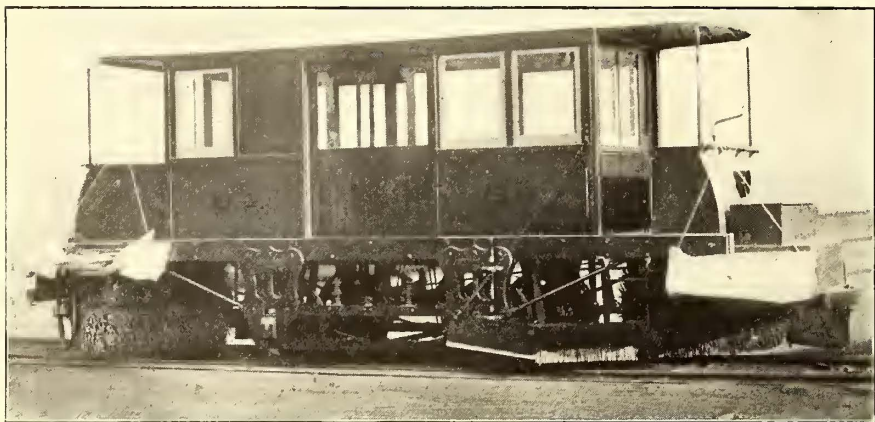
Each car is 34 ft. long over the corner posts, and has two compartments—passenger and smoking. Both sections are furnished with reversible cross seats. The interior finish is of veneered mahogany and is very elegant in appearance. As these cars have very large windows they can be considered semi-convertible. The hot-water heaters are placed in the passenger compartment next to the partition. The main compartment is fitted with bundle racks.

All the cars are built in accordance with the St. Louis Car Company's standard steel-bottom construction, and are mounted on the company's No. 23-B trucks. They are also equipped with the builder's sand-boxes and vertical wheel hand brakes in addition to air brakes.

A recent change in the operation of cars of the St. Louis & Suburban Railway Company has resulted in a division but two blocks long. On this short road one car is operated, one man being employed in the double capacity of motorman and conductor during the day and one at night. Although the operator is motorman-conductor, he collects no money, his duties being to operate the car. It requires only 5 minutes to make the trip.

### BRILL SWEEPERS FOR THE METROPOLITAN STREET RAILWAY

The Metropolitan Street Railway Company, of New York City, has recently received from the J. G. Brill Company ten



SWEeper USED BY METROPOLITAN STREET RAILWAY COMPANY

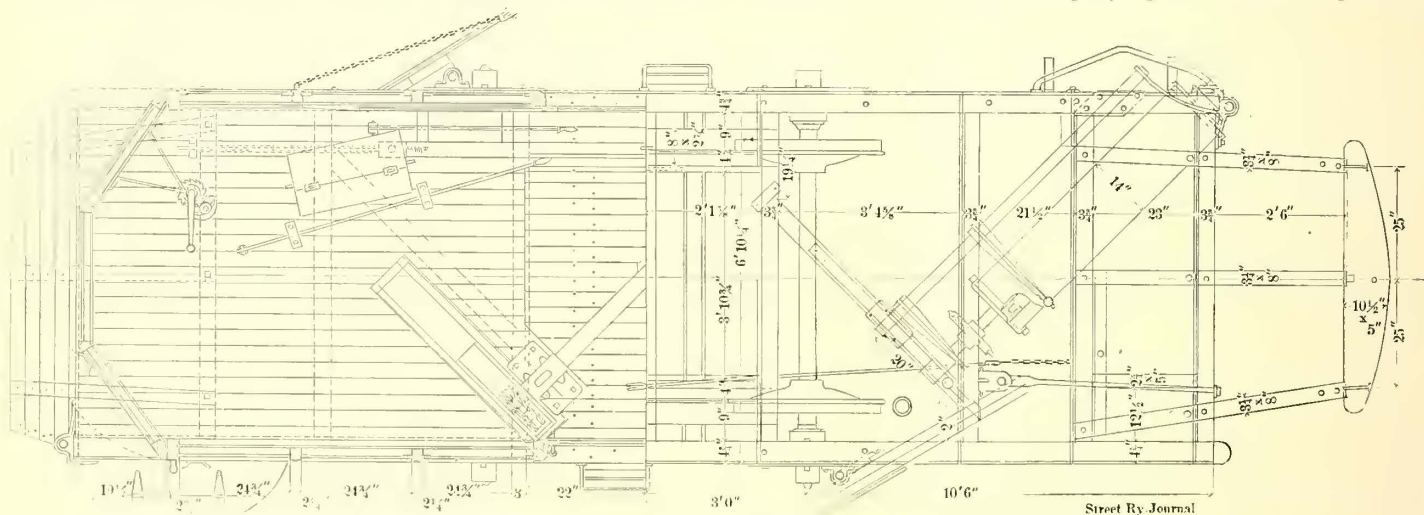
snow-sweepers of the type shown in the accompanying illustration and detail drawing. This is the fourth lot of sweepers built for the company, making in all thirty-three sweepers.

single swinging doors at the ends. The window sashes in the sides are stationary, and the sashes in the ends are arranged to drop into pockets. The brooms have a clear sweep of 14 ins. outside the gage line. The diameter of the brooms is 36 ins.; from track to center of draw-bar, 17 ins. A tool box is placed on the extension in front of the dash at one end. The brooms are raised and lowered by convenient levers, and both brooms are operated by a motor situated in the cab. The cars are equipped with Brill brake handles, sand-boxes, alarm gongs, etc. The cars are mounted on gear trucks with 33-in. wheels, 7-in. wheel base, and are equipped with 35-hp motors.

### CONVERTIBLE CARS WITH DETROIT PLATFORMS

*P.C.S.C.*

The Springfield Consolidated Railway Company, of Springfield, Ill., has received two convertible cars which are remarkable as being the first convertible cars to be built with Detroit platforms, and one of the few instances of using this type of platform with cars mounted on single trucks. One of these cars is shown in the accompanying illustrations—open and

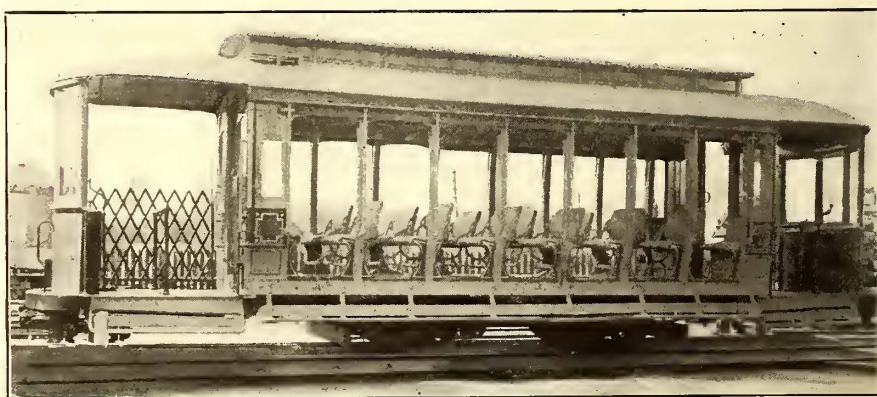


CONSTRUCTION DETAILS OF METROPOLITAN SWEEPER

The plan follows the general practice of the builders, modified in certain details to suit the requirements of the railway company. The Brill sweepers are constructed with short brooms, set at an angle of 45 degs. The brush board and wing, as shown in the cut, extend the clearing area in front of the right forward wheel, and whatever snow may be left by these extensions is thoroughly cleared away by the rear revolving broom. It is claimed that with short brooms set at a more acute angle than long brooms, the snow is thrown clear of the rails instead of ahead, and that they conform better to the curvature of the pavement between the tracks. Open platforms are used because of the crowded condition of New York streets, making it necessary that the motorman should have an unobstructed view of all that is going on about him.

The cabs are 14 ft. 10 1/8 ins. over the ends and 2 ft. over platforms. The total length is 28 ft. 8 ins.; width over sheathing, 6 ft. 10 1/4 ins.; height from track over roof, 11 ft. 4 ins. The side sills are 4 1/4 ins. x 8 3/4 ins., plated on the outside with 8-in. x 1/2-in. steel. Sliding doors with 40-in. opening are provided on either side and

closed. The platforms are equipped with portable vestibules. The entrances have folding gates, which close against the corner posts. The cars are seated for twenty-eight passengers, and are handsomely furnished in ash with ceilings of decorated



OPEN CONVERTIBLE CAR, WITH DETROIT PLATFORM

birch. These cars, which are of the Brill convertible type, were built by the American Car Company, of St. Louis. Their length over end panels is 20 ft. 7 ins., and over crown pieces 32 ft. 7 ins.; from end panels over crown pieces, 6 ft.; width over



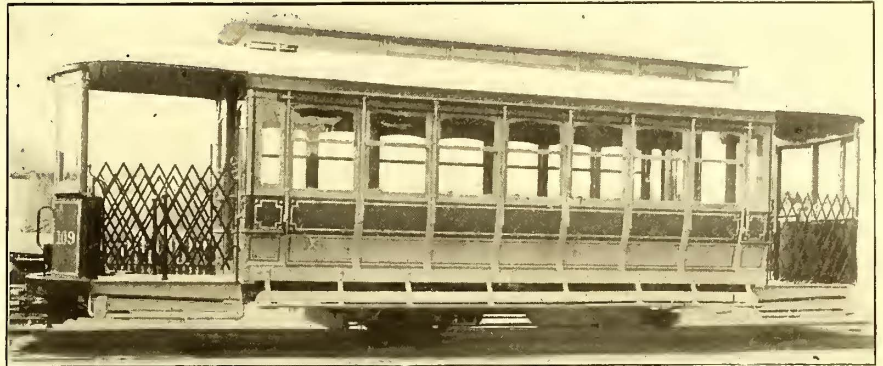
sills, 6 ft. 11¼ ins., and over posts at belt, 7 ft. 9 ins.; from center to center of posts, 2 ft. 7 ins.; thickness of corner post, 3¾ ins., and the side posts, 3¾ ins.; sweep of post, 5 ins. The seats are 31½ ins. long, and the aisles 20 ins. wide. Height of platform steps from rail, 15½ ins.; from step to platform, 12 ins.; from platform to car floor, 8 ins. The running board is 17½ ins. from the rail head, and from board to platform is 14¼ ins. Cars are mounted on Brill 21-E trucks, with 7-ft. 6-in. wheel base and 33-in. wheels. They are equipped with two 25-hp motors each. The angle-iron bumpers, platform gongs, brake handles, gates and other specialties are of Brill manufacture.

**CONDUIT LAYING IN LOUISVILLE**

The Louisville Traction Company has lately had installed an extensive conduit system, the contract for which was given to G. M. Gest, of New York, Boston and Cincinnati. This installation was for high-tension and low-tension cables, required over 500,000 ft. of duct, and was completed within ninety days after work commenced. It was equipped throughout with the most modern improvements, including Gest cable hanging racks and terminals.

In one of the accompanying illustrations is shown an uncovered section of the system as laid in one of Louisville's principal streets. The other illustration shows a Gest terminal of

money and skill can supply, to keep and maintain the property in the best condition during the entire period, to carry passengers from any one point to any other required, to make transfers with another company to effect this, to operate its cars by methods and in such manner as required by the city, to comply with requirements not only as to the operation but also as to the con-

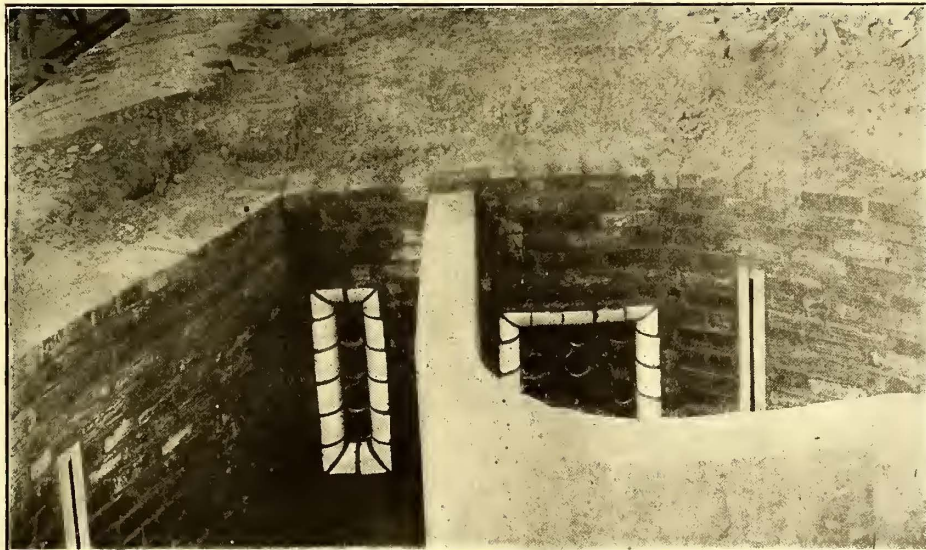


CLOSED CONVERTIBLE CAR, WITH DETROIT PLATFORM

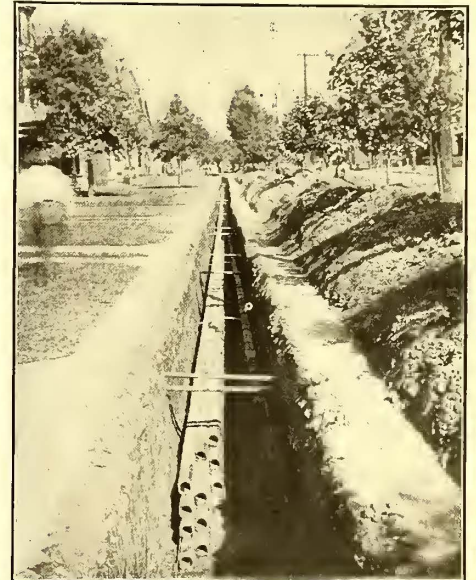
struction and maintenance; to build and operate, on order of the Council, its tracks into new territory, which may amount to 60 miles of double track; to waive valuable vested rights, and in addition to these requirements to pay compensation estimated at from 3 per cent to 20 per cent of its gross receipts.

Strikes will add largely to the item; increase in insurance premiums and damages to persons and property all tend to maintain, if not to increase the rate.

The company is asked to invest from fifteen millions to eighteen millions in new construction to meet the demands of this ordinance, to stand the depreciation, and to provide for it out of the



TERMINAL OF CONDUIT SYSTEM, WITH DIVIDING WALL



EXPOSED SECTION OF CONDUIT SYSTEM

the same system. The concrete dividing wall which separates the two series of conduit is shown in relief, one of the conduit series running into a terminal duct and the other ready for continuation. To the right and left of the illustration are the cable hanging slots, one of Mr. Gest's recent improvements for conduit work.

**CHICAGO CITY RAILWAY FRANCHISE MATTERS**

In connection with the publication of the proposed ordinance granting a new franchise to the Chicago City Railway Company for twenty years, the Council sub-committee has made public a letter, addressed by President D. G. Hamilton, of the Chicago City Railway Company, to the Council sub-committee, regarding the matter of compensation, which is left blank in the ordinance. He says in part:

It is proposed to require of the company the best service that

risks of the future, all out of its present income which is known.

All this the company stands willing to do, to furnish the best of service, new equipment, modern appliances, and insists that these should be considered as compensation.

The estimate which the company submits for the whole period of twenty years is as follows:

Passenger receipts.....	\$197,000,000
Operating expenses.....	126,987,000
Extensions .....	6,000,000
Taxes .....	9,008,000
Reserve .....	1,090,000
Interest on bonds.....	14,250,000
Sinking fund.....	11,347,740
Dividends .....	21,600,000
Balance for compensation and contingencies .....	6,716,760

## LEGAL DEPARTMENT

CONDUCTED BY WILBUR LARREMORE, OF THE  
NEW YORK BAR

### BOARDING MOVING CARS

The New York Supreme Court, Appellate Division, First Department, rendered a decision in May, 1903, in *Fremont vs. Metropolitan Street Railway Company* (83 App. Div., 414), which lays down some very wise and just principles. It appeared that the plaintiff's intestate was injured by an accident upon a car of defendant's railway company in Church Street, in the city of New York, during what was known as the "rush hour;" that is, at half-past five in the afternoon; that for twenty minutes previous to the accident the defendant's north-bound cars had been blockaded; that, as the second car which passed north, after the raising of the blockade, was crossing Cortlandt Street, or when it had reached a point a few feet north of that street, the intestate attempted to board it. He succeeded in grasping one of the stanchions, but, as the plaintiff's evidence tended to show, the speed of the car was suddenly accelerated at this time, and the intestate slipped or fell from the car, sustaining injuries which resulted in his death.

There was evidence to show that the intestate signaled the motorman of the car to stop by holding up his hand, but it did not appear that the motorman saw him or acknowledged the signal. Several other men had rushed for and succeeded in boarding the car just before the intestate attempted to board it. It did not appear, however, that either the motorman or the conductor saw that the intestate was attempting to board the car. The car was traveling at a speed of 5 miles or 6 miles an hour at the time of the accident, and the motorman testified that when a blockade occurred during the "rush hour" he had orders to pass streets without taking passengers in order to equalize the traffic; that he did not slow up or stop for passengers at Cortlandt Street, and was not aware that any one attempted to board the car there. It was held that, although in view of the fact that other persons were boarding the car at the time the intestate attempted to do so, it could not be said that he was guilty of contributory negligence as matter of law, there was no evidence of any negligence on the part of the defendant, and that the court should have dismissed the complaint. It was further held that in view of the conditions existing at the time of the accident, the defendant could not be held to have been negligent because of the failure of the motorman to stop and take on passengers at Cortlandt Street; and that the fact that the motorman slackened the speed of the car as it was crossing Cortlandt Street did not constitute an invitation to persons to board it while it was still moving, particularly as it appeared that the speed was slackened at a time when people were crossing the tracks. The opinion of the court contains the following language:

"There was no invitation to the decedent to board the car, and there is no evidence that the motorman or conductor knew that he was attempting to board the car at the time the speed was accelerated. The company cannot be held negligent merely because the motorman did not stop to take on passengers at this crossing. It is evident that if, after cars have been delayed, every car in the vicinity of the blockade stopped to take on all passengers, the cars would become overcrowded, and unable to take on passengers at other crossings, and frequent and long stops by the first cars out of the blockade would tend to prolong the effects of the blockade, and not relieve and equalize the traffic over the entire line. It is, therefore, necessary in some circumstances for the cars to pass streets without taking on passengers. The company should not be chargeable with negligence from the mere fact that the speed of the car passing over a crossing at the rate of 4 or more miles per hour is somewhat accelerated at the usual point of stopping to take on passengers, when the circumstances were such that it was not intended to stop at that point. Those who attempt to board a car under such circumstances going at a speed of 4, 5 or 6 miles an hour, in the absence of an invitation by signal or otherwise from the conductor or motorman, assumed the risk of the change of speed and of their ability to get on in safety."

Note.—Communications to this department should be addressed to Mr. Larremore, 32 Nassau Street, New York.

This language is significant, because, among other things, it recognizes the necessity and the privilege of passing streets without stopping to take on passengers. The conductor was inside the car collecting fares at the time of the accident, and the company, therefore, was in a fortunate position so far as the application to take the case from the jury was concerned. Quite frequently in cases of boarding moving cars, a question of fact may be raised sufficient to carry the case to the jury whether there was or was not a sufficient invitation to the passenger to enter.

The intimation of the court that the attempt to board a moving car is not necessarily contributory negligence as matter of law, is unquestionably sound. In *Distler vs. Long Island R. R. Co.* (151 N. Y., 424), it was held that it is not negligence *per se* for an embarking passenger to step, by direction of the conductor, from a station platform upon a railroad train moving at the rate of 2 miles or 3 miles an hour, when there is nothing to indicate any unusual or peculiar danger. This decision by the New York Court of Appeals involved a sharp controversy on the subject of boarding moving trains, the court distinguishing certain of its previous decisions. The spirit of the reasoning in the *Distler* case, which applies *a fortiori* to street railroads, is summed up in the following language from the opinion:

"It is a matter of common knowledge that it is of daily occurrence that ordinarily prudent persons safely board a train or car moving at 2 miles or 3 miles an hour. We are not prepared to hold that it is negligence *per se* to step upon a train moving at that rate of speed. To do so would encroach upon the proper province of a jury."

Ordinary observation shows that it is not an uncommon thing for passengers safely to board street cars moving at a low rate of speed, and that conductors not infrequently do not discourage male passengers from making the attempt. Frequently there is danger of a plaintiff being able to testify, or procure testimony, to alleged facts sufficient to require a submission to the jury of the question whether there was direct invitation or practical connivance of the motorman or conductor when an effort to enter a moving car was made. The situation calls for rigid enforcement of the rule that passengers shall not be received until a car has been brought to a full stop. If such rule were strictly enforced, and conductors were able to testify that in practice it never was violated, cases of boarding moving cars might be more uniformly disposed of in favor of street railway companies, as was the *Fremont* case first above cited.

#### LIABILITY FOR NEGLIGENCE.

GEORGIA.—New Trial—Newly Discovered Evidence—Diligence.

1. On an application for a new trial on the ground of newly discovered evidence, the movant must exclude any idea of laches, and show affirmatively that by the exercise of ordinary diligence the newly discovered evidence could not have been procured in time for use on the trial.

2. Ordinary diligence is all that is required, by the Code, of a movant for a new trial in the ascertainment of "newly discovered" evidence. The opinion of the majority of the court requires extraordinary diligence. Under the facts disclosed by the record, the movant showed ordinary diligence. The newly discovered evidence would certainly change the result and prevent a robbery under the forms of law, and the trial judge should have granted a new trial.—(*Atlanta Rapid Transit Co. vs. Young*, 43 S. E. Rep., 861.)

GEORGIA.—Appeal—Harmless Error.

1. When in the trial of an action against a railway company for negligence in damaging property the evidence demands a finding that the defendant was not negligent, an error in the admission of evidence relating to the ownership of the property damaged will not authorize the granting of a new trial.—(*Marchman vs. City Electric Ry. Co.*, 44 S. E. Rep., 992.)

ILLINOIS.—Elevated Railroads—Injuries to Passengers—Negligence—Question for Jury—Evidence—Declaration—Motion in Arrest.

1. Where a passenger on a dark night stepped into an unguarded hole between two cars and the platform of an elevated railroad station, believing it to be the platform of the car she was about to board, and it was shown that the space between the cars was usually protected by a trellis gate, which at the time of the accident

had been removed, the question of the carrier's negligence was for the jury.

2. Where plaintiff boarded a shuttle car on a city street, which connected with an elevated railroad, and plaintiff was carried to a platform station erected between two elevated tracks, where she waited for the elevated train, on which she intended to continue her journey, and she was injured by falling between two cars as she attempted to board the train, she was a passenger, and entitled to the exercise of more than ordinary care by the carrier.

3. In an action for injuries to a passenger, it was not error to permit a pencil drawing of the cars, showing the space where the injury occurred, to be used for the purpose of aiding the jury in understanding the testimony, though such drawing was not strictly accurate, where it was neither introduced in evidence, nor taken by the jury to its room.

4. Where a declaration set forth the relation of passenger and carrier, and averred that it was defendant's duty to use due care in providing suitable gates or other safeguards to prevent persons from falling between the cars, and that defendant failed to do so, by reason of which plaintiff was injured, the declaration was sufficient to support a verdict for plaintiff, as against a motion in arrest of judgment.—(Lake Street El. Ry. Co. vs. Burgess, 66 N. E. Rep., 215.)

ILLINOIS.—Negligence—Street Cars—Warning at Street Crossing—Evidence—Appeal.

1. In reviewing the refusal of the trial court to instruct the jury, at the close of all the evidence, to find a verdict for the defendant, the Supreme Court will not review the evidence to determine its weight, but only examine to determine whether there was any evidence fairly tending to support the plaintiff's cause of action.

2. Where plaintiff, while crossing a street at a regular crossing, was struck and injured by defendant's street car, and she testified that she heard no warning given of the approaching car, and she could have heard it if one had been given, and other witnesses heard no warning given, a finding that defendant was negligent, affirmed by the Appellate Court, will not be disturbed.—(Chicago City Ry. Co. vs. Loomis, 66 N. E. Rep., 348.)

ILLINOIS.—Street Railroads—Injuries to Passengers—Pleading—Evidence—Instructions—Negligence—Contributory Negligence—Boarding Moving Car—Signaling to Stop—Intoxication—Harmless Error.

1. A count for personal injuries, alleging that defendant did not stop the car after plaintiff had given notice of his intention to take passage, in consequence of which, while he was attempting to take passage, he was thrown to the ground, did not state a cause of action, as the refusal to stop and accept plaintiff as a passenger was not the proximate cause of the injury alleged.

2. In an action for injuries received by being thrown from a street car, evidence examined, and held sufficient to warrant the submission of the question of defendant's negligence to the jury.

3. On an issue of the negligence of a street railway in allowing plaintiff to board a car while slowly passing over the tracks of a steam railroad, the admission of evidence that it was customary for people to get on the cars at the crossing while in motion, though error, was not prejudicial to defendant; such evidence merely showing that people got in the cars while in motion, where there was no stopping place and no reasonable man would expect them to stop, and such fact not having been made the basis of any instruction as to the law.

4. It is not negligence, as a matter of law, for a passenger to get on a street car when it is in motion; but the question is one of fact, depending on the rate of speed of the car and all the circumstances.

5. In an action for injuries received by being thrown from a street car, which plaintiff had boarded while it was in motion, an instruction that if plaintiff did not signal to stop, and the motorman did not slacken the speed or stop, to invite plaintiff to get on, the jury must find for the defendant, was properly refused, where the evidence showed that a large number of people approached the cars and got on with the knowledge of the conductor and motorman, as, plaintiff being the last one to get on, they had notice of his intention.

6. An improper instruction as to the effect of intoxication as bearing on the question of contributory negligence was harmless, where the evidence would not justify a finding that plaintiff was intoxicated at the time of the accident.—(South Chicago City Ry. Co. vs. Dufresne, 65 N. E. Rep., 1075.)

ILLINOIS.—Carriers—Injuries to Passengers—Negligence—Pleading—Variance—Negligence Not Alleged—Damages—Evidence—Hearsay—Trial—Misconduct of Counsel.

1. In an action against an electric railway company for personal injuries, plaintiff's evidence that she was injured, in stepping from the car to the platform, by a lurch in the train, tended to support the declaration, alleging that the train was suddenly started, and plaintiff thereby thrown from the train onto the platform.

2. A party cannot recover upon a cause of action not alleged in the declaration.

3. A declaration in an action against an electric railway company for injuries, alleging negligence in defendant in violently starting its train while plaintiff was about to alight therefrom, is not supported by proof that the train was started slowly and smoothly, while the gates were open, and before plaintiff had time to alight.

4. In an action for personal injuries, where there was a conflict as to the character and extent of the injury sustained, it was error to permit a servant of plaintiff to testify that plaintiff "complained of pain in her right hip."

5. In an action for personal injuries, where there was a conflict as to whether the injury sustained extended to the right hip, it was error to permit plaintiff's counsel to intentionally misquote a deposition of a physician, so as to include the words "the right hip," in his recital of plaintiff's statements regarding her injuries.—(Lake Street Elevated Ry. Co. vs. Shaw, 67 N. E. Rep., 374.)

ILLINOIS.—Street Railroads—Injury to Cyclist—Evidence—Questions for Jury—Instructions—Use of Street—Presumption of Care—Damages.

1. A street car company had two tracks on a street. All northbound cars carrying passengers ran on the east track, and all southbound cars on the west track. About midnight each night two cars used on another line were run north on the west track to the car house. The tracks were 4 ft. 10 ins. apart. Decedent, about 11:40 p. m., was riding a bicycle, going north between the tracks, when a car on the west track, going in the same direction, overtook him. The car was running at from 12 miles to sixteen miles an hour. When within 25 ft. or 35 ft. of the man the motorman rang his bell, when the man turned toward the west track, evidently supposing the car was on the east track, and was killed. The street outside the car tracks was impassible for a bicycle on account of snow. Held, that the questions of negligence of the motorman and contributory negligence of the deceased were for the jury.

2. Evidence of the custom of running all northbound cars on the east track and all southbound cars on the west track was admissible, though there was no allegation that running the car northward on the west track was negligence.

3. An instruction that "one who uses the public streets has a right to expect from others using the same highway ordinary prudence and care to avoid accidents, and to rely upon that presumption in determining their own manner of using such street," gave the impression that decedent had a right to rely on the continued observance by the street car company of the custom of running all northbound cars on the east track, and that in doing so he exercised ordinary care as matter of law, and invaded the province of the jury.

4. Where, in an action to recover for negligence resulting in the death of a husband and father, there was no evidence relating to his services in the care of his family, or in the education of his children or fitness for such purpose, an instruction that, in assessing the damages, the jury should take into consideration the value of his services and attention in the care of his family and education of his children, was error.—(North Chicago Street Ry. Co. vs. Irwin, 66 N. E. Rep., 1077.)

ILLINOIS.—Street Railways—Driving on Tracks—Injuries—Negligence—Evidence—Sufficiency—Instructions—Inferences.

1. Plaintiff was driving on defendant's street railway tracks in a covered wagon. A car, approaching from the rear, sounded its gong when within about 25 ft. of him, whereupon he at once attempted to turn to one side, but was struck by the car, which had not slackened its speed, before he succeeded in getting off the tracks. Held, that the question of defendant's negligence was for the jury.

2. An instruction that the jury might "find any fact to be proved which they think may be rightfully and reasonably inferred from the evidence" did not give the jury too much latitude in drawing inferences, or authorize them to draw illogical inferences.—(North Chicago Street Ry. Co. vs. Rodert, 67 N. E. Rep., 812.)

ILLINOIS.—Carriers—Street Railroads—Injuries to Passengers—Position—Negligence—Care Required—Instructions—Refusal of Requests.

1. Where, in an action for death of a passenger while riding on the running board of a street car by his coming in contact with the sides of a tunnel, the declaration contained five counts, and there was no evidence in support of at least one of them, it was error to give a general instruction authorizing the jury to find for plaintiff, if they found he had made out his case as set forth in his declaration, and to refuse proper instructions, asked by defendant, explaining the issues, and that if the jury believed there was no negligence in the management of the train as alleged, or

that the negligence alleged in the other counts had not been proved, their verdict should be for the defendant.

2. In an action for the death of a passenger while riding on the running board of a street car by being struck by the sides of a tunnel, the carrier was not guilty of negligence as a matter of law in permitting deceased to ride in such position.

3. An instruction that a carrier of passengers is bound to exercise the utmost and highest degree of care, skill, and diligence for the safety of passengers that is consistent with the mode of conveyance employed, was erroneous for failure to limit the care required to such as was consistent with the practical operation of the railroad.—(North Chicago Street Ry. Co. vs. Polkey, 67 N. E. Rep., 793.)

ILLINOIS.—Servant—Injuries—Fellow Servant—Question for Jury—Incompetency—Manner of Proving—Assumption of Risk—Appeal—Review of Evidence.

1. The judgment of the Appellate Court is final as to the facts where there is any evidence tending to support it.

2. Whether servants are fellow servants is, as a general rule, a question for the jury.

3. A servant does not assume the risk resulting from the employment of an incompetent fellow servant unless he has notice of such incompetency.

4. Incompetency of a motorman may be shown by proof of his general reputation as to prudence in running motor cars, and by evidence that he had run past signals, had jerked the train he was pulling, and had been laid off and reprimanded by the master for carelessness in the performance of his duties.—(Metropolitan West Side Elevated Ry. Co. vs. Fortin, 67 N. E. Rep., 977.)

INDIANA.—Carriers—Street Railroads—Injury to Passengers—Contributory Negligence—Presumption—Time to Alight—Continuance—Admissions—Evidence—Conclusions—Complaints of Pain—Instructions—Issues—Special Verdict—Judgment Notwithstanding General Verdict—Harmless Error.

1. An application for judgment on special interrogatories notwithstanding a general verdict cannot be sustained unless the facts found by the special verdict are so repugnant to the general verdict that both cannot be true under any conceivable state of facts provable under the issues.

2. Nothing but the pleadings, the general verdict, and the answers to special interrogatories can be considered in determining the force of such special interrogatories on a motion for judgment notwithstanding the general verdict.

3. Where plaintiff was injured by the premature starting of a street car while he was attempting to alight, and the jury specially found there was no evidence that plaintiff could have released his hold on the car and have avoided being dragged, the court could not presume, on a motion for judgment notwithstanding a general verdict in plaintiff's favor, that he could have released his hold by the exercise of ordinary care, and therefore was guilty of contributory negligence.

4. Where an old and infirm passenger was thrown down by the premature starting of a street car, and in the fall caught hold of the running board of the car, and was dragged a considerable distance, his act in so doing, having been under an impulse created by a sudden danger, did not constitute contributory negligence.

5. Where plaintiff, in order to prevent a continuance, admitted that certain witnesses, if present, would testify to the material facts set forth in defendant's affidavit, such admission did not preclude plaintiff from objecting that statements of conclusions of the witnesses, contained in the affidavits, should not be read to the jury.

6. Where plaintiff testified through an interpreter, the overruling of an objection to a question asking the witness to state whether or not his foot was twisted or wrenched at the time of the injury, on the ground that it was leading, was not reversible error.

7. In an action for injuries, evidence that plaintiff complained of pain to his wife is admissible, though the complaints were not made at the time or shortly after the accident.

8. Where the sole allegation of negligence in an action for injuries was the untimely starting of a street car before plaintiff had time to alight, an instruction that, if defendant's employees failed to assist plaintiff in leaving the car, defendant would be guilty of negligence, was error, though evidence on such issue was received at the trial without objection.—(Indiana Ry. Co. vs. Maurer, 66 N. E. Rep., 156.)

INDIANA.—Street Railways—Cyclist—Injuries—Contributory Negligence—Evidence.

1. One riding a bicycle so near a street car track as to be in danger from passing cars failed, for a distance of 300 ft., to look behind him, though he knew that the cars came frequently from such direction. There was nothing to prevent him from riding

further from the track, except a roughness in the asphalt pavement. He was in full possession of his senses, and had control of his bicycle. He was struck by a car running at full speed, which had given no special warning of its approach, but which, had he looked or listened, he could have seen or heard at a distance of 300 ft. It was not shown what indications he gave that he could not or would not turn aside to avoid the car. Held, that he was guilty of contributory negligence.—(Robards vs. Indianapolis Street Ry. Co., 66 N. E. Rep., 66.)

INDIANA.—Carriers—Street Car Company—Injury to Passenger—Instructions—Proximate Cause—Theories of Action—Harmless Error—Right to Alight From Moving Car—Preservation of Exceptions.

1. In an action for injury to a street car passenger, the court instructed that the defendant would be responsible for "the slightest neglect resulting in an injury," etc. Held, that, in view of the following instructions that there could be no recovery unless the injury was shown to be the direct and proximate result of defendant's negligence, the first instruction was not erroneous for failing to limit defendant's liability to such neglect as was the proximate cause of the injury.

2. In an action for injury to a street car passenger, the court instructed that the gist of the action was an injury by the company's negligently starting the car while the passenger was alighting; that, to warrant a recovery, it must be shown that the passenger was injured as the proximate result of the negligent starting of the car; that it was for the jury to determine whether the defendant was negligent in the alleged starting of the car, and whether the injuries were caused thereby; and that they might consider whether the car was fully stopped, and whether there was a sufficient length of time for the passenger to safely alight, and whether the car was so crowded as to make it difficult for her to depart; that it was the company's duty to stop its cars long enough, and to provide facilities, for a safe alighting; and that, if the car did not start while the passenger was getting off, but that she fell from some other cause, plaintiff could not recover. Held, that the instruction was not objectionable, as confused and contradictory, in that it included two theories of plaintiff's cause of action.

3. The court instructed that, if the car had stopped for her to alight, but started again before she could do so, and while she was still in a position of safety, and the car had attained a dangerous rate of speed, as she knew, or might have known, it was her duty to remain on board until the car was again stopped; and, if she attempted to alight while the car was moving at such dangerous rate of speed, plaintiff could not recover because the car had been prematurely started. This instruction was given in view of testimony that the passenger left her seat after the car had started, and stepped off while it was running at its usual rate of speed; but the jury found that she was within one step of the ground, and not in a place of safety, when the car started. Held, that, in view of the finding, any error in the instruction as to the passenger's obligation to know the movement of the car was harmless.

4. Defendant's requested instruction that the mere fact that the car started before the passenger had time to alight "would not give her the right to jump from the car while it was in motion" was modified by substituting, "would not give her the right to alight while the car was going at a rate of speed which would make it dangerous to do so." Held, that the modification was proper, as it is not true that a passenger has no right under any circumstances to attempt to get off a moving car.

5. Any error in the court's interrogation of a party's witnesses cannot be reviewed where no objection was made or exception saved.—(Indianapolis Street Ry. Co. vs. Hockett, 66 N. E. Rep., 39.)

INDIANA.—Street Railway—Injury to Passenger—Contributory Negligence—Question for Jury—Pleading—General Denial—Issues—Bill of Exceptions—Signature—Designation of Court—Judge—Judicial Notice.

1. Where a passenger on a street car was about to alight, but was still in a safe position when the car suddenly started, and in getting off while the car was moving was injured, the question whether she exercised reasonable care in continuing her attempt to alight was for the jury.

2. Where, in an action against a street railway for injuries, defendant answered by general denial, and there was no evidence, positive or circumstantial, that defendant owned or operated the road or car on which plaintiff was a passenger, a judgment in her favor was error.

3. Burns' Rev. St. section 638a, provides that, to make the evidence a part of the record on appeal, it shall be sufficient if the transcript contains the bill of exceptions embracing all such evidence, provided it shall appear that such bill was presented to and signed by the proper trial judge and filed within the time

allowed by law. Section 1395 provides for the creation, in certain counties, of a "superior court," and section 1396 that the seal of such court shall contain the words "Superior Court of ——— County." The record shows that M. presided at the trial, and that the bill of exceptions containing all the evidence was duly presented to and signed by him. The caption of the bill of exceptions was: "State of Indiana, Marion County—ss. In the Superior Court," and it was signed, "M., Judge of Marion Superior Court." It bore the file mark of the clerk, and was included in the transcript under the certificate of the clerk attested by the seal of the "Superior Court of Marion County." Held, that the name of the court appeared with sufficient accuracy; hence the evidence was properly in the record.

4. The court will take judicial notice that a certain person was one of the judges of the superior court of a certain county at the date of the signing of a bill of exceptions.—(Indianapolis St. Ry. Co. vs. Lawn, 66 N. E. Rep., 508.)

INDIANA.—Street Railways—Injury to Passenger—Negligence—Instruction—Relevancy—Evidence—Res Gestæ—Declaration of Bystander.

1. Where, in an action against a street railway company, the only negligence complained of was the violent starting of the car without warning while plaintiff was on the running board, getting off, a requested instruction that the plaintiff assumed all the risk of stepping or walking over the street in the condition it was then in was properly refused as not germane.

2. In an action against a street railway company for injuries to a passenger owing to the sudden starting of the car while she was getting off, it was error to permit a witness who had witnessed the accident to testify that she stated to the conductor, just after the passenger fell, that, if the car had stopped and let her off, it would not have occurred; such declaration not being *res gestæ*.

3. Where, in an action against a street railway company for injuries to a passenger, the chief question was whether the car stopped until after the plaintiff had alighted, and she stumbled in the street, or whether the sudden movement of the car threw her to the ground, there were a greater number of witness for defendant than for plaintiff, but a witness of the accident was erroneously permitted to testify that immediately after the accident the witness stated to the conductor that if the car had stopped it would not have happened, it was prejudicial error.—(Indianapolis St. Ry. Co. vs. Whitaker, 66 N. E. Rep., 433.)

INDIANA.—Carriers—Expulsion of Passenger—Defective Transfer Ticket—Justification—Evidence—Sufficiency.

1. Where a passenger is aboard a street car without the proper transfer ticket, which is due to the mistake or fault of the conductor of the car from which he was transferred, and not to the fault of the passenger, the conductor in charge of the car must accept the reasonable explanations of the passenger in regard to the transfer in dispute.

2. In an action against a street railway company for the forcible expulsion of a passenger from one of its cars because of defects in transfer ticket, evidence considered, and held to show that the expulsion was unjustifiable.—(Indianapolis St. Ry. Co. vs. Wilson, 66 N. E. Rep.)

INDIANA.—Street Railways—Negligence—Newsboys Riding on Cars—License—Ordering Boy Off Car—Injuries—General Verdict—Special Findings—Inconsistency.

1. In an action against a street railway the complaint alleged that plaintiff, an infant, went upon the running board of one of defendant's open cars to sell a newspaper, when the conductor commanded him to jump off, and approached him threateningly, so that plaintiff slipped from the running board, and was injured; that the car was running at considerable speed at the time; and that it was a custom of the railway company to permit boys to go upon the cars to supply passengers with newspapers. There was a general verdict for the plaintiff, but the jury found specially that the conductor had ordered plaintiff to get off the car before it started and again just after it started. Held, that such findings were not inconsistent with the general verdict, since they did not find that the boy heard or could have heard the command.

2. Where, according to general custom, newsboys are permitted to go on street railway cars to sell and deliver papers, a boy is not a trespasser while on a car selling a paper, unless his right to remain on the car has been terminated by reasonable notice.

3. A command given by a conductor to a newsboy on the car to get off, which he did not hear, would not operate to terminate his right to be on the car.

4. Where, after a car had started, the conductor ordered a boy to leave the car while it was running at a hazardous speed, and under the influence of fear, while attempting to comply with the order, the boy was injured without fault on his part, the railroad was liable.

5. The question whether it was safe for a boy to alight from a

car at the command of the conductor while it was running at a speed of some 4 miles to 5 miles an hour was a question of fact for the jury.

6. Where a conductor orders a boy to leave a moving street car, and, being frightened at the threatening manner of the conductor, he sustains injuries while attempting to alight, the expulsion from the car is the proximate cause of the injury.

7. It appearing that the conductor did not intend to injure the boy, his conduct was negligent, but not wrongful.—(Indianapolis St. Ry. Co. vs. Hockett, 66 N. E. Rep., 106.)

INDIANA.—Street Railways—Defect in Street—Injury to Pedestrian—Special Interrogatories—Consistency with General Verdict—Evidence—Harmless Error—Service of Summons—Presumption as to Party Served.

1. In the absence of a showing to the contrary, it is presumed that summons was served on the defendant named in the complaint.

2. Where a street railway company, after tearing up a brick paved street to lay its tracks, replaces the paving, a pedestrian has a right to presume that the street is safe, and, in the exercise of due care, to act upon such presumption.

3. In an action by a pedestrian against a street railway company for injuries from a defect in a street, the jury found a general verdict for plaintiff, and by its answers to interrogatories found that the company had relaid the brick paving after constructing its tracks, but had not set the bricks as close together as practicable, nor tamped down the gravel solidly enough; that the street was lighted, and near the crossing where the plaintiff was injured a red lantern was burning; that plaintiff lived in the neighborhood, and knew the nature of the work being done, and had seen the red lights, and understood their significance; that she crossed the street without heeding the conditions surrounding her, or looking to see where she was walking. There was no signal light on the street crossing itself, and nothing to warn plaintiff that the crossing was dangerous. There was evidence that plaintiff could not see the loose bricks which caused her injury. Held, that the answers to the interrogatories were not so inconsistent with the general verdict as to necessitate a reversal.

4. Where a street railway company is sued by a pedestrian for injuries occasioned by a defect in a street, and the jury find that red signal lights were burning at the place of accident, the exclusion of a witness' testimony that he had not observed their absence is harmless error.

5. Inasmuch as a street railway company, which tears up a paved street to lay its tracks, and replaces the paving, is bound to know whether it has restored it as nearly as practicable to its former condition, any error in the admission of evidence offered by a pedestrian, suing the company for injuries from a defect in the street, to show that the company was notified of its condition, is harmless.—(Union Traction Co. of Indiana vs. Barnett, 67 N. E. Rep., 205.)

INDIANA.—Street Railroads—Injury to Cyclist—Contributory Negligence.

1. Where plaintiff, riding a bicycle near a street car track, was struck by a car, and, if he had looked and listened, would have known of its approach, and could have put himself out of danger up to the instant of the injury, the rule that a plaintiff's conduct is not contributory negligence, if, notwithstanding his negligence, the injury could have been avoided by defendant's ordinary care, does not prevail, as his negligence continued up to the moment of the injury, and was the contributing cause.—(Robards vs. Indianapolis St. Ry. Co., 67 N. E. Rep., 953.)

INDIANA.—Street Railroads—Personal Injuries—Defect in Street—Negligent Repairing of Track—Complaint—Sufficiency—Bill of Exceptions—Leave to File—When Obtained.

1. A complaint alleging, in substance, that defendant street railway, in replacing a broken rail, performed the work so negligently as to leave the street in a dangerous and unsafe condition, owing to the use of loose dirt, which settled, leaving a dangerous hole, so as to permit vehicles to drop into said hole, and that plaintiff, while driving along the street, in the exercise of due care, drove into the hole and was injured, and that the accident occurred wholly by reason of the negligence of defendant, etc., was not objectionable as failing to show negligence.

2. The street railway was liable, though it had no notice of the defective condition alleged.

3. The complaint was not objectionable as failing to show that the negligence of the street railway was the proximate cause of the injury.

4. Burns' Rev. St. 1901, section 638, provides that the party objecting to the decision must except at the time the decision is made, but time may be given to reduce the exception to writing, but not beyond the term, unless by special leave of the court, provided that, if a motion for a new trial shall be filed in a cause

in which such decision so excepted to is assigned as a reason for a new trial, such motion shall carry the decision and exception forward to the time of ruling on such motion, and time may be given by the court within which to reduce such exception to writing. Held, that leave to file a bill of exceptions, not given until several days after a motion for a new trial has been overruled, is without authority.—(Citizens' St. Ry. Co. et al. vs. Marvil, 67 N. E. Rep., 921.)

INDIANA.—Carriers—Injuries to Passengers—Negligence—Contributory Negligence—Pleading—Statutes—Constitutionality—Assumption of Risk—Burden of Proof—Sufficiency of Complaint—Demurrer—Trial—Instruction—Curing Error—Special Verdict—Interrogatories.

1. A general allegation of negligence in a complaint is sufficient to withstand a demurrer for insufficiency of facts to show negligence.

2. A complaint in an action against a carrier which alleged that plaintiff's injuries were caused "solely by the fault, carelessness, and negligence of the defendant and its servants" sufficiently averred negligence to withstand attack by demurrer.

3. The mere fact that the car on which a person attempted to take passage was crowded when he was injured by the sudden starting thereof does not render such person guilty of contributory negligence per se.

4. Plaintiff attempted to take passage on a crowded car, which had stopped at a place where cars usually received passengers, but, owing to the crowd, did not secure a firm footing before the car was started with such force as to throw him to the ground. Defendant's servants did not warn plaintiff not to take passage. Held, that the question of contributory negligence was for the jury.

5. The complaint in an action against a street railroad for injuries alleged that plaintiff was in waiting at a point where defendant's cars usually stopped for passengers, with the intention of taking passage; that a car stopped to take on passengers; that plaintiff stepped on the step of the rear platform, and endeavored to get on the car, which was crowded, when he was thrown to the ground and injured by the starting of the car. Held, that the complaint, prima facie, showed plaintiff to have been a passenger.

6. Act Feb. 17, 1899 (Acts 1899, p. 58), providing that it shall not be necessary for a plaintiff in an action for negligent personal injuries or negligent death to allege and prove want of contributory negligence, is not in conflict with Const. art. 4, section 22, prohibiting the passing of special laws regulating the practice in courts of justice.

7. In an action by a passenger against a carrier for negligent injuries, defendant has the burden of proving assumption of risk.

8. Where a requested instruction was substantially contained in instructions given, the error, if any, in refusing it, was harmless.

9. While a street railway is required to exercise the highest degree of care, skill, and diligence for the safety of its passengers in operating its cars and in constructing and maintaining its tracks, roadway, and machinery, it is only liable for negligence, and cannot be considered as an insurer of the safety of its passengers.

10. Where the complaint in an action by a passenger against a street railroad for negligent injuries alleged that plaintiff was thrown off the car and injured by reason of a severe jolt or jerk of the car, caused by its going over a switch or a frog which was old and worn, it was error to instruct the jury that they might inquire not only whether the jolt of the car was caused by the old and worn frog or switch, but also whether the jolt was due to "any other cause, which the defendant could have guarded against by the exercise of the highest degree of skill and foresight."

11. Though the instructions in a suit may appear fair and correct when considered as a whole, an error in a particular part thereof will not be considered harmless unless the Appellate Court be satisfied that the jury was not misled to the prejudice of the complaining party.

12. Act of March 4, 1897 (Acts 1897, p. 128), repealing Civ. Code 1881, section 380, as amended by Acts 1895, p. 248, which provides for special verdicts, and authorizes the submission of special interrogatories, enables each party in a cause triable by jury to have submitted to and determined by the jury every essential fact in the case, and in no manner abridges the right of parties to a trial by jury as authorized by the Constitution.—(Citizens' St. Ry. Co. vs. Jolly, 67 N. E. Rep., 935.)

INDIANA.—Negligence—Personal Injuries—Willful Injury—Complaint—Allegations—Sufficiency.

1. A complaint in an action for injuries sustained by plaintiff while a passenger on defendant's street car, which alleges that the starting of the car with a sudden and violent jerk, without warning, was the proximate cause of the injuries, and that because of

his condition his injuries were the natural and probable consequences of defendant's act of starting the car without warning; that defendant, with full knowledge of plaintiff's condition, and without warning, intentionally, purposely, and willfully so started the car, utterly regardless of the safety of plaintiff, and with knowledge of the fact that the natural and probable consequences of so starting it would be injury to him—does not state a cause of action for willful injury.

2. The recital of evidence in a complaint for personal injuries willfully inflicted, which tends to prove that defendant acted with a reckless disregard of the safety of plaintiff, and with a willingness to inflict the injuries complained of, does not help the complaint, or make it state a cause of action for willful injury, though such evidence on the trial is competent to support the allegation of willfulness.

3. The complaint in an action for personal injuries willfully inflicted, being quasi criminal in its nature, and involving an intent to inflict the injuries complained of, must be strictly construed.—(Union Traction Co. of Indiana vs. Lowe, 67 N. E. Rep., 1021.)

INDIANA.—Street Railroads—Injury to Pedestrian—Contributory Negligence—Failure to Look and Listen—General and Special Verdict.

1. Where a special verdict is antagonistic to and in irreconcilable conflict with the general verdict, the general verdict must give way.

2. Where a special verdict does not disclose any facts going to the negligence or want of negligence on defendant's part, the general verdict that defendant was guilty of actionable negligence must stand.

3. One alighting from a street car on which he was a passenger became at once a traveler on the public street, charged with the duty of exercising due care.

4. A person who alighted from a street car and passed back of it, and upon the track on which cars traveled in the opposite direction, without looking and listening for the approach of cars, was guilty of contributory negligence as a matter of law, where he was familiar with the manner of operating the cars on the two tracks.—(Indianapolis St. Ry. Co. vs. Tenner, 67 N. E. Rep., 1044.)

IOWA.—Street Railways—Collision with Pedestrian—Negligence—After Danger Is Apparent—Evidence.

1. Though one is negligent in getting struck by a street car, yet if the motorman sees his danger long enough before the accident to prevent it, and negligently fails to do so, the railway company is liable.

2. A finding that the motorman of an electric street car saw a person who was struck by the car in time to have avoided accident to him (it being possible to stop the car within from 5 ft. to 12 ft.) is authorized by evidence that from the front platform, where he was, he could easily see the surface of the street immediately in front; that it was his duty, not only under the rules of the railway company, but also under the general requirement of the exercise of care in operating the car, to be on the lookout to avoid injuring persons in the street; and that deceased was carried 20 ft., while clinging to the dashboard, before he was run over.—(Barry vs. Burlington Ry. & Light Co., 93 N. W. Rep., 68.)

IOWA.—Street Railways—Injuries—Contributory Negligence—Duty to Look and Listen—Ordinary Care—Ringing of Gong—Presumption—Speed of Car—Damages—Future Loss—Pleadings—Instructions—Credibility of Witnesses—Harmless Error.

1. Where in an action for injuries some of the grounds of negligence stated in the petition were withdrawn from the jury, an instruction, requiring the jury to confine itself to the acts of negligence "set out in plaintiff's petition," and that the plaintiff must prove negligence "as set forth in his petition," was properly refused.

2. A requested instruction that the jury was "at liberty" to consider the opportunity of the witnesses for seeing, their interest, their demeanor, etc., was not strictly correct, since, if the instruction was required, it should have made such consideration the "duty" of the jury.

3. Where a jury is instructed that a preponderance of the evidence is not necessarily established by the greater number of witnesses, and that it is the jury's duty to disregard testimony which does not seem reasonably worthy of credence, it is not an abuse of the court's discretion in the matter to refuse to charge that they should consider the opportunity of the witnesses for seeing, their interest in the case, and demeanor on the stand.

4. In an action against a street railway for injuries sustained in a collision between plaintiff's carriage and a car, a requested instruction that plaintiff was guilty of contributory negligence if he could have seen or heard the car by looking or listening in time to have avoided the accident was erroneous, as imputing negli-

gence in case by any possibility plaintiff might have so discovered the car.

5. Ordinary care to discover an approaching street car by looking or listening is all that is required of a driver.

6. Where the only issues to be submitted to a jury were as to the negligence of a street car company in running its car at an excessive speed, and in failing to sound its gong, and as to the contributory negligence of plaintiff, an instruction relating to the right of the motorman to assume that plaintiff would get out of the way was properly refused.

7. In an action by a driver for injuries sustained in a collision with a street car, a requested instruction that plaintiff could not recover if the accident occurred as the result of his failure to exercise ordinary care in driving on the track was covered by instructions that the driver was bound to take reasonable precaution to avoid collision with the car, and that a failure to exercise reasonable care, resulting in the accident, would defeat his recovery.

8. Where witnesses who deny the ringing of a street car gong were in as good position to hear as those who affirm it, no presumption arises in favor of the ringing of the gong.

9. In an action for injuries sustained in a collision with a street car, caused by its alleged excessive speed, the rate of speed, in the absence of municipal regulations, was for the jury to consider in connection with surrounding circumstances, in order to determine whether it was negligent, and an instruction which, as a matter of law, eliminated the question of speed, was properly refused, unless it was so great as to imply a disregard for the safety of those approaching the track in an ordinarily careful manner.

10. In an action by a driver for injuries sustained in a collision with a street car, an instruction that if the jury find "that by reason" of running the car at an unreasonable rate of speed it collided with plaintiff's vehicle, so as to injure him, then, etc., sufficiently instructs that the rate of speed must have been the proximate cause of the injury.

11. Another instruction read that if the jury "found plaintiff's injuries, if any, were directly and proximately caused by the negligence, if any, of the defendant's," then, etc. Held, that any omission in the first instruction was cured when taken in connection with the second.

12. Future pain and suffering and loss of time constitute a proper element of damage for injuries received in a street car accident.

13. In an action by a driver for injuries received in a collision with a street car, an instruction authorizing damages in such sum as will reasonably compensate him for the pain, loss of time, etc., sustained by reason of the accident, is not erroneous for failing to specify that the jury's findings on such matters must be based on the evidence.

14. One driving at a slow trot on a busy city street, as he approached a cross street on which ran a street car line, listened for the car, but heard nothing. It was raining, and other rapidly driven vehicles were close beside him. As he reached a point at the corner where the buildings permitted him to look up the cross street 50 ft. or 60 ft., he did so, and, seeing no car, looked down the street for cars in that direction. On turning again to look up street, just as the horse got on the track, he saw a car only about 10 ft. away, and tried to whip up his horse so as to escape, but was injured. Held, that the facts negated contributory negligence.—(Stanley vs. Cedar Rapids & M. C. Ry. Co., 93 N. W. Rep., 489.)

IOWA.—Street Railroads—Collisions with Vehicles—Injuries to Persons on Track—Negligence of Driver—Persons on Vehicle—Failure to Signal—Contributory Negligence—Issues for Jury.

1. While a hook and ladder truck, weighing 9000 lbs. and carrying ten men or twelve men, was crossing a street, it was struck by a car going south on the cross street, and plaintiff was injured. A seven-story building on the corner obstructed the driver's view up the cross street on approaching it. The distance from his seat to the horses' heads was over 14 ft., and he testified that he did not notice the car coming from the north 50 ft. or more feet away, though he both looked and listened until the horses were about to go on the track, and that he urged them, but could not get across in time to avoid the collision. Held, that whether the driver was at fault was for the jury.

2. While crossing a street a hook and ladder truck was struck by a street car coming from the north. Plaintiff, a fireman, was riding on the footboard on the north side of the truck, and, as customary, looking across it. Other employees were on the opposite side, looking to the north. There was evidence that the gong on the car was not rung, and the first warning plaintiff had of the car's approach was the signal of a woman on the sidewalk. He immediately jumped, but was caught by the car and injured. Held, that plaintiff was not negligent, as a matter of law, in not

turning around and observing the car in time to leave the truck in safety.—(Quinn vs. Dubuque St. Ry. Co., 94 N. W. Rep., 476.)

IOWA.—Servant's Injuries—Assumption of Risk—Contributory Negligence—Question for Jury.

1. An ordinary laborer for a railroad, working with other laborers of the same class, who had never had any occasion to make a coupling, nor any reason to suppose that he would be required to do so, did not assume the risk of defects in a car or a drawhead of which he had no reason to know and had never observed, when suddenly called by a foreman to make such coupling.

2. In an action for servant's injuries caused by a defective coupling, where the evidence was conflicting as to whether the usual safe method of making such couplings was by going between the cars or not, the question as to what was the usual safe method was for the jury.—(Branz vs. Omaha & C. B. Ry. & Bridge Co., 94 N. W. Rep., 906.)

IOWA.—Street Railroads—Injury to Pedestrian—Contributory Negligence—Presumptions—Direction of Verdict.

1. Five or six covered wagons were following one another southward along a street close to a street railway track. Decedent stepped from behind the last of these wagons toward the track, and was struck by a street car coming from the south. There was evidence that the car was running faster than allowed by law. There was no evidence that any care was exercised by decedent to avoid collision with the car. Held, that a verdict for defendant was properly directed.

2. Where there is direct evidence as to the circumstances surrounding an accident resulting in the death of the person injured, the presumption that, prompted by the instinct of self-preservation, he was in the exercise of due care, does not obtain.—(Ames vs. Waterloo & C. F. Rapid Transit Co., 95 N. W. Rep., 161.)

KANSAS.—Negligence—Question of Law—Street Railways—Care to Protect Passengers.

1. In an action to recover damages for personal injuries resulting from the alleged negligence of another, if the facts are admitted or undisputed and but one conclusion can be drawn therefrom, the question of whether negligence existed is one of law.

2. A street railway company in the transportation of passengers must use the utmost degree of care and skill, for the protection of passengers, in the preparation and management of the means of conveyance.—(Metropolitan St. Ry. Co. vs. Hanson et al., 72 Pacific Rep., 773.)

KENTUCKY.—Street Railways—Collision with Pedestrian—Pleading and Evidence—Negligence—Instruction.

1. Under a complaint alleging that, while plaintiff was going along an avenue, and crossing a street, a street car struck him, there may be a recovery, though the collision did not occur exactly at the footwalk, but within the intersection of the street and avenue.

2. Though the collision of a street car with a pedestrian is not exactly at the footwalk, still, it being at the intersection of streets, it is proper to charge that it was the motorman's duty to decrease the car's speed as it approached the intersection, and to give notice of its approach by the usual signals, and to have it under control, and to keep a lookout to avoid injuring one there using the street or crossing.—(Louisville Ry. Co. vs. French et al., 71 S. W. Rep., 486.)

KENTUCKY.—Electricity—Protection of Wires—Negligence—Contributory Negligence—Questions for Jury—Instructions.

1. An electric company, which permitted a pulley wire used in lowering and hoisting an arc lamp to remain without proper or any insulation, and to come in contact with the feed wires, and become so charged with electricity that a boy passing along the sidewalk and taking hold of the wire where it passed around the reel on the pole at a point 4½ ft. above the ground was killed by the current, was guilty of negligence.

2. The question whether the boy was guilty of contributory negligence in taking hold of the wire was for the jury.

3. Under the evidence, held, that the question whether the boy jerked the wire, so that it came in contact with the feed wire, or was jerked about by the electric current, was for the jury.

4. It is the duty of an electric company to know the condition of its wires, and to use the utmost care to keep them safely protected by proper insulation, so that those exposed to likelihood of contact with them may escape injury; and an instruction that the company is only required to use such means as would prevent the escape of the current is too favorable to it.

5. An instruction that if the boy "purposely took hold of said pulley wire, and by so doing caused it or any wire to come in contact with another wire charged with an electric current, this was negligence on the part of" such boy, was as favorable to the company as the law authorized.—(Lexington Ry. Co. vs. Fain's Adm'r., 71 S. W. Rep., 628.)

## LONDON LETTER

*(From Our Own Correspondent.)*

The Sunderland District Electric Tramways Company, Limited, has been formed to operate electric tramways through the large and populous colliery district in the neighborhood of Sunderland, Durham County, lying between the southern terminus of the Sunderland Corporation tramway system and the parish of Easington. The tramways authorized comprise a length of  $19\frac{1}{4}$  route miles, and will be 4 ft.  $8\frac{1}{2}$  in. gage, being uniform with the Sunderland Corporation lines. The capital is £270,000, divided into 100,000 6 per cent cumulative preferred shares of £1 each and 170,000 common shares of £1 each.

Glyn Mills Currie & Company, on behalf of the Metropolitan District Railway Company, recently invited subscriptions for £500,000 4 per cent perpetual debenture stock. The prospectus stated that the work of converting the District Railway from steam to electricity was steadily progressing, and that the engineers anticipated that the whole system would be equipped and ready for working by the end of 1904. Provision is being made for a largely increased train service, and it is intended to provide eventually on the main line a service of forty trains per hour, as against eighteen trains now running, and on each of the five suburban western branch railways a ten-minute service. During the year ended June 30 last, the passengers numbered 43,203,584. When the system is electrically equipped and in full working order, the company expects to carry at least 100,000,000 passengers per annum, and to meet this it is providing a seating capacity for 143,548,000 persons per annum.

At a recent meeting the tramways committee of the Erdington Urban District Council considered and approved the detailed specification and drawings for the construction of the first portion (about 6 miles long) of a complete scheme of electric tramways for the district, prepared by Robert Green and H. H. Humphries, the joint engineers, who were instructed to forthwith obtain the approval of the Board of Trade to them and to advertise for tenders.

A further extension of the electric tramway system in Aberdeen has been inaugurated with the opening of a line to Torry, which has now become a thickly-populated suburb of the city. The new line passes along South Market Street from Guild Street, and crosses Victoria Bridge, which spans the River Dee.

In the projected scheme of the extension of the Newcastle Tramway system, which has already cost over £800,000, nearly £250,000 will be spent, and the urban areas which are chiefly included in the proposed extension of boundaries will all be knit together by a network of rails. The chief difficulty experienced in connecting the great eastern suburb of Byker and Heaton has been that traffic has been carried over one bridge—the Byker Bridge—which was two years ago doubled in width for this purpose. To complete the circle of rails it is essential to run the tramways over the bridge built over Jesmond Dene by Lord Armstrong, and presented to the city. But it is not considered feasible to make a double line of rails, and to lay only a single line would spoil the completeness of the system which is double throughout. The tramways committee has inspected the bridge with a view to devising some scheme which shall enable the laying of a double line, and will report to the City Council shortly.

Fifty-three candidates applied for the post of chief officer of tramways to the London County Council, vacated by Mr. Baker, who has gone to Birmingham. A. L. C. Fell, J. B. Hamilton, and C. J. Nicholson were selected by the general purposes committee to appear before the Council, and they have now appointed Mr. Fell at a salary of £1,500 a year, he to give all his time to the duties. Mr. Fell, as is well known, has been for many years the successful electrical engineer and manager of the Sheffield Corporation Tramways.

The Birmingham Corporation has entered upon the first stage of reconstruction of tramways in the city, and workmen are engaged in pulling up the wood paving in Steelhouse Lane, preparatory to laying down the tramlines from the corner of Snow Hill to form a junction with the existing lines at Lancaster Street and Aston Street. This portion will be electrified in conjunction with the Aston route. When complete the Aston and Gravelly Hill trams will run to the new terminus, while the Perry Barr and Saltley steam trams will continue to traverse the old route to the Old Square until the leases terminate. Until the Corporation has laid down other lines the whole of the electric supply for the route from Aston to Snow Hill will be provided by Aston.

A representative meeting of Flintshire gentlemen was held recently at Chester to consider an application to be made to Parliament during the coming session for powers to construct an electric tramway in Flintshire. It is proposed to connect the districts of Bagilt, Greenfield, Holywell, Flint, Halkyn, Northop, Mold, Buck-

ley, Sandycroft, Queen's Ferry, Shotton and Connah's Quay. The distance is about 30 miles, and the population about 34,000. A generating station will be erected in the area if electrical power cannot be obtained from the North Western Electricity & Power Gas Company, incorporated during the last session of Parliament. It is proposed to have fifteen-minute service of trams, and in addition to the ordinary passenger traffic it is expected that a considerable business will be done in the carriage of goods from various points in the district to the Dee ports, and from point to point.

The city of Manchester has provided on more than one occasion a number of interesting surprises in connection with its electrical committees and their officials, and it has again brought itself to the notice of the electrical public and received a good deal of adverse criticism by the resignation of their city electrical engineer, G. F. Metzger, which has been brought about by a misunderstanding between himself and the electricity committee. Mr. Metzger has been the electrical engineer of the city of Manchester for some years, and during his appointment enormous improvements and extensions have been promulgated. The resignation was evidently brought about by the fact of some misunderstanding between Mr. Metzger and the electrical committee as to whether he had the right or not to do outside work for other corporations or companies. There seems to be a good deal of bitterness on both sides, but in any case Mr. Metzger has handed in his resignation, which has been accepted, and he will most likely leave his present work about the end of the year.

The city of Glasgow is now taking up the matter of experimenting with the welding its rails instead of the ordinary joints with fish-plates. It is now making a most important experiment with the Lorain Steel Company's process of electrical welding of rails, a process which has been utilized in America to considerable extent, in Buffalo, Rochester, Worcester and other cities, but it has not hitherto been used in Great Britain. The work is in charge of Mr. Kleinschmidt, of the Lorain Steel Company. An order has also been placed in Glasgow for 1000 joints to be welded by the Goldschmidt Thermit process.

At the last general meeting of the Underground Electric Railway Company, of London, Mr. Yerkes made some interesting statements. It may be remembered that this company controls not only the Metropolitan District Railway, but practically all of the new tubes which are being constructed at present and which are to be put into service within the next year or two. These tubes, according to Mr. Yerkes, are being pushed on as rapidly as possible, but work of this kind can only be completed at a certain speed. The Chelsea power house, which will furnish current for all of Mr. Yerkes' schemes, is not proceeding so rapidly as had been expected, but still the work is going on successfully and satisfactorily. The work of conversion in the tunnels of the Metropolitan District Railway is also proceeding satisfactorily, and every night large gangs of men are hard at work after the train service is discontinued. It is not expected that the electrical service of the District Railway will be commenced before 1905, when it is expected that the Baker Street and Waterloo tube will also be ready to be put into service at the same time. This tube is practically complete so far as it was originally intended to extend, viz., between Baker Street and Waterloo, the work now going on being extensions to the Elephant & Castle on the south side and to Paddington on the northwest.

At the annual meeting of Willans & Robinson, Ltd., Mr. Robinson made some interesting statements entirely outside the financial condition of the company. Mr. Robinson considered that the big steam engine as manufactured to-day is going out of fashion, and it is rapidly becoming the fashion to order either steam turbines or gas engines instead. Though Willans & Robinson have not said much about their gas engines or steam turbines, their chairman stated at the meeting that they are already in receipt of orders for several large steam turbines, and that they are now perfectly prepared to go into the manufacture of steam turbines up to the largest sizes. It is also a matter of great interest that they have received a number of orders for their gas engines which are being built entirely on their own design. Mr. Robinson also stated that they were preparing an even greater novelty than either the steam turbine or the gas engine, in the shape of an auxiliary waste-heat engine, although the development of this will probably be quite slow, and finally the interesting statement was also made that they were now manufacturing for automobile manufacturers a large number of petrol engines.

The Torquay Town Council has been considering the subject of tramways for some time, and it was confidently expected that some decision would soon be arrived at, especially as the Dolter Electric Traction Company had made a proposition to them which it was expected would be accepted. The latest information, however, from Torquay states that the Dolter Company has now abandoned its proposition, so that the whole subject has for the time being fallen through. It will be remembered that the Dolter



Electric Traction Company is the promoter of a surface contact system which is at present in use in parts of Paris.

One of the most important contracts in connection with electric traction that has been placed for some time has just been decided by the London County Council, and an order has accordingly been placed with Messrs. John Musgrave & Sons, of Bolton, for four engines, nominally of 5000-hp each. The price of these will aggregate £96,713. It is interesting to know that Messrs. Musgrave's tender was very far from being the lowest tender and that the whole matter was thoroughly discussed at meetings of the committee, who arrived finally at the result that they were completely justified in accepting Messrs. Musgrave's tender, as they considered that this firm had had larger and greater experience in the manufacture of large engines for similar purposes than any other firm. The engines will be of a design different from anything that has been previously seen in Great Britain, having both vertical and horizontal cylinders. The specifications for these engines provide that with superheated steam at 500 deg. F., and 180 lbs. pressure and with 26 ins. vacuum these engines shall operate at approximately full load on 11½ lbs. of steam and at approximately half load on 13 lbs. With saturated steam, under the same conditions, the figures to be reached are 12¾ lbs. and 14½ lbs.

The tramways committee of the London County Council has asked for power to initiate the conversion of about 52 miles of tramways in north London from the horse to the underground system of electric traction. The following lines will be dealt with in the first instance: Theobalds Road to London Dock, Norton Foldgate to Stamford Hill, and Aldgate to Poplar. Other lines shortly to be taken in hand are Moorgate Street to Old Street, Holborn to Theobalds Road and along Old Street. The length of the tramways to be dealt with immediately is about 22 miles of single line, and it will be practicable for the whole of these to be worked from the Greenwich electricity generating station.

A. C. S.

### REDUCED FARES IN PHILADELPHIA

It is reported that the Philadelphia Rapid Transit Company, as a convenient method of getting the free use of several million dollars a year, has under consideration the plan of selling tickets for rides on its cars at the rate of six for 25 cents or twenty-five for \$1. It is said that the money the company expects will be advanced by the adoption of this plan would be considerable, and that it would be particularly acceptable just at this time when so much money is needed for the construction of the Market Street subway and the elevated roads.

In this connection it is interesting to note the scheme of fares and transfers now in vogue in that city. It seems that many years ago, when there was a large number of independent operating companies, they commenced by joint agreement issuing exchange tickets between connecting lines, for which a charge of 3 cents was made. This plan enables passengers to ride over connecting lines for 8 cents instead of paying 10 cents, and the idea became so popular that the number of points connecting lines where exchanges were sold was increased.

At the time of the consolidation of the independent lines as the Union Traction Company, the question of transfers was gone into very thoroughly, and the present system of issuing almost universal transfers for 3 cents in addition to the regular fare was adopted. The exchange ticket, for which 8 cents is paid, when issued by the conductor, is punched for the day and hour of issue, but is accepted for passage at any time. The effect of the practice of issuing these exchange tickets amounts practically to a reduction of fare to a 4-cent basis for a considerable number of the company's patrons, and this reduction the public seems to consider of more consequence than a limited free transfer privilege. In addition to the exchange tickets sold, the company issues a considerable number of free transfers. This is done at some points to fill charter requirements where it is not found practicable to run through cars via the original routes.

### BOILER CONTRACT FOR THE NEW YORK CENTRAL POWER STATION

The Babcock & Wilcox Company has been awarded by the New York Central & Hudson River Railroad Company a contract for forty-eight 625-hp forged steel construction boilers, designed for 200 lbs. working pressure.

These boilers are intended for the new power stations of the company, mentioned in the last issue. The boilers will be equipped with Babcock & Wilcox patent superheaters, proportioned to give a superheat of 200 degs. above the temperature due to the pressure carried.

### TERMS OF SETTLEMENT OF THE CHICAGO CITY RAILWAY STRIKE

As briefly announced in these columns last week, the great strike of trainmen on the Chicago City Railway was ended by mutual agreement Nov. 25, having lasted two weeks. The agreement was reached after a conference of many hours, at which the representatives of the men and the representatives of the company appeared before the mayor and a special committee of the Council. Following is the text of the agreement, which was ratified by the vote taken at a mass-meeting of the striking employees a few hours after its acceptance by their representatives:

Memorandum of agreement executed in duplicate this 24th day of November, 1903, between the Chicago City Railway Company, party of the first part, and the Amalgamated Association of Street and Electrical Railway Employees of America, Division 260, Chicago, Ill., party of the second part, witnesseth:

It is hereby agreed that the question of wages between the parties hereto shall be submitted within the next ten days to a board of arbitration, the board of arbitration to be composed of three persons, one to be chosen by the party of the first part, one to be chosen by the party of the second part, and the two thus selected shall choose a third. As soon as the third member of the board is selected, they shall organize by the selection of one of their number as chairman, and then decide upon the times and places of meetings.

The board of arbitration shall settle the wages of all the trainmen and other employees of said company for the period of this contract. This question shall be determined upon the fair value of the services to be rendered by said employees, as shown by such evidence as would be legally competent to fix said wages if the various men had performed the service without a specific contract and were suing to recover the value of such services, with the exception that inasmuch as the company claims that the present wages paid to its employees are above the market value, the present scale or rate of wages paid by the company to its employees shall be ignored in determining the wages hereafter to be paid by the company.

The expense of said board shall be borne equally by the parties hereto.

The rate of wages fixed by the board shall date from the signing of this agreement, it being understood that the present rate of wages shall be paid regularly until the decision has been reached.

2. The company shall meet with the committee of trainmen from the organization, and will make the hours of service as nearly as possible to suit them on the basis of a maximum of eleven hours and a minimum of eight hour within fifteen consecutive hours, or will establish a nine-hour day within fifteen consecutive hours if preferred, but the company shall have the right to fix the number of cars running at all hours, and the length of the time they shall be on the streets, endeavoring always to make the work as agreeable to the men as will be consistent with the performance of its duty to the public.

3. There shall be no opposition by the party of the first part to the employees becoming members of the union, neither shall there be any discrimination or distinction by either party for or against men who belong to a union or who do not belong to a union. No attempt shall be made to prevent employees from becoming members of the union and employees who are not members of the union shall not be annoyed or subjected to pressure to compel them to join the union. But reasonable and peaceable association shall not be considered annoyance or pressure. A disregard of this provision of the contract shall be construed a repudiation of this contract. Nothing herein contained shall be construed as in any way interfering with or limiting the right of the company to absolutely exercise its own judgment and discretion in employing, discharging or disciplining its employees, except for membership in the union.

4. The properly accredited officers of the company agree to meet and treat with any committees of the organization on all questions and grievances that may arise in the future.

5. The company agrees that any employee who has been unjustly suspended or discharged shall, upon reinstatement, be reimbursed for all time lost.

6. The company agrees that officers of the organization shall be granted leave of absence on organization business when so requested. It further agrees that any member of this organization who now holds office or who shall be elected to any office in said association which requires his absence from the company's employ, shall, upon his retirement from said office, be placed in his former position, provided such officer during his absence from the company's employ shall not have been guilty of acts which would justify his discharge if he had continued in the employ of the company.

7. The company shall endeavor at all times to maintain an adequate and proper extra list.

8. The company shall place in the office of each car house of the respective lines an open book, in which the men can register the particular day or days on which they want to get off, and the men so registered first for any particular day or days shall have first preference. It is agreed, however, that members of the executive board of the executive organization shall be entitled to get off in preference to others. Said book shall be dated seven days ahead.

9. All car repairers, motor repairers, grip repairers, inspectors, dopers, car pushers and car cleaners shall be absent from duty every other Sunday.

10. This agreement to be binding and in force beginning this 25th day of November, 1903, and continuing until the 25th day of November, 1904, with this understanding: That this agreement will not be ratified until all employees shall return to work in the positions they occupied prior to the 12th day of November, 1903, provided that the company shall have the right to refuse to take back any employee who shall have been guilty of acts of violence or intimidation on or since Nov. 12, 1903, which would justify his dismissal from the service of the company.

It is difficult to see of what benefit this strike was to the men, but it is very plain to all that it meant a loss to them, a loss to the company and a great inconvenience to the Chicago public. Not one of the main points at issue was yielded by the company. There is a possibility under the new agreement that there will be a reduction of the wages of some of the men. The clause providing for arbitration of the wages without regard to the present scale, and with consideration only for the value of such services in other cities, would naturally result in a lowering of the pay of the cable trainmen, who now receive wages much higher than the trainmen on electric cars and higher than is paid in any other large city of the United States. These cable wages are the outgrowth of an agreement made many years ago. Practically, the only concession made by the company in the peace negotiations previous to the ending of the strike was that it agreed to take back engineers and firemen who went on a sympathetic strike in violation of an agreement. The company has gained one important point under the new agreement which did not prevail under the old agreement which expired Oct. 1, 1903. The company is now free to hire, discharge and discipline men as it chooses, without regard to the grievance committees and arbitration boards, which have taken so much time during the past year in connection with ordinary routine discipline, the principal results of which have been to take time and energy which might better have been spent otherwise. There is a general feeling of relief by all parties concerned that this senseless affair has been ended. The terms of the settlement were enthusiastically accepted at the meeting of the men, the majority of whom are very glad to be at work in their former places again. The operation of cars began Thanksgiving Day, Nov. 26, just two weeks from the time the strike began.

### RESUMING SERVICE IN CHICAGO

The operation of cars was resumed by the Chicago City Railway Company on Thursday, Nov. 26, and that night cars were run for the first time after dark since the strike was called on Thursday, Nov. 12. When the struggle was on, the service operated under police protection was abandoned each day shortly after 4 o'clock, in order to avoid any attack that might be made by strike sympathizers under cover of darkness. On Thursday the only remaining evidence of the recent struggle was that the service was not on regular schedule. On Friday, however, cars ran practically on regular time. When the strikers reported for duty on Thursday morning, all of them, with the exception of fifty-nine, were given their old positions. Of those whom the company refused to reinstate, fifty-three were trainmen and six were members of the Cable Splicers' Union. These men, the company claims, were guilty of misconduct during the strike, and according to the terms of the settlement were not entitled to reinstatement. The men, however, deny that they took part in any acts of violence, and it is said that they will appeal their case to Mayor Harrison and the Aldermanic mediation committee, which pledged itself during the negotiations for a settlement to demand from the company an adequate reason and proof of violence before any of the strikers should be refused employment.

### CONFERENCE ON TRAFFIC CONDITIONS IN CLEVELAND

A special meeting of the board of public service of Cleveland was held last week to consider complaints made against the service of the Cleveland Electric Railway. Mayor Tom L. Johnson acted as chairman of the meeting. The company was represented by President Andrews and General Manager Stanley. The meeting was pleasant and harmonious throughout, and instead of making excuses for poor service, or any contest against the demands of the citizens who appeared to make the complaints, the railway officials appeared willing to meet the complaints more than half way.

The burden of complaints was that cars are crowded at all times and that during rush hours they are packed. It was claimed that since the consolidation of the Cleveland Electric and Cleveland City companies the headway on many lines has been made less frequent. A strong complaint was that certain lines do not traverse the Public Square and Superior Street as they formerly did.

Mr. Andrews expressed himself in strong terms on this point. He stated that Cleveland people had been humored in years past by being taken direct to the Public Square and down Superior Street by every car in the city. He said that in no other large city the size of Cleveland is such a rule in practice. This practice,

he said, has had much to do with the fact that cars are crowded and the downtown district congested, and he stated that instead of putting cars back on the Public Square and Superior Street route, it was the intention to diverge other lines from this route. He thought the fact that universal transfers are now given ought to compensate for this change.

In this connection he gave some very interesting figures showing the increased service consequent with the six tickets for a quarter and universal transfer rules now in force. He stated that 74 per cent of the people are now buying tickets instead of 40 per cent, the average under the eleven tickets for 50 cents rule. The proportion of passengers asking for transfers is now 40 per cent instead of 28 per cent as in years past. Lower fares and universal transfers have increased the traffic 25 per cent, and Mr. Andrews said that the company is making less money. He claimed that as a matter of fact the company is operating more cars than formerly and that the number of trippers had been increased. He also pointed out that it was practically impossible to maintain regular headway on many of the Cleveland lines because of numerous grade crossings and draw-bridges.

There are about fifty grade crossings in the city and four draw-bridges. Two of these draw-bridges are on the Central and Superior Street viaducts, the main arteries of the city, and crossed by over half the car lines. On a line having a two-minute headway, a ten-minute blockade means that five cars each way are held up. It is conservative to estimate that four blockades on each of the fifty grade crossings are experienced daily. With 200 blockades of this nature, each of ten minutes' duration, it will be seen that 2000 minutes are taken off the schedules. Where the cars are on five-minute headway it means that the traveling public has been hindered to the extent of 400 cars. The draw-bridges are even worse than the grade crossings, as it usually takes from ten to twenty minutes to swing the large draws. During rush hours the approaches to the bridges are sometimes completely filled with cars waiting to cross, hindering incoming as well as outgoing cars. Cleveland at one time had an ordinance prohibiting the opening of draw-bridges between certain hours morning and evening, but if it is now in force the street railway officials are not aware of it. The city has an ordinance requiring a freight train to be cut in two after it has blockaded a street five minutes, but practically no attention is paid to this ordinance and the police apparently make no attempt to enforce it.

The railway officials invited citizens to call at their office with complaints as to service, but requested that they deal in facts and specify the exact time, the number of cars, etc., regarding which they desired to make complaint. The board of public service took no action and decided to wait and see the results of the changes promised by Mr. Andrews. The position of the company has been rendered more uncomfortable still through the loss of seventy-five cars in the recent fire.

### NEW TRANSFER SCHEME IN BROOKLYN

Announcement has been made by the Brooklyn Rapid Transit Company of a number of changes in its transfer system to go into effect Dec. 1. On and after that date conductors will issue transfer tickets only to passengers presenting continuous trip tickets or paying cash fares. In order to avoid confusion, passengers will have to ask for transfers upon payment of fares. In other words, conductors will not thereafter issue transfers upon transfers. In the official circular outlining the new scheme the names are given of the lines to which continuing trip tickets, which entitle the holder to a transfer, will be given, and the points at which transfer agents will issue such tickets are also given. A number of new transfer points will be established, and these are specified. According to General Manager Calderwood, the company has increased the transfer privileges between the lines since July 1, 1902, from 262 to 292, and he says that the new arrangement will make an increase of 7, or a grand total of 299. The purpose of the company in adopting the new system is to make it possible for a passenger, by the use of a transfer, to go from one point to another by the shortest route and in the quickest time for one fare, and to stop, if possible, the flagrant misuse of transfers. It is pointed out by Mr. Calderwood that in adopting the new system the practice of the companies in all the large cities of the United States has been followed, and that the new arrangement will in no way work to the detriment of those who heretofore used transfers legitimately.

In accordance with the general policy of Mr. Huntington, the Los Angeles Traction Company will issue no more pass books, save those provided for in the franchises.

## CENSUS REPORT ON CENTRAL ELECTRIC LIGHT AND POWER STATIONS

Bulletin No. 5 of the Census Bureau, devoted to electric light and power stations, has just been issued by the Department of Commerce and Labor, of the government. The history of central electric light and power stations in the United States is briefly enumerated. Statistics for the year ending June 30, 1902, which is the period covered by the report, shows that there are 3620 central stations of this kind in operation. The cost of construction and equipment amounted to \$504,740,352; the gross income is reported as \$85,700,605, and the total expenses as \$68,081,375. The power plant equipment consisted of 5930 steam engines, with 1,379,941 hp, and 1390 water wheels, with a stated hp of 438,472. Of the total number of stations, 815 were operated under control of municipalities. The total output in kw-hours for the year was 2,453,502,652; the total number of arc lamps was 385,698; the total number of incandescent lamps 18,194,044. During the year 252 electric railway companies reported the generation of electric current for sale for light and power; of this number, 118 reported the generation of electric current for this purpose was of sufficient importance to enable them to give the number of lamps in use and the amount of income from the sale of current. Adding these stations to those already enumerated, the number would be increased to 3738; the total income from the sale of current to \$90,458,420.

The report states that 75 per cent of the central electric stations are in towns of less than 5000 inhabitants. Illinois contains the greatest number of stations operated under private ownership, and Ohio the greatest number under municipal ownership. Of the private stations in the country, 157 furnish electric current to railway companies for the operation of their cars, but only two municipal stations, one at Riverside, Cal., and one at Hannibal, Mo., reported current as sold for this purpose. The capitalization of the central stations is represented by \$372,951,952 stock and paid on either common or preferred stock. A more complete report is to be issued later, and is being compiled by T. C. Martin, special expert agent for the bureau.

## APPLICATION FOR RIGHT TO BUILD OVERHEAD TROLLEY IN NEW YORK

The Metropolitan Street Railway Company, of New York, has taken the first steps toward securing the necessary authority to convert its West Street horse car line into an overhead trolley system. West Street is devoted to commerce, and parallels the river front on the west side of the city, and for most of its length is so low that the conduits which would have to be laid for the underground trolley would be frequently flooded by high tide. Probably the best understanding of the conditions to be met in a change of motive power on this line can be obtained from the official circular of the company sent out to property-owners along the street by President Vreeland, of the Interurban Street Railway Company. The circular says:

For several years there has been an urgent and constantly growing demand for better street car facilities on West Street than can be furnished by horse cars. The Metropolitan Street Railway Company has expended a large amount of time and money in an effort to develop some system of mechanical or electrical traction which would enable it to meet this demand. It has been recognized from the outset that the underground electric system, which has been generally adopted for the Metropolitan lines on Manhattan Island, cannot be used upon West Street, because for most of its length the street is so low that the conduits which contain the underground electric conductors would be so frequently flooded by high tides as to prevent the successful use of the underground trolley. Storage-battery cars and compressed-air cars have both been tried at great cost, but without success. Many other systems have been examined. The company even offered a reward of \$50,000 for a successful system, and, although numerous systems were offered in response to this invitation, none proved successful.

It has finally come to be generally recognized that the only systems of electric propulsion of surface cars which successfully meet the requirements of the traffic on Manhattan Island are the underground electric system and the overhead electric system.

Accordingly, the conclusion has been reached that if the street cars upon West Street are to be operated otherwise than by horses, the overhead electric system must be used. This system can be installed on West Street in such a manner as not to obstruct traffic or detract from the appearance of the street. The same cars can be fitted with both overhead and underground trolley, so that the West Street line, if equipped with the overhead electric system, could be operated as part of the general Metropolitan system.

Now that almost all of the surface lines upon Manhattan Island are operated by electricity, the co-operation of the owners and occupants of property on West Street is asked in securing the necessary authority for the installation of the only system of electric propulsion which is available under the conditions which exist on West Street.

## ECLIPSE LIFE-GUARDS ADOPTED IN BROOKLYN

The Eclipse Car Fender Company, of Cleveland, has received an order for fifty Eclipse life-guards to be placed on new cars for the Brooklyn Rapid Transit Company being built by the G. C. Kuhlman Car Company. The fenders are a departure from the now well-known Eclipse life-guard, being designed to meet special requirements met with on the Brooklyn system. In that city the cars are double-enders, and it is the practice to carry the fender from one end to the other. The framework for the new fender is made of tubing instead of angle iron, and the table is detachable so that it can be carried from one end to the other. The use of tubing makes the fender much lighter than heretofore and renders it easy to handle. It is also claimed the tubular frame is much stronger than the angle iron frame. The Eclipse Car Fender Company is supplying seventy-five equipments to the Cleveland Electric Railway Company, making 225 for that company, and it has received an order for forty-five additional equipments for the new cars just ordered to replace those recently destroyed by fire. General Manager Stanley, of the Cleveland Electric Railway, states that his company expects to equip every car on its system with the Eclipse life-guard, as he regards it as a great life-saver and a profitable investment. It is reported that within the past thirty days no less than seven persons have been picked up and their lives probably saved by Eclipse life-guards in Cleveland.

## REPORT OF NORTHWESTERN ELEVATED, CHICAGO

The report of the Northwestern Elevated Railroad Company, of Chicago, for the year ending June 30, 1903, has been made to the Railroad & Warehouse Commission of Illinois as follows:

### INCOME ACCOUNT

Earnings—	
Northwestern, main line.....	\$1,215,071
Loop division .....	387,232
Total .....	\$1,602,303
Rents and miscellaneous.....	40,153
Gross .....	\$1,642,456
Operating expenses—	
Maintenance way .....	19,698
Maintenance equipment.....	66,754
Reserve for maintenance.....	36,000
Transportation .....	343,243
General and legal.....	51,746
Total .....	\$517,441
Net earnings .....	1,125,015
Charges—	
Bond interest.....	779,350
Other interest.....	6,155
Taxes .....	156,100
Total .....	\$941,605
Surplus .....	183,410

### BALANCE SHEET ASSETS

Cost road and equipment.....	\$28,589,089
Stocks and bonds owned.....	4,307
Cash and bills receivable.....	108,520
Accounts receivable.....	579,056
Materials .....	17,912
Land and buildings.....	456,000
Sundry .....	199,588
Total .....	\$29,954,472

### LIABILITIES

Capital stock.....	\$10,000,000
Bonds outstanding.....	18,387,000
Real estate mortgages.....	119,000
Interest accrued.....	241,504
Taxes accrued.....	9,164
Accounts payable.....	424,294
Reserves .....	72,925
Sundry .....	14,062
Profit and loss.....	600,523
Total .....	\$29,954,472

## GRANT FOR TUNNEL BETWEEN NEW YORK AND NEW JERSEY

The Rapid Transit Commission of New York has granted a franchise to the Hudson & Manhattan Railroad Company to run a tunnel under the North River from Exchange Place, Jersey City, to Cortlandt Street, Manhattan. William G. McAdoo is the president of the company and also is president of the New York & New Jersey Railroad Company, which has received a franchise to run a tunnel under the North River, entering Manhattan at the foot of Christopher Street.

The tunnel which will enter New York at Cortlandt Street will run to Church Street and then will form a loop, running back through Fulton Street to the place where the tunnel strikes Manhattan. There will be a spur from the station in Church Street, and this spur will connect at Broadway and Dey Street with the lower Broadway spur of the rapid transit subway.

The franchise gives to the company a twenty-five year grant with the privilege of two renewals, one at ten and the other at fifteen years, at varying rates of compensation, equivalent to the city of 3 per cent of the capital involved and of the earnings of the company as estimated.

## REPORT OF THE WEST END COMPANY OF BOSTON

At the annual meeting of the stockholders of the West End Street Railway Company, held Nov. 24, the following directors were re-elected: Edwin F. Atkins, Samuel Spencer, Charles H. Baker, C. Minot Weld, Parkman Dexter, Stephen H. Weld, John Parkinson, Chas. A. Williams, Joseph B. Russell, Moses Williams and Alfred Winsor. The report of President Russell showed the total assets to be \$31,800,000. The liabilities, including common and preferred stock, aggregate \$15,900,000, and there is a surplus of \$650,000. The bonded indebtedness has been increased by an issue at 4 per cent amounting to \$3,915,000, and bonds to the value of \$3,362,000 have been paid. The total bonded indebtedness of the company is \$15,219,000. The capital stock has been increased by the issue and sale of 9085 shares of the common stock of the par value of \$454,250. The balance sheet shows:

ASSETS		
	1903	1902
Road and construction.....	\$10,871,119	\$10,581,397
Equipment .....	8,256,387	8,080,812
Land and buildings.....	11,169,063	10,734,953
Subway equipment .....	275,739	296,942
Cash and cash accounts receivable.....	1,240,551	1,231,778
Total .....	\$31,812,860	\$30,925,883
LIABILITIES		
Common stock .....	\$9,539,250	\$9,085,000
Preferred stock.....	6,400,000	6,400,000
Bonds .....	15,219,000	14,666,000
Surplus .....	654,610	215,213
Current and unfunded debt.....	.....	559,670
Total .....	\$31,812,860	\$30,925,883

Since the last annual report two accounts for additions and improvements made to the property of this company by the Boston Elevated Railroad Company, covering the year ended March 31, 1902, under terms of lease to that company and amounting to \$873,203, have been presented and approved by the board. Two accounts for similar work done by the Boston Elevated Railroad Company covering the year ended March 31, 1903, have also been presented, but have not yet been adjusted.

## TRUCKS AT BRIGHTON, ENGLAND

The tramways committee of Brighton, one of the most popular South of England seaside resorts, which have from time to time placed contracts for various American equipment, recently disqualified a tender of the British Brush Engineering Company, on the ground that the company had not complied with the specifications regarding the trucks to be used.

The Brighton municipal electrical engineer specified for trucks built either by the J. G. Brill Company or the Peckham Manufacturing Company. The Brush people, being publicly invited to bid, offered to supply trucks constructed at its own works at Loughborough, one of the southeast suburbs of the British metropolis. Not being in accordance with the specification, the

Brush tender was thrown out. The action of the Brighton committee, according to advice received from the other side, has created no little stir in the British electrical trade. The employees of the electric traction department of the Brush Company passed the following resolutions at a special meeting:

1. That this meeting, having heard that in several towns it is the custom to exclude British firms from putting in tenders for trucks in competition with foreign makers, respectfully appeals to members of tramway committees and other buyers of cars to give fair play to an industry on which the welfare of so many of their countrymen, not only ourselves and our families, but other workers concerned in the preparation of the material is absolutely dependent.

2. That, while having no right or wish to interfere with the actual placing of orders, we urge that in our own country it is unjust that British truck makers should be barred from opportunities of selling goods which are the product of British labor.

3. That we protest against any suggestion that foreigners can claim superiority, or even equality in any branch of steel work, and we are confident that, with fair and open competition, foreign-made electric traction trucks would soon fail to find any market whatever in this country, and that employment would then be provided for a large number of additional men in this industry.

## MR. DUFFY RETURNS TO CHICAGO

C. Nesbitt Duffy has resigned his position as comptroller of the Interurban Street Railway Company, of New York, and has returned to the Chicago City Railway Company, resuming his former position of secretary and auditor of the company. During his short stay in New York Mr. Duffy made an excellent record as comptroller of the Interurban Street Railway Company, and his resignation from that company was accepted only with great regret by the officials of that system. But the fact that he has been closely identified with the policy of the Chicago City Railway Company during the last three or four years, that during this time he had made a very careful study of the traffic conditions of the company, and that recently he had taken an active part in negotiations with the city authorities looking to the company's franchise extensions, made his presence in Chicago almost indispensable to the owners of that road. All who are acquainted with Mr. Duffy realize that it must have been a considerable sacrifice on his part to relinquish the important work in New York upon which he had just entered, but his feeling of loyalty to the principal stockholders of the company with whom he had been connected for a long time in Chicago and previously in St. Louis, induced him to return to Chicago when it was found that his services were necessary.

## TORONTO RADIAL ELECTRIC RAILWAY

An agreement has at last been reached between the Council of Toronto, Ont., the Toronto Railway Company, and Solicitor Walter Barwick, K. C., representing the Metropolitan Electric Railway, whereby the different radial railways will gain admission to the city. The line from the north will enter the city at or near Christie Street, and will proceed mostly by private right of way through the unimproved tract that extends to College Street and on to Stanley Park, thence mostly by Front Street to St. Lawrence Market. The lines from the west will cross the Grand Trunk Railroad tracks at Sunnyside and extend along the south side of these tracks to Bathurst Street, recross the steam railroad tracks by a bridge and take the radial Front Street line to the St. Lawrence Market. The Toronto & Hamilton Railway will also use this road. The companies are to carry over that right of way passengers, light or package freight and express traffic. Only during limited night hours are other classes of freight, mostly coal, to be carried, and this subject to the supervision and direction of the city engineer. The tracks of this radial right of way are to be the standard gage, which is 4 ins. smaller than the gage of the Toronto Company. The radial companies are not to pick up city passengers. They are to pay for the privilege of entering the city a percentage on the cost of the right to the city, such percentage to include a compensation at the rate of 5 per cent for the use of the streets traversed. This will enable the city to pay the interest on the cost and provide a sinking fund that will pay off the principal in forty years. The city can borrow at 3½ per cent, and the other 1½ per cent will provide the required sinking fund. The radial railways are also to pay to the city a percentage on the rate of fare for every passenger brought into the city. The Metropolitan Electric Railway promises to build within four years at least 150 miles more of track. It now has 150 miles, and the total of radial lines entering Toronto will be 300 miles. Only the Metropolitan tracks are standard gage, so the tracks of the three other radials will have to be changed.

## (CONTINUED) IMPROVEMENTS BY THE BROOKLYN RAPID TRANSIT COMPANY

The Brooklyn Rapid Transit Company has been planning a number of important changes and improvements which it expects to carry out within the next year or two. Among these are complete trackage arrangements to ensure adequate passenger transportation over the new Williamsburg Bridge, which is to be opened to wagon and pedestrian traffic on Dec. 19. The railway company is at present negotiating with the city for a franchise which will enable it to run cars over the new bridge and along one or two streets in New York leading from the bridge. As soon as practicable the company will build a third track on all its elevated lines, so that an express service can be given such as is now enjoyed by passengers on the Manhattan division of the Interborough Rapid Transit Company. This will involve much rebuilding, as on most of the lines "island" stations are in use, and on one of the lines where such stations are not used the structure is so narrow that it will have to be widened to accommodate a third track. It is also planned to enlarge the Culver terminal at Coney Island so that 1000 passengers a minute can be comfortably handled there. While the winter traffic at this terminal is of little importance, the enlargement will be made to accommodate the immense passenger business which is handled during the summer months, Coney Island being the most popular seashore resort near New York. The tracks of the Brighton Beach division, which run through some very fine suburban districts, are to be depressed in some places and raised in others to comply with the wishes of property-owners along the route.

As has been previously stated in these columns, the Brooklyn Rapid Transit Company is building a large addition to its Kent Avenue power station. Owing to the labor troubles in the building trade in New York and Brooklyn the completion of this station has been greatly delayed, and as a result the company has been unable to abolish the use of steam locomotives as quickly as it desires, but hopes to do this during the coming year. The new loops which were recently built by the company at the New York end of the Brooklyn Bridge have given satisfaction, and the company expects that it will be able to transport 20,000 passengers more per hour as soon as its patrons have become thoroughly familiar with the new arrangement.

It is reported that a contract has been made by the American Railway Traffic Company for removing the city's ashes on cars over the lines of the Brooklyn Rapid Transit Company to the low lands of Coney Island. This work is to be done at night so that it will not interfere with the regular passenger business.

The company also expects to construct a new seven-story office building sometime during the coming spring. This structure will be an annex to the present office building of the company, the new building being directly behind the present quarters.

## IMPROVEMENT BY THE PUBLIC SERVICE CORPORATION

President Thomas N. McCarter, of the Public Service Corporation, of New Jersey, has just outlined plans for the reconstruction of the street railway system of that company that will call for the expenditure of \$7,000,000 in the next five years. In addition to this there will also be important and extensive improvements to the gas and electric lighting system controlled by the company, but the expenditure for this latter work will be small compared with that which will be spent upon the street railway system, due to the relative conditions in which the properties were found when taken over. During the summer a complete examination was made by experts of the street railway system and the result of that examination has recently been submitted to the company. It is substantially that the large expenditure just referred to must be made without reference to the future development of power, which is separately considered, and without reference to a single extension.

Some of the improvements to the street railway system are already under way. Deliveries are being made on the first lot of 150 new cars ordered almost immediately after the consolidation, and the last of the cars on this order, it is expected, will be delivered within the next month or two. Additional orders are to be placed which will result in an increase in the rolling stock of 600 more cars during the next five years.

Most of the money for improvements will be expended in what is known now as Greater Newark. If the right of the company to build on Central Avenue through East Orange is sustained, a line will be built through the Oranges as far as the company is permitted to go on Central Avenue, thus furnishing direct com-

munication to all that part of the community south of Main Street, and if the company receives the permission of the authorities of East Orange, it will build a similar line on Springfield Avenue, about equidistant to the north, so that two more lines radiating from the Oranges will come into Newark.

The plan is to proceed at once with the extension to Elizabeth, via Lyons Farms Road, and as soon as this work is completed the Plainfield cars will run directly into the city of Newark. Simultaneously with the completion of the improvements just outlined, it is planned to run a new line from Hoboken Ferry, Hoboken, direct to Newark. Negotiations are now pending for a through line from Hackensack over the line of the Newark & Hackensack Traction Company, an independent line, into the city of Newark. The company also expects soon to complete negotiations so that cars can be run direct from Perth Amboy into the city of Newark, and approval has just been given by the company to a contract drawn to provide for a through car service, commencing Jan. 1, approximately, from Jersey City to Trenton.

If the commissioners approve of the abandonment of the Morris Canal, and if the Legislature sanctions the plan, Mr. McCarter says that the company will immediately enter into negotiations for the use of the canal bed for street railway purposes, so as to increase the transit facilities of the city of Newark and the county of Essex. The whole project of canal abandonment is in its primary stages at present, but the possibilities of the use of the waterway for high-speed work are important. It is pointed out that the canal bed could be used for a high-speed line in one direction to Paterson and in the other to the Passaic River, and that after the Passaic is crossed it would be possible to continue in the canal bed or else on present right of way which the company owns, abutting the plank road, across the Hackensack River. Then by building a short new line from the Hackensack to the elevated line which the company owns in Jersey City, passengers could be taken not only from Newark, but from the Oranges and all the outlying territory on a high-speed line to the Hoboken Ferry. When the new tunnel under the Hudson River is completed, if the negotiations that are now under way are successful, the terminal of the Public Service Company's lines will not be at Hoboken, but New York, to which place through cars will be run.

## PERSONAL MENTION

MR. A. N. CONNETT, of J. G. White & Co., Ltd., of London, has been making a short visit to the United States.

MR. H. L. SHIPPEY, New York manager of John A. Roebling's Sons Company, of Trenton, N. J., has been dangerously sick with appendicitis, but is now convalescent, having recovered without the necessity for an operation.

COL. GILES S. ALLISON has returned to New York hale and hearty after a long and serious illness. On Aug. 22 he underwent a difficult operation at the medical college of Johns Hopkins University, Baltimore. Subsequently he was confined at his St. Louis home by pneumonia. His many railway friends will no doubt be glad to learn of his return.

MR. EDWARD H. CHAPIN, of Rochester, has just been appointed Eastern sales agent of the National Car Wheel Company, and will establish headquarters about Dec. 1 at 556 West Thirty-Fourth Street. Mr. Chapin, who has long been known in the railway trade through his connection with the Rochester Car Wheel Works, has recently recovered from an attack of appendicitis.

MR. CLARK YERRICK, assistant superintendent of the San Francisco, Oakland & San Jose Railroad, of San Francisco, Cal., known as the Key route, was instantly killed on the evening of Nov. 21, near his home in Oakland, by coming in contact with an old telephone wire, which had broken and fallen across a 2000-volt lighting main. Mr. Yerrick was an old steam railroad man, but had been in the employ of the Oakland Transit Company in various capacities since 1894. When the new electric ferry line between Oakland and San Francisco was opened up by interests identical with the Oakland Transit, he was made assistant superintendent of the system, and in that capacity had charge of the movements of the electric trains and ferryboats from the new pier. Mr. Yerrick was a very competent official, was possessed of an even temper and was extremely well liked by employees and associates. His death removes the second official of the new Key route within a few days, the first being Mr. George Spink, master mechanic, whose accidental death was noted in last week's issue.

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 boards of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. \* Including taxes. † Deficit. a Including all lines operated.

COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Available for Dividends	COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Available for Dividends	
AKRON, O. Northern Ohio Tr. & Light Co.	1 m., Oct. '03	75,272	41,314	33,958	22,477	11,511	HOUSTON, TEX. Houston Electric Co.	1 m., Sept. '03	38,599	23,389	15,210	6,306	8,904	
	1 " " '02	65,027	36,333	29,294	16,769	12,525		1 " " '02	32,282	17,804	14,478	6,250	8,228	
	10 " " '03	741,574	403,264	338,340	222,112	116,198		12 " " '03	421,018	261,368	159,050	79,107	80,543	
	10 " " '02	617,526	340,471	277,055	170,067	106,988		12 " " '02	339,728	196,112	143,616	-----	-----	
ALBANY, N. Y. United Traction Co.	3 m., Sept. '03	449,906	279,727	169,579	76,147	93,432	ITHACA, N. Y. Ithaca Street Ry. Co.	3 m., Sept. '03	29,067	17,270	11,797	4,920	6,877	
	3 " " '02	414,635	251,738	162,897	71,597	91,300		3 " " '02	30,396	18,588	11,808	5,736	6,072	
AURORA, ILL. Elgin, Aurora & Southern Traction Co.	1 m., Oct. '03	37,011	22,869	14,142	9,173	4,970	JACKSONVILLE, FLA. Jacksonville Electric Co.	1 m., Sept. '03	21,813	14,149	7,664	3,100	4,564	
	1 " " '02	33,648	20,494	13,154	9,050	4,104		1 " " '02	16,575	10,947	5,628	2,875	2,753	
	10 " " '03	283,181	219,446	163,735	85,010	78,725		12 " " '03	237,034	158,530	78,494	35,363	43,131	
	10 " " '02	341,888	196,233	145,655	84,765	60,890		12 " " '02	-----	-----	-----	-----	-----	
BINGHAMTON, N. Y. Binghamton Ry. Co.	1 m., Oct. '05	18,613	10,586	8,028	-----	-----	LONDON, ONT. London St. Ry. Co.	1 m., Oct. '03	13,772	8,656	5,116	2,289	2,827	
	1 " " '02	17,107	10,693	6,414	-----	-----		1 " " '02	11,645	7,408	4,237	1,911	2,926	
	4 " " '03	92,120	44,584	47,537	-----	-----		5 " " '03	146,289	92,412	53,877	22,161	31,716	
	4 " " '02	82,360	44,675	37,685	-----	-----		5 " " '02	127,307	78,220	49,086	22,195	26,891	
BROOKLYN, N. Y. Coney Island & Brooklyn R. R. Co.	3 m., Sept. '03	516,757	293,705	223,052	67,628	155,424	LONG ISLAND CITY, N. Y. New York & North Shore Ry. Co.	3 m., Sept. '03	48,611	24,555	24,056	9,186	14,870	
	3 " " '02	525,955	284,109	243,846	68,842	175,004		3 " " '02	42,237	22,621	19,616	9,130	10,486	
CHICAGO, ILL. Aurora, Elgin & Chicago Ry. Co.	1 m., Oct. '03	38,878	20,079	18,799	-----	-----	MILWAUKEE, WIS. Milwaukee El. Ry. & Lt. Co.	1 m., Oct. '03	264,513	137,890	126,623	73,949	52,674	
	1 " " '02	191,314	82,159	109,155	-----	-----		1 " " '02	239,853	114,902	124,951	67,811	57,137	
	10 " " '03	48,307	10,746	32,561	-----	-----		10 " " '03	2,509,950	1,266,371	1,243,579	723,504	520,074	
	10 " " '02	237,943	77,682	160,261	-----	-----		10 " " '02	2,254,794	1,061,410	1,193,383	664,625	528,758	
Chicago & Milwaukee Elec. Ry. Co.	1 m., Oct. '03	15,731	6,548	9,183	-----	-----	MINNEAPOLIS, MINN. Twin City R. T. Co.	1 m., Oct. '03	348,646	161,451	187,195	60,944	126,251	
	1 " " '02	237,943	77,682	160,261	-----	-----		1 " " '02	304,317	140,326	164,091	60,233	103,857	
	10 " " '03	163,139	66,395	96,743	-----	-----		10 " " '03	3,369,489	1,560,338	1,809,151	609,074	1,200,076	
	10 " " '02	-----	-----	-----	-----	-----		10 " " '02	2,971,411	1,331,546	1,639,865	590,967	1,048,899	
CINCINNATI, O. Cincinnati, Newport & Covington Light & Traction Co.	1 m., Sept. '03	110,719	*60,716	50,003	22,664	27,339	MONTREAL, QUE. Montreal St. Ry. Co.	1 m., Oct. '03	206,601	110,709	95,892	18,922	76,970	
	1 " " '02	99,147	*49,698	49,444	20,562	28,587		1 " " '02	181,406	96,419	84,987	15,992	68,995	
	9 " " '03	905,686	*521,206	384,484	203,123	181,357		OAKLAND, CAL. Oakland Transit Consolidated Co.	1 m., Oct. '03	93,624	49,868	49,756	24,311	25,445
	9 " " '02	806,583	*451,492	355,091	189,636	165,455			1 " " '02	81,955	45,344	36,611	21,865	14,745
10 " " '03	-----	-----	-----	-----	-----	10 " " '03	937,635		478,919	458,716	-----	-----		
10 " " '02	-----	-----	-----	-----	-----	10 " " '02	777,672		460,155	317,517	-----	-----		
CLEVELAND, O. Cleveland & Southwestern Traction Co.	1 m., Oct. '03	43,656	24,875	18,782	-----	-----	PHILADELPHIA, PA. American Railways	1 m., Oct. '03	116,953	-----	-----	-----	-----	
	1 " " '02	28,243	16,342	11,900	-----	-----		1 " " '02	96,266	-----	-----	-----	-----	
	10 " " '03	373,889	213,614	154,275	-----	-----		4 " " '03	539,186	-----	-----	-----	-----	
	10 " " '02	248,211	137,462	110,748	-----	-----		4 " " '02	449,459	-----	-----	-----	-----	
Cleveland, Painesville & Eastern R. R. Co.	1 m., Oct. '03	18,333	11,696	6,637	6,568	68	RICHMOND, VA. Virginia Passenger & Power Co.	1 m., Oct. '03	124,355	79,132	45,203	-----	-----	
	1 " " '02	16,980	10,422	6,558	6,180	378		ROCHESTER, N. Y. Rochester Railway Co.	1 m., Oct. '03	107,887	56,510	51,378	25,933	25,445
	10 " " '03	183,219	105,704	77,515	64,871	12,644			1 " " '02	92,211	47,104	45,107	24,836	20,271
	10 " " '02	168,875	94,818	74,057	61,955	12,102			4 " " '03	416,208	224,186	222,022	-----	-----
10 " " '02	-----	-----	-----	-----	-----	4 " " '02	387,123		195,271	191,852	-----	-----		
DETROIT, MICH. Detroit United Ry. Co.	1 m., Oct. '03	387,340	234,239	153,101	85,119	67,982	SAO PAULO, BRAZIL. Sao Paulo Tramway, Light & Power Co., Ltd.	1 m., Oct. '03	109,200	32,270	77,000	-----	-----	
	1 " " '02	345,589	199,222	146,367	81,078	65,289		1 " " '02	92,721	35,692	57,029	-----	-----	
	10 " " '03	3,720,953	2,181,717	1,539,246	828,882	710,394		10 " " '03	1,071,500	327,301	744,200	-----	-----	
	10 " " '02	3,331,709	1,867,239	1,464,470	784,297	680,173		10 " " '02	914,741	350,629	564,112	-----	-----	
DULUTH, MINN. Duluth Superior Traction Co.	1 m., Oct. '03	53,632	29,010	24,622	15,838	8,784	SAVANNAH, GA. Savannah Electric Co.	1 m., Sept. '03	45,606	26,505	19,101	10,583	8,517	
	1 " " '02	48,587	28,204	20,333	14,590	5,743		1 " " '02	42,883	22,803	20,080	9,583	10,497	
	10 " " '03	518,893	280,011	232,842	154,923	77,919		3 " " '03	146,674	80,558	66,116	30,219	35,886	
	10 " " '02	442,845	233,248	209,597	146,409	63,188		3 " " '02	135,630	71,435	64,194	28,749	35,444	
FORT WORTH, TEX. Northern Texas Traction Co.	1 m., Oct. '03	47,569	27,459	20,110	9,723	10,387	SCHENECTADY, N. Y. Schenectady Ry. Co.	3 m., Sept. '03	231,648	122,084	109,564	43,436	66,128	
	1 " " '02	34,127	15,856	22,271	474	21,797		3 " " '02	140,476	76,300	64,176	32,844	31,332	
	10 " " '03	382,866	2,05,627	177,239	93,212	85,027		SEATTLE, WASH. Seattle Electric Co.	1 m., Sept. '03	175,678	122,200	53,479	22,917	30,562
	10 " " '02	177,239	-----	-----	-----	-----			1 " " '02	163,685	107,888	55,797	21,878	33,919
10 " " '03	-----	-----	-----	-----	-----	12 " " '03	2,067,418		1,470,964	596,454	287,976	308,479		
10 " " '02	-----	-----	-----	-----	-----	12 " " '02	1,772,330		1,215,916	556,414	255,708	300,706		
GLENS FALLS, N. Y. Hudson Valley Ry. Co.	3 m., Sept. '03	181,389	103,823	77,566	64,123	13,442	SYRACUSE, N. Y. Syracuse Rapid Transit Co.	1 m., Oct. '03	70,015	39,685	30,330	20,323	10,006	
	3 " " '02	121,125	83,183	37,942	55,272	417,330		1 " " '02	59,545	32,644	26,941	19,025	7,916	
	1 m., Oct. '03	46,677	24,246	22,421	15,931	6,490		4 " " '03	282,608	157,145	125,463	81,306	44,258	
	1 " " '02	41,747	22,648	19,099	16,512	2,587		4 " " '02	243,900	133,868	110,032	71,100	33,932	
HAMILTON, O. The Cincinnati, Dayton & Toledo Traction Co.	5 " " '03	251,328	123,832	127,496	80,221	47,274	TERRE HAUTE, IND. Terre Haute Elec. Co.	1 m., Sept. '03	46,713	25,309	21,404	8,523	12,881	
	5 " " '02	226,249	113,854	112,305	81,753	30,642		1 " " '02	32,717	19,944	12,773	6,451	6,322	
	1 m., Sept. '03	16,479	9,376	7,103	3,852	3,251		3 " " '03	135,012	77,384	57,629	19,726	35,902	
	1 " " '02	13,581	8,827	4,754	2,604	2,150		3 " " '02	94,975	63,012	31,903	21,342	12,622	
HANCOCK, MICH. The Houghton County St. Ry. Co.	12 " " '03	185,001	12,144	63,857	35,097	26,760	TOLEDO, O. Toledo Rys. & Lt. Co.	1 m., Oct. '03	142,651	74,805	67,846	41,245	12,881	
	12 " " '02	170,302	105,247	65,055	31,632	33,423		1 " " '02	124,487	60,483	64,004	38,832	25,172	
	1 m., Oct. '03	41,896	38,975	2,921	-----	-----		10 " " '03	1,368,580	705,979	662,601	408,096	254,505	
	1 " " '02	37,447	22,355	15,092	-----	-----		10 " " '02	1,193,546	607,072	586,474	381,541	204,983	
HARRISBURG, PA. Central Pennsylvania Traction Co.	10 " " '03	433,039	313,108	119,931	-----	-----	TOLEDO, BOWLING GREEN & SOUTHERN TRAC. CO.	1 m., Oct. '03	26,240	16,955	9,285	-----	-----	
	10 " " '02	381,956	228,285	153,701	-----	-----		1 " " '02	21,195	11,642	9,563	-----	-----	
	1 m., Oct. '03	12,277	5,356	6,921	-----	-----		10 " " '03	243,633	150,104	93,529	-----	-----	
	1 " " '02	6,419	3,316	3,103	-----	-----		10 " " '02	-----	-----	-----	-----	-----	
HAZLETON, PA. Lehigh Traction Co.	10 " " '03	117,799	64,369	53,430	-----	-----	Toledo, Bowling Green & Southern Trac. Co.	1 m., Oct. '03	26,240	16,955	9,285	-----	-----	
	10 " " '02	81,137	49,894	31,243	-----	-----		1 " " '02	21,195	11,642	9,563	-----	-----	
	10 " " '03	-----	-----	-----	-----	-----		10 " " '03	-----	-----	-----	-----	-----	
	10 " " '02	-----	-----	-----	-----	-----		10 " " '02	-----	-----	-----	-----	-----	