

INDEX

Street Railway Journal

Vol. XXVII.

NEW YORK, SATURDAY, MARCH 3, 1906.

No. 9.

PUBLISHED EVERY SATURDAY BY THE
McGraw Publishing Company

MAIN OFFICE:

NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

BRANCH OFFICES:

Chicago: Monadnock Block.
Philadelphia: Real Estate Trust Building.
Cleveland: Cuyahoga Building.
London: Hastings House, Norfolk Street, Strand.

Cable Address, "Stryjourn, New York"; "Stryjourn, London"—Lieber's Code used.

Copyright, 1906, McGraw Publishing Co.

TERMS OF SUBSCRIPTION

In the United States, Hawaii, Puerto Rico, Philippines, Cuba, Canada, Mexico and the Canal Zone.
Street Railway Journal (52 issues).....\$3.00 per annum
Single copies 10 cents
Combination Rate, with Electric Railway Directory and Buyer's Manual (3 issues—February, August & November) \$4.00 per annum
Both of the above, in connection with American Street Railway Investments (The "Red Book"—Published annually in May; regular price, \$5.00 per copy).....\$6.50 per annum

To All Countries Other Than Those Mentioned Above:

Street Railway Journal (52 issues), postage prepaid..... \$6.00
25 shillings. 25 marks. 31 francs.
Single copies20 cents
Remittances for foreign subscriptions may be made through our European office.

NOTICE TO SUBSCRIBERS

REMITTANCES.—Remittances should be made by check, New York draft, or money order, in favor of the STREET RAILWAY JOURNAL.
CHANGE OF ADDRESS.—The old address should be given, as well as the new, and notice should be received a week in advance of the desired change.
BACK COPIES.—No copies are kept on sale beyond fifteen months from date of issue, except in bound volumes.
DATE ON WRAPPER shows the month at the end of which the subscription expires.

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8300 copies are printed. Total circulation for 1906 to date, 74,300 copies, an average of 8256 copies per week.

The Design of Motorman's Cabs on Interurban Cars

There has been considerable discussion at several recent meetings of interurban railway associations and in the columns of the STREET RAILWAY JOURNAL, on the proper design of interurban cars. In this consideration of the arrangement of the car body the design of the motorman's cab has been almost

completely neglected. The cab of an interurban car, however, deserves considerable attention. Interurban railway men are beginning to appreciate to a greater and greater extent the value of the floor space in a car, and, as they do so, the practice of devoting the entire front platform to the motorman is being discontinued.

On many interurban cars of recent design, a portion only of the platform is given up to the motorman. The remainder is used for baggage or for passengers.

A design of car used in some cities, as well as on certain interurban lines, seems to be a happy solution of the question. The car is intended for operation in both directions. Strictly speaking, there are no platforms as the body of the car is continued to the bumper. The motorman's cab occupies the left-hand side of the front of the car, and is separated from the rest of the car by sliding doors. Another door, from the motorman's compartment, opens outside. The rear of the car is fitted, of course, in the same way, except that the doors from the cab to the body of the car are kept open and the cab serves as an entrance into the car. A single-end car now being constructed for a large interurban system, has a similarly located cab in the front end, without the sliding doors. The motorman may enter the cab from the outside through a door of the usual type, or he may enter from the baggage compartment through a half-door, which opens to a height of only about 4 ft. from the floor.

In both of these designs, the motorman is under plain observation from the passenger compartment through the glass partitions. Some object to having the motorman in plain view of the passengers, but such a plan has its advantages. The motorman knows the eyes of the passengers are upon him, and he is therefore more likely to attend strictly to his work. Where the interior of the cab is obscured from the main compartment, there is often a tendency for the motorman to be less attentive to business than otherwise.

The size of the cab is a question deserving considerable attention. With the multiple-unit control systems, it can be made very small as is the practice on elevated roads. This has the advantage that visitors are necessarily excluded, but on long interurban runs a cramped cab is rather trying on the motorman. While there is no need of giving him the entire front of the car, yet the cab should be made sufficiently roomy to relieve its occupant of the idea that he is fastened in stocks.

A type of interurban car used on many roads has no cab proper. The motorman occupies the front of the baggage and smoking compartment. An iron-pipe railing protects him from intrusion. Sometimes this railing reaches to the roof of the car, and is made strong enough so that baggage can be piled up against it. Such an arrangement has the

disadvantage that the general conversation is likely to distract the motorman's attention.

The fact that there are so many designs of cabs in use, is an indication that thought is being given to the subject of cabs in general; and no doubt in a few years there will be a general tendency to settle on one style that in practice will be found best fitted to the requirements.

Ignorance in the Winding Room

The armature is the most mysterious part of an electric-car equipment. In fact, it is about the only piece of apparatus about the shop that overawes most shop men of average intelligence. They consider it completely beyond their ability to gain a very definite idea of armature design. To be sure, the workmen understand enough about it to know how to put the coils in. This requires only a knowledge of the throw of the coils and of the throw of the leads to the right and to the left of a slot or segment taken as the starting point. But after they have completed the winding, very few have little more than a vague, hazy idea of the connections each coil makes or the path of the current through the armature when the machine is in operation. Ask the average armature winder what connections result when the top or bottom leads are laid one segment on either side of the proper position, and he is completely in the dark. Other similar questions will confuse him to a similar extent. We believe that many other winders would be completely at sea, were they given a stripped armature to wind. When stripping an armature, preparatory to rewinding it, they usually take great care to mark the position in the slots of one coil and also to mark the commutator segments to which the terminals of the coil are connected. This is their sole guide. Evidently, such had been the method of winding armatures followed in a shop where the writer encountered a General Electric 800 armature wound with a lap winding. The winder had been at the head of the department for several years, and for about a year previous to the time the armature came in for some minor repairs. In testing the armature, it was discovered that the winding lapped back on itself or, in other words, was connected for a two-pole machine. The car in which this armature belonged was noted for its speed, and had an ammeter been placed in circuit the equipment would certainly have acquired a reputation as a current consumer. Evidently, several years before, some one had made a mistake and wound the machine wrong. Ever afterwards, when it came in for repairs, the new coils were put back exactly as the old ones had lain and the armature continued to take about twice the normal current.

It must be admitted, that ignorance in the winding room costs many companies a great deal of money, and it must also be admitted that it is rather difficult to remove such ignorance. There is very little literature on street railway armature windings. In fact, there is not much to write about them. The only way for a winder to get a better knowledge of armatures is to use his imagination and a pencil. He should draw diagrams of windings with coils and leads in the proper positions, and then transpose one or two of the leads and note what connections result. He should accompany the study of the diagrams by making the same changes of connections on an armature, and then testing the armature with a lamp bank or other device.

By constant work he will finally get the connections so fixed in his mind that when he encounters an armature wound wrong he will know what is the matter with it at once. It will require patience and a great deal of time and a great deal of coaxing of the imagination, but such efforts will certainly result in a great deal of good to the workman and a great saving in winding-room expenses to the company.

Electric Railway Development in the South

It is probably true that the average Northerner does not realize what a truly remarkable country the much-heard-of "New South" really is. The uniformly good crops of the past few years, the influx of new capital and well-directed energy on the part of its own citizens, have given a new impetus to all Southern industries and activities, and this section of the country is crossing the threshold of what gives promise of being an unparalleled era of prosperity and growth. As a matter of fact, the South has grown faster than her own resources. This is true with special emphasis as regards electric railways, and the street railway managements in all of the important cities are being hard put to keep their systems up with the growth of the population and business in the communities they serve. Fortunately, virtually without exception, the roads are in strong hands, and the demands for improvements and betterments are being intelligently and consistently met.

A recent editorial visit to a few of the important Southern cities revealed an immense amount of new work in progress in the form of reconstruction and extensions of tracks, additions to power facilities and rolling stock, and the construction of new car houses and shops. Most of the development thus far has been in the strictly city properties, although the modern type of high-speed suburban road is beginning to make its appearance, as for example near Atlanta, where there is in successful service a 40-mile interurban line operated with single-phase motors.

In reviewing the electric railway developments in the South with reference to the improvements and betterments that are being carried out, a considerable number of the properties can be classified into two groups. One group, known as the Newman properties, comprises the street railway systems in Birmingham, Ala.; Little Rock, Ark.; Memphis, Tenn.; Nashville, Tenn., and Knoxville, Tenn. The other group is those properties controlled by Stone & Webster, of Boston, and includes the roads in El Paso, Dallas, Houston and Galveston, Tex.; Jacksonville, Fla.; Savannah, Ga., and Tampa, Fla. For the most part the systems in the other important cities are largely owned by local interests, but the same progressive spirit is being shown in putting them in first-class condition to meet the uniformly healthy growth of their respective communities. Atlanta, the gateway of the South from the East, has an up-to-date transportation system that within the past two or three years has been brought to a high state of efficiency by the judicious expenditure of large sums of money in extensions and betterments. New Orleans has entirely recovered from the slight set-back incident to the yellow fever scare, and has now entered upon an area of growth and prosperity that bids fair to equal, if not eclipse, any city of her class in the North or West. To an outsider visiting the city for a few days, it would seem as though New Orleans was enjoying

a regulation Western boom, but the citizens of the city are quick to assure the visitor that the present commercial and industrial activities are not evidence of boom conditions, but are assurances that New Orleans, as the metropolis of the South, is but reflecting the general prosperity of the country. The street railway system of the city has had its full share of vicissitudes, but is now in the hands of a management that is keenly alive to the opportunities, and by the judicious expenditure of several millions of dollars on improvements the property is rapidly being put into condition to give the city ample transportation facilities. Justification for faith in the enterprise is already being reflected in largely increased earnings. The work which the company is doing in enlarging its power-generating supply under difficult circumstances is a particularly noteworthy engineering achievement.

No review of the street railways of the South would be complete without special mention of the little city of Galveston. Owing to the gigantic undertaking now being carried out by the city and county of Galveston, in raising the grade of a considerable area of the city from 2 ft. to 10 ft. above the old level forever to protect the city against the inroads of the sea, the street railway company has been forced to operate during the past two years under the most adverse conditions. Many of its tracks have been operated on temporary trestle-work, and in a number of cases the company has been compelled to abandon portions of its lines for months at a time in order to accommodate the grade-raising operations. Despite these obstacles, the company is showing a steady and healthy increase in gross earnings, and under normal conditions will make a record of which the management may well be proud.

It may be said without disparagement, that up to within a half-dozen years the Southern cities, as a class, were somewhat backward in taking advantage of progress in the transportation art, and, as a result, most of the new work that is now going on is being carried out with properties that are more or less antiquated as the basis. This has often introduced complications, for much of the old is still serviceable, and conservative finance does not justify its entire abandonment. Therefore, the betterment work in practically all of the cities has been in the direction of redesign, rearrangement and reconstruction, together with the addition of extensions and enlarged capacities to meet new conditions.

In track work, the tendency is, of course, toward heavier rails, although the extremely heavy sections, say of 100 lbs. and over, now so frequently recommended for cities of similar size in the North and West, are not yet used extensively in the South—undoubtedly, because the engineers do not feel that the density of the traffic warrants the extremes in weight. In the matter of ballast, aside from a few localities like Birmingham, where furnace slag is available, good track-ballast is scarce. Oyster and clam shells are widely used, and make satisfactory ballast if given a good foundation. Some of the cities, such as Atlanta, Birmingham and New Orleans, are to some extent going in for concrete construction on lines of heavy traffic. In the extreme Southern cities, where the soil is always more or less impregnated with moisture, the question of track foundation is a most serious one. The surviving tendency is toward an 80-lb. T or a 9-in. girder rail, with plenty of ties laid on 6 ins. to 12 ins. of shell

or gravel ballast. If less than 10 ins. of ballast is put under the ties, it is the common practice to support the ballast on a tight, compactly-laid flooring of 1 in. or 1½-in. planking in the bottom of the trench, the idea being that this planking distributes the load evenly over the sub-foundation and prevents concentration and consequent sagging at any one point. Gravel and broken stone for ballast are very scarce and very expensive.

As regards new power-station equipment, most of the systems are taking advantage of the latest developments in generating apparatus, and many of them are putting in steam turbine driven alternating units. It is the rule rather than the exception, in the Southern cities, for the street railway and electric lighting plant to be operated under the same management, and this condition has opened up a larger field for the turbine-driven alternator. As previously stated, the systems as a rule are urban propositions and few of them would require alternating-current transmission for the street railways alone, but in conjunction with the lighting the two combined are able to secure the advantages of high-tension generation, and distribution. Texas oil is now available for fuel throughout a very large section of the South, and practically all of the power stations are fitted to burn oil under the boilers. Many of them are so arranged that either oil or coal can be burned in the same furnace, so that advantage can be taken of the relative prevailing prices of both oil and coal. Taking into consideration the prices at which oil is usually available and the steam-producing qualities of both fuels, the economy in burning oil as a substitute for coal does not come so much in direct saving per pound of combustible per pound of steam as it does in the material reduction in power-house labor and in the general convenience and cleanliness resulting from the use of oil.

Cars of the semi-convertible types are rapidly supplanting all other designs, and under the conditions prevailing in most of the cities south of Mason and Dixon's line, this type may be said to find its ideal application. For three months of the year, a complete equipment of closed cars is almost necessary, while for the remaining nine months, open cars are imperative. The semi-convertible solves the difficulty by combining the two. The short, single-truck car is still most frequently seen on the city streets, but the large double-truck car is rapidly coming into favor for heavy-traffic lines. However, the four-motor car is not yet in general favor with the Southern managers, primarily because the country, as a rule, is flat and conditions do not require speeds much in excess of 12 to 14 miles an hour. On the comparatively few long suburban lines, modern four-motor equipments have, of course, been adopted.

The crying need of all the roads visited is car house and shop room, and the designing and erection of new car housing and repair facilities is the one subject that is probably uppermost in the minds of most of the managements. The old plants, without exception, have been outgrown, and the lack in this regard is being rapidly met by the erection of new buildings. In this work, the fullest advantage is being taken of modern ideas in house and shop design and equipment, special regard being paid to reducing fire risks. Concrete car houses are being built in at least two instances. Detailed accounts of the more important improvements in progress in the South will appear in due course in this paper.

THE GRAND AVENUE STATION OF THE CONSOLIDATED RAILWAY COMPANY AT NEW HAVEN, CONN.

Like the majority of power stations serving the smaller street railway systems at the present time, the Grand Avenue power house of the Consolidated Railway Company, New



FIG. 1.—THE GRAND AVENUE STATION OF THE CONSOLIDATED RAILWAY AT NEW HAVEN, CONN., TAKEN BEFORE INSTALLATION OF COAL-HANDLING APPARATUS

Haven, Conn., was planned and built in the early days of the industry with little reference to the changes that might be wrought by the future, either in the way of extensions of old lines or consolidations with adjoining railways. From time

operation. This station was built by Sheaff & Jaastad, of Boston.

LOCATION

The station faces Grand Avenue, with the Mill River on the west and the Manufacturers' Railroad on the east, thus affording excellent facilities for securing salt water for con-

densing purposes and for getting coal either by water or by rail. The building is constructed of brick, 199 ft. long and 78 ft. 8 ins. wide (inside measurements). Each of the two stacks is 140 ft. high, but one them has an internal diameter of 6 ft. 6 ins., and the other 9 ft. At the bottom of the rear stack a room has been built for storing paints and other dangerous materials. The boiler room, which is on one floor, is 187 ft. long, 29 ft. 8 ins. wide and 39 ft. high. The engine room is 199 ft. long, 49 ft. wide and 29 ft. high. The basement is 10 ft. in height. The shorter length of the boiler room allows room for the chief engineer's office in the front part of the power house.

BOILER-ROOM EQUIPMENT

The boiler room contains nineteen hand-stoked, vertical, fire-tube, Manning boilers, ten of which are 125-hp and nine of 200-hp each. The working steam pressure is 120 lbs. per square inch. Each of the 125-hp boilers has 188 $2\frac{1}{2}$ -in. tubes, and the 200-hp boilers 284 tubes of the same diameter. The heating service of each of the small boilers is 1950 sq. ft., and the grate area 28 sq. ft., while the corresponding figures for the large boilers are respectively 2918 sq. ft. and 38 sq. ft. The total heating surface of all the boilers is therefore 45,782

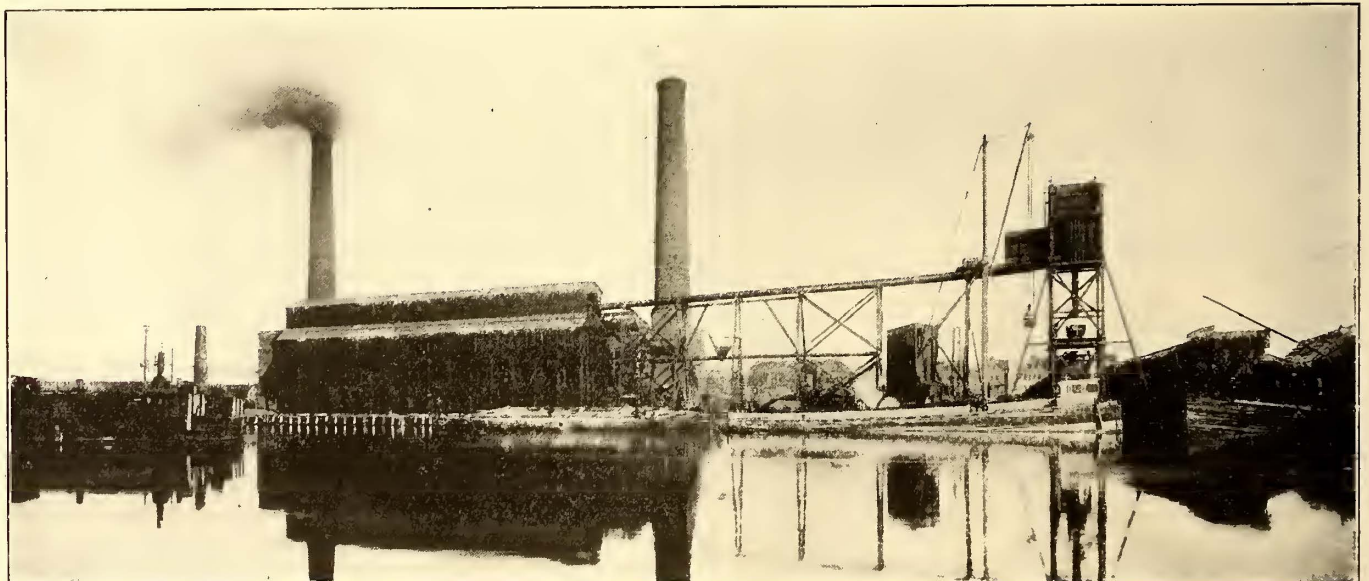


FIG. 2.—REAR VIEW OF THE GRAND AVENUE POWER STATION, SHOWING THE MAST AND GAFF HOISTING OUTFIT AND AUTOMATIC RAILWAY FOR HANDLING THE COAL SUPPLY

to time it has been found necessary to add new machinery and make unusual demands on the older apparatus, so that now this station represents something very different from the original layout and operating condition. Nevertheless, despite its twelve years' service and mixed equipment, this plant is producing power at such low rates as to make well worth while a detail study of the character of its equipment and

sq. ft., and the grate area 631 sq. ft. The grates are stationary, with $\frac{3}{8}$ -in. openings. The feed-water supply is taken from the New Haven city system through one 4-in. and two 6-in. metered mains. The boiler feed-pumps, all of which are operated by steam, comprise two single double-acting Knowles pumps, 10 ins. x 10 ins. x 4 ins.; one Dean duplex pump, 12 ins. x 7 ins. x 10 ins.; and one Carpenter duplex pump, 12 ins.

x 6 ins. x 10 ins. In addition, there is one 2-in. Metropolitan injector. There are eight primary coil heaters and one auxiliary coil heater. The steam main is 12 ins. in diameter. All of the valves in the plant are of the Chapman extra heavy pattern, No. 43.

ENGINES AND GENERATORS

The oldest units in the station are three 275-kw, 8-pole, 500-volt Westinghouse generators running normally at 92 r. p. m. These machines have been in service for twelve years, or since the opening of the station. When some of the lines were extended it was found that with 500 volts at the bus-bar the drop in transmission was so great as to interfere seriously with the schedule. By speeding up the generators, however, it was found that they could be made to give 550 volts, and they are still frequently worked at this higher voltage with very satisfactory results. Like all the later electrical apparatus in this station, these first machines are able to carry 25 per cent overloads for long periods without injury. They are direct connected to three horizontal cross-compound Allis engines, 16 ins. x 30 ins. x 36 ins., rated 350-hp each, and require a floor space of 380 sq. ft. per unit. The two cranks of each of these engines are placed at an angle of 90 degs. Corliss valves are used. The ratio of the cylinders is $3\frac{1}{2} : 1$; the diameter of the piston rod, $2\frac{5}{8}$ ins.; length of the connecting rods, 9 ft.; length of the shaft, 15 ft. 10 ins.; diameter of the shaft, 16 ins.; bearings, 13 ins. x 19 ins. The fly-wheel is 16 ft. in diameter, and has governors of the centrifugal ball type. The steam pipes are 4 ins., and the exhaust pipes 12 ins. in diameter. Each engine has an independent Allis-Chalmers jet condenser, 8 ins. x 10 ins. x 17 ins.

The two 525-kw General Electric generators were installed about six years ago. They are normally 550-volt machines, but frequently give 600 volts. They have 10 poles, and when

diameter of the high-pressure piston rods, $3\frac{7}{8}$ ins.; low-pressure piston rods, $4\frac{5}{8}$ ins.; length of the connecting rods, 11

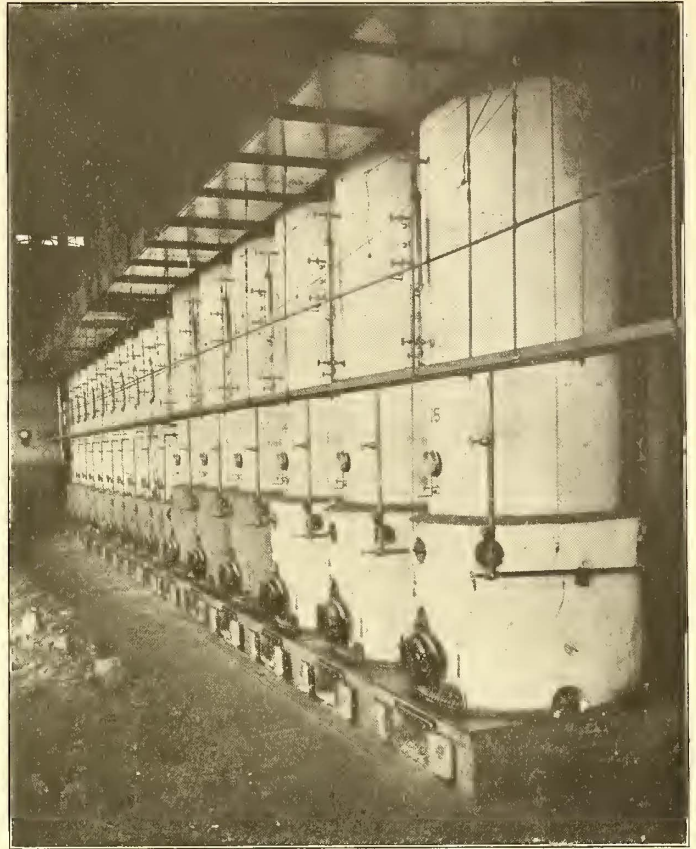


FIG. 3.—THE BOILER ROOM



FIG. 4.—THE 900-KW GENERATING SET RECENTLY INSTALLED IN THE GRAND AVENUE POWER STATION, NEW HAVEN, CONN.

giving 550 volts have a speed of 80 r. p. m. These generators are direct connected to two vertical cross-compound Allis engines, 23 ins. x 48 ins. x 48 ins., rated at 750-hp each, and occupying a floor area of 307 sq. ft. per engine. Each has two cranks set at an angle of 90 degs. As on the 350-hp engines, Corliss valves are used. The ratio of the cylinders is $4\frac{1}{4} : 1$;

ft.; length of the shafts, 19 ft.; diameter of the shafts, 20 ins.; bearings, 18 ins. x 36 ins. The fly-wheels are 18 ft. in diameter, and the governors are of the centrifugal ball type. The steam pipes are 7 ins., and the exhaust pipes 16 ins. in diameter. Each engine has an independent jet condenser, 12 ins. x 12 ins. x 26 ins.

The two 800-kw, 550-volt General Electric generators have been in service for about five years and are also operated, when necessary, at 600 volts. They have 14 poles, and when giving 550 volts have a speed of 80 r. p. m. Direct connected to these machines are two vertical cross-compound Allis engines, 26 ins. x 52 ins. x 48 ins., rated at 1000-hp each, and requiring a floor area of 307 sq. ft. per engine. Each engine has two cranks placed at an angle of 90 degs., and is furnished with Corliss valves. The ratio of the cylinders is 4 : 1; the diameter of the high-pressure piston rods, $3\frac{7}{8}$ ins.; low-pressure piston rods, $4\frac{5}{8}$ ins.; length of the connecting rods, 11 ft.; length of the shaft, 19 ft., and diameter of the shaft, 20 ins.; bearings, 18 ins. x 36 ins. The fly-

wheels are 18 ft. in diameter. The governors are of the centrifugal ball type. The diameter of the steam pipes is 8 ins., and of the exhaust pipe, 18 ins. Each engine is connected to an independent Allis jet condenser, 14 ins. x 14 ins. x 28 ins. No difficulty is experienced in procuring a vacuum of 24 ins. to 26 ins. with these condensers, even under overloads.

The latest and largest unit is a 900-kw standard Crocker-Wheeler railway generator, which was placed in service during May of last year, and it is therefore supplied with the patented brush holder, which is one of the characteristics of the direct-current machines built by the Crocker-Wheeler Company. There are only nine volts per bar on the generator, and consequently the machine is remarkably free from flashing over. The operating efficiencies are given as follows:

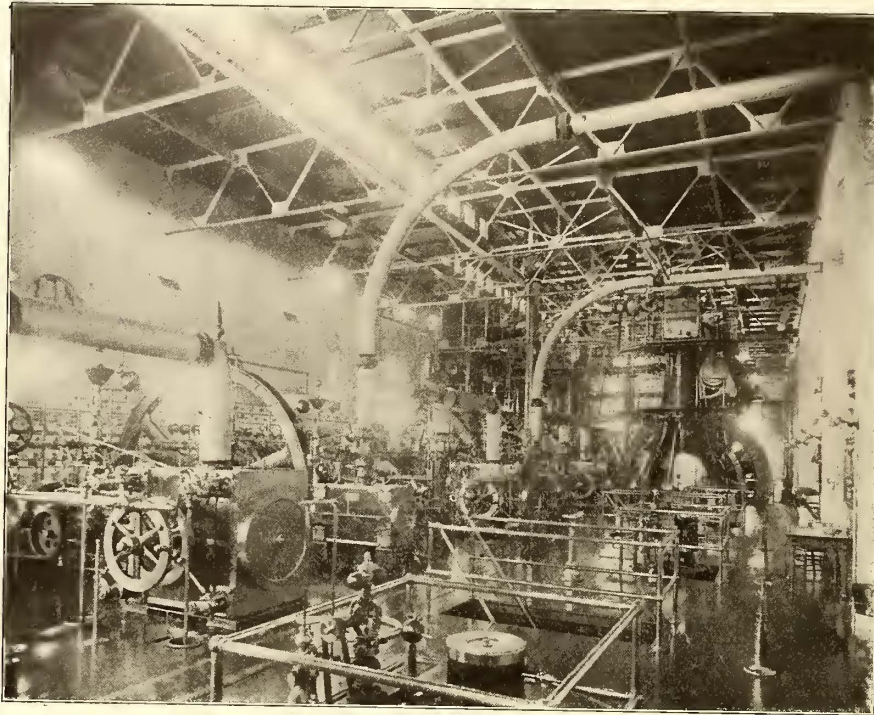


FIG. 5.—VIEW OF NORTHERN END OF ENGINE ROOM AS SEEN FROM THE ENTRANCE ON GRAND AVENUE

FORM C RY 47.
THE CONSOLIDATED RAILWAY COMPANY

POWER HOUSE—Station A.

Watch..... to..... 190

	STARTED.	STOPPED.	RUN.
Engine No. 1.			
Engine No. 2.			
Engine No. 3.			
Engine No. 4.			
Engine No. 5.			
Engine No. 6.			
Engine No. 7.			
Engine No. 8.			

Water Meter, No. 1. Cubic Feet
 " " No. 2. " "
 " " No. 3. " "

Coal Used, Tons, Pounds.
 Coal Ordered, Tons.

Watt Meter, No. 1.
 Watt Meter, No. 2.
 Watt Meter, No. 3.

REMARKS:

Engineer in Charge.

FIG. 7.—FORM OF REPORT MADE OUT BY ENGINEER IN CHARGE ON ENGINE TIME AND WATER, COAL AND CURRENT CONSUMPTION

POWER STATION LOG SHEET

Consolidated R. R. CO.
 DAY ENDING MIDNIGHT Jan 9, 1906.
Grand Ave. POWER STATION A

BOILER			ENGINE			GENERATOR			WATER TURBINE			K. W. HOURS BY STATION RECORDING WATTMETERS																					
Number	In Service Hours	Banked Fire Hours	Number	Started	Stopped	Engine Hours	Number	Cut in	Cut out	K. W. Hours	Number	Started	Stopped	Hours Run	Number	Reading Midnight Yesterday	Reading Midnight To-day	Difference	Constant	K. W. HOURS													
																			Power	Light													
1	24		1				1				1				1	19,423,600	19,463,720	40,120	1	40,120													
2	24		2				2				2				2	198,100	198,100		1														
3	24		3				3				3				3	2,184,950	2,196,560	11,610	1	11,610													
4	24		4	5:45 AM	12:30 AM	12:35	4	5:45 AM	8:30 AM	12:30 AM	4				4																		
5	24		5	6: AM	7:40 PM	13:40	5	6 AM	7:40 PM	12: PM	5				5																		
6	24		6	5:20 AM	3: AM	21:40	6	5:20 AM	3: AM		6																						
7	24		7	3: AM	1:15 AM	22:15	7	3: AM	1:15 AM		7																						
8	17 1/2		8	6:35 AM	12:40 AM	19:5	8	5:35 AM	12:40 AM		8																						
9	24		9				9				9																						
10	19 1/2		10				10				10																						
11	24		11				11				11																						
12	24		12				12				12																						
13	24		13				13				13																						
14	24		14				14				14																						
15	24																																
16	24																																
17	24																																
18	24																																
19	24																																
20	24																																
21																																	
22																																	
TOTAL																																	
FUEL CONSUMED														WATER METER READINGS					REMARKS:														
														OIL AND WASTE		Kerosene		GAL.		Cubic Feet													
														ENGINE		13		12,683,410		12,698,540		15,130											
														CYLINDER		9.5		4,002,329		4,002,527		1.92											
														CRANK CASE				448,535		454,835		6,300											
														DYNAMO																			
														KEROSENE								21,430 1.92											
														GREASE																			
														WASTE, WHITE																			
														" COLORED																			
														RAGS																			
														SPARKS																			
														WOOD																			
														COROS																			

FIG. 6.—FAC-SIMILE OF POWER STATION DAILY LOG SHEET

Full load, 93.5 per cent; three-quarter load, 93 per cent; one-half load, 92 per cent. The generator is a 16-pole machine, giving 600 volts at 102 r. p. m. It is direct connected to one horizontal cross-compound Buckeye engine, 26 1/2 ins.

x 50 ins. x 40 ins., rated at about 1400 hp. The floor space occupied by this engine is 957 sq. ft. The two engine cranks are placed at an angle of 90 degs.; piston valves are used; ratio of the cylinders, 3 1/2 : 1; diameter of the high-pressure

made out on the requisition blank represented by Fig. 10. As will be noted, the foreman must state for what purpose the material is to be used, this information enabling the keeper of the log book to charge the item under the proper account. Fig. 11 shows the card used in the card index system for keeping track of material received and used.

The accompanying tables have been prepared from the detail figures in Mr. Farnham's log book. It will be seen therefrom that the costs for power are very low considering the size and equipment of the plant, and the fact that they are

tion takes salt water for condensing purposes from a bay through a 10-in. iron pipe, which is about 3700 ft. long. Despite strainers and screens and other precautions at the intake end the suction draws up a large amount of oyster and barnacle spawn and spats, and these in the course of the journey to the condenser attach themselves to the inside of the pipe and build their shells, forming a hard, crustaceous lining that unless watched might gradually reduce the carrying capacity of the pipe.

As a precautionary measure, it is the practice to period-

TABLE I.—GENERAL DATA COVERING THE OPERATION OF THE GRAND AVENUE POWER STATION OF THE CONSOLIDATED RAILWAY COMPANY FOR THE LAST SIX MONTHS OF 1905

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total kw. output.....	930,000	1,046,300	1,050,400	1,114,400	1,282,000	1,395,300
Average kw. per day.....	30,000	33,752	35,013	35,948	42,760	45,010
Total hp.....	1,246,649	1,402,546	1,408,043	1,467,024	1,718,406	1,870,375
Average hp. per day.....	40,214	45,234	46,935	44,098	57,283	60,335
Lbs. water used.....	28,510,625	29,413,750	29,083,750	30,931,875	35,352,500	36,353,125
Lbs. coal used.....	2,800,000	3,004,480	2,840,320	2,878,400	3,375,680	3,609,054
Lbs. water per lb. coal.....	10.1	9.8	10.2	10.7	10.47	10.07
Lbs. water per hp.....	22.8	20.9	20.6	21.08	20.5	19.4
Lbs. coal per hp.....	2.2	2.1	2.01	1.9	1.9	1.9
Cost per kw. for operation.....	.0074	.0074	.0060	.0064	.0061	.0058
Cost per hp. for operation.....	.0055	.0055	.0049	.0049	.0045	.0043
Lbs. water per kw.....	30.67	28.1	27.6	27.75	27.5	26.
Lbs. coal per kw.....	3.01	2.8	2.7	2.58	2.6	2.58

based on the use of bituminous coal costing \$3.75 per ton. Under a new arrangement, coal will no longer be carted to the station, but will be delivered in boats at the pier adjacent to the power house, carried to the bunkers via an automatic railway, and then transported over the industrial railway running in front of the boilers. The saving in carting expenses will amount to 40 cents per ton, and, of course, will reduce still further the cost of power. The new coal-hoisting machinery was installed by Westinghouse, Church, Kerr & Company, of New York. In the second table are given the exact cost per kw-hour of wages, fuel, water, lubricants and waste, maintenance, repairs, etc. The total costs of these items are entered in the log book and charged to the account numbers

TABLE II.—COST, IN DOLLARS, PER KW-HOUR OF VARIOUS ITEMS DURING THE LAST SIX MONTHS OF 1905

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Wages charged to account 10.....	.00178	.00163	.00157	.00154	.00131	.00135
Fuel for power, account 11.....	.00504	.00485	.00464	.00432	.00431	.00386
Water for power, account 12.....	.00036	.00027	.00026	.00028	.00024	.00024
Lubricants and waste, account 13..	.00025	.00033	.00021	.00018	.00014	.00022
Miscellaneous supplies and expenses, account 14.....	.00010	.00048	.00014	.00011	.00010	.00009
Maintenance of steam plant, account 4 .....	.00001	.00011	.00000	.00003	.00003	.00003
Total cost per kw-hour.....	.0075	.0076	.0068	.0065	.0061	.0058

specified in the 1899 edition of the standard form of accounting report adopted by the Street Railway Accountants' Association of America.

Taken all in all, this station presents an excellent example of the good results that can be achieved even in an old plant by keeping such close track of every item entering into its operation that the slightest variations in cost and efficiency will be made apparent immediately, and thus tend toward the early elimination of all needless expenses.

TESTING OUT CONDENSER WATER-PIPES

The following describes a simple and effective test used by H. S. Cooper, general manager of the Galveston Electric Company, of Galveston, Tex., for making sure that the intake pipe that supplies water to the condensers is not becoming filled up with incrustations or sediment sufficiently to materially limit the flow of water. The Galveston sta-

tionally determine the inside diameter of the pipe by inserting at the intake end copper balls of different sizes, and allowing them to be drawn through the pipe by the force of the water. The copper balls used in the test have very thin shells, so they will crush if they become lodged and will not injure the pipe. It is usual to start the test with a 2-in. ball, then follow with a 2½-in. ball and so on, utilizing balls of larger diameters. As the balls come up at the condenser end of the pipe they are carefully examined for traces of scratching. When the marks on the balls of the larger sizes begin to give evidence of having scraped against the incrustations, the diameter of the largest ball passed through is taken as the minimum size of the opening through the pipe. In this way the actual condition of the pipe can be noted from time to time.

If no other balls are obtainable for the test, copper balls borrowed from steam and water traps in the power house may be utilized, and they can be replaced on the traps as their passage through the condenser pipe does not injure them. It is the practice to turn live steam from the boiler back through the intake pipe before beginning the ball test.

The station is equipped with Worthington jet condenser. The pumping plant for pumping condensing water is located on a wharf near the intake end of the pipe, as it is found easier to force the water through so long a pipe rather than to draw it through by suction. The pumping outfit consists of a Westinghouse type C induction motor, driving through gears a 10-in. x 12-in. 3-piston Blake pump. At the power house the intake pipe ends in a closed tank provided with screens on the inside, which serve to prevent any loose shells from being carried over into the condenser.

As a means of killing the live crustation-forming spats that are drawn into the pipe, the experiment is being tried of feeding creosote in minute drops into the condensing water at a point just inside the intake end. This is accomplished by means of an ordinary injector lubricator, set to feed the creosote drop by drop into the pipe. The creosote is having the effect of killing the spats before they form their shells.

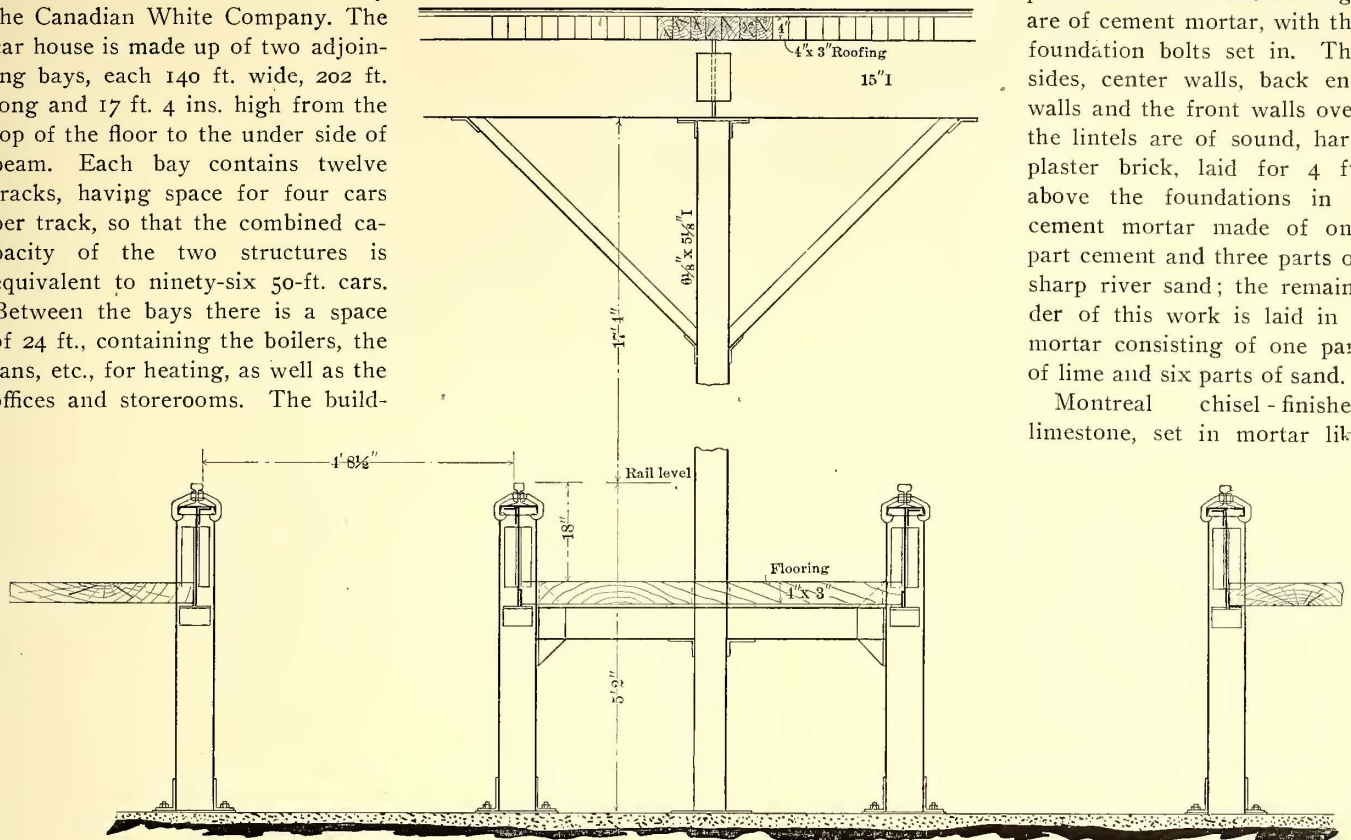
In spite of the nature of the condensing water, the operation of the plant has never been interrupted from trouble in the condensing system, and the station log shows a mean vacuum of approximately 28½ ins. gaged at the engines.

THE NEW CAR HOUSE OF THE MONTREAL STREET RAILWAY COMPANY

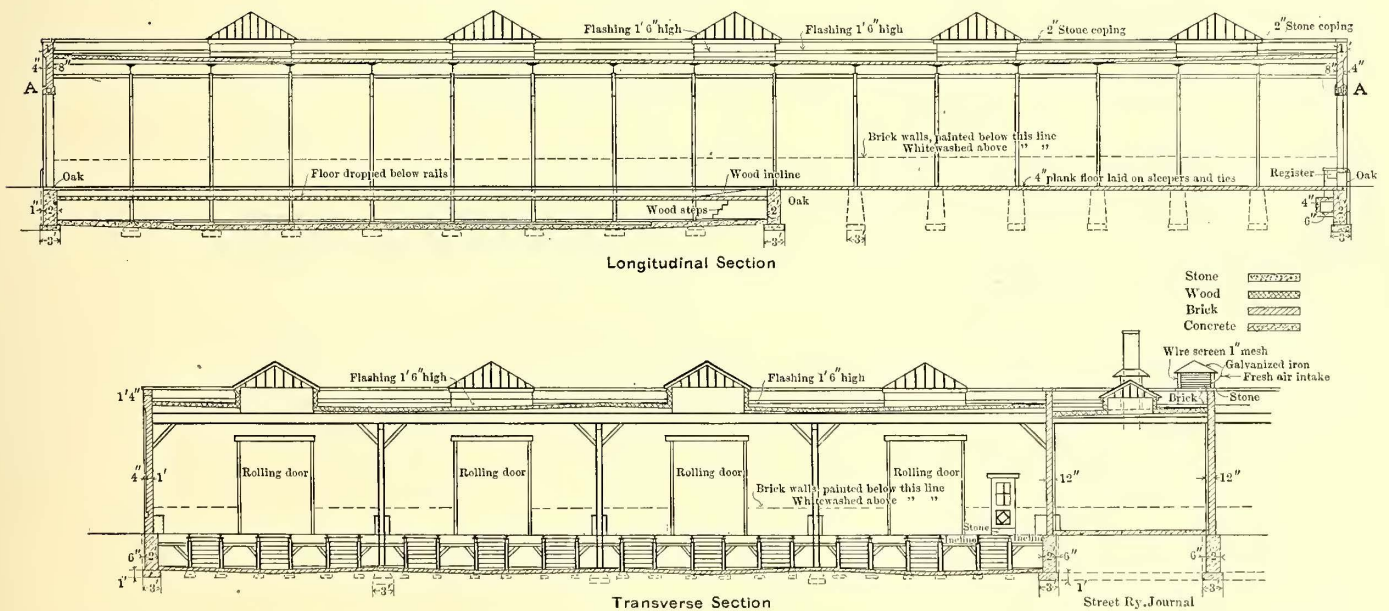
The Montreal Street Railway Company has recently placed in service a new car house on De Fleurimont Street, near St. Dennis Street, Montreal, erected by the Canadian White Company. The car house is made up of two adjoining bays, each 140 ft. wide, 202 ft. long and 17 ft. 4 ins. high from the top of the floor to the under side of beam. Each bay contains twelve tracks, having space for four cars per track, so that the combined capacity of the two structures is equivalent to ninety-six 50-ft. cars. Between the bays there is a space of 24 ft., containing the boilers, the fans, etc., for heating, as well as the offices and storerooms. The build-

land cement, three parts of sharp river sand and five parts of clean broken stone, the whole showing a minimum tensile strength of 125 lbs. per square inch. The piers for the posts and track iron work in the pits, as well as the bottom floor of the buildings, are made of concrete cement of the same proportions. All of the footings are of cement mortar, with the foundation bolts set in. The sides, center walls, back end walls and the front walls over the lintels are of sound, hard plaster brick, laid for 4 ft. above the foundations in a cement mortar made of one part cement and three parts of sharp river sand; the remainder of this work is laid in a mortar consisting of one part of lime and six parts of sand.

Montreal chisel-finished limestone, set in mortar like



ARRANGEMENT OF PIT FRAMING AND ROOFING IN MONTREAL SHOPS



LONGITUDINAL AND TRANSVERSE SECTIONS OF THE DE FLEURIMONT STREET CAR BARN OF THE MONTREAL STREET RAILWAY COMPANY

ings were designed to combine the advantages of a practically fireproof construction, a quick clearing of the car houses in case of fire, and the possibility of easily inspecting cars and making light repairs to them.

The foundations, which are on rock, extend to the rail level. They consist of a machine-made mixture of one part of Port-

land cement, three parts of sharp river sand and five parts of clean broken stone, the whole showing a minimum tensile strength of 125 lbs. per square inch. The walls of the structure are of plastic hard-burned brick, while the facing in the front elevation is of No. 3 red pressed brick, the bricks being laid so that every seventh course is made up of headers. The copings are laid with a pitch to the

roof. All posts, including the roof supports, rafters and pit supports, are of steel. The floors and platforms between the tracks are of 4-in. x 3-in. pine, laid 4 ins. thick and lowered 18 ins. below the top of the rail for the front half of each building. This construction permits the cars to be inspected more easily, and allows repairs to be made to springs, side rods, etc., without requiring a pit. One of the most interesting features in connection with the pit work is in the method adopted to prevent the rails from spreading. As tie-rods would, of course, have been impracticable, it was determined to prevent spreading by clamping the rails, as illustrated. It will be seen that every rail is secured on either side of the web by a clamp, which is turned in under the supporting channel beam, the opposite clamps being bolted together.

The floors in the pits slope slightly to the center of each third track to a shallow longitudinal drain leading to a central drain slightly nearer the back end of the shop, thence into a cross drain leading into a catch basin, from which it passes into the main city drain on St. Denis Street.

The roof, which is calculated for a load of 75 lbs. per square foot, is supported on steel beams. It consists of 3-in. x 4-in.

tilation. All outside and inside woodwork was painted with three coats of lead and oil, while for the interior brick work two coats of bronze green were applied to a height of 4 ft., the remaining distance to the roof being whitewashed. The car doors and fire doors are of the Kinnear rolling shutter type, operated by hand. For the door sills, 4½-in. x 12-in. oak beams are used. These are secured to the top of the concrete with countersunk bolts.

The heating and ventilating system used in these car houses was supplied by the B. F. Sturtevant Company, of Hyde Park, Mass. It is capable of changing the air in the bays four times an hour and heating the building to 70 degs. F. in zero weather. The main hot-air ducts leading from the fans are of concrete, and those under the floors of galvanized iron.

HOME-MADE HYDRAULIC PIT JACK AT KANSAS CITY

G. J. Smith, master mechanic of the Kansas City Railway & Light Company, has built some hydraulic pit jacks for lifting motors and armatures, which are illustrated herewith. Fig. 1 shows the jack alone, while Fig. 2 shows the jack in

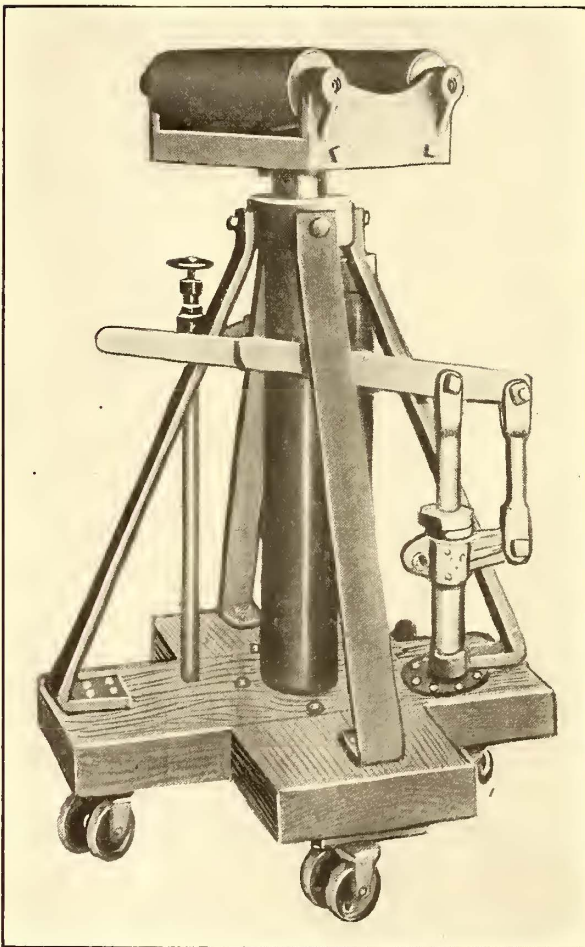


FIG. 1.—HYDRAULIC LIFT USED IN KANSAS CITY

spruce, laid and spiked together on edge, which makes a solid roof 4 ins. thick, covered with 1-in. spruce boards, grooved and tongued, and laid pitching to gutters down the line of posts in the center, the whole being properly drained by pipes leading to the drain in the building. The inside of the roof is covered with fireproof paint. The roof covering consists of a five-ply 8-oz. composition of tar and gravel roofing.

The walls, skylights, fresh-air inlet and all other places where required are flashed with galvanized iron. The skylights are made of galvanized iron reinforced with iron rods set in a wooden curb and glazed with obscure glass of double thickness. These skylights serve both for lighting and ven-

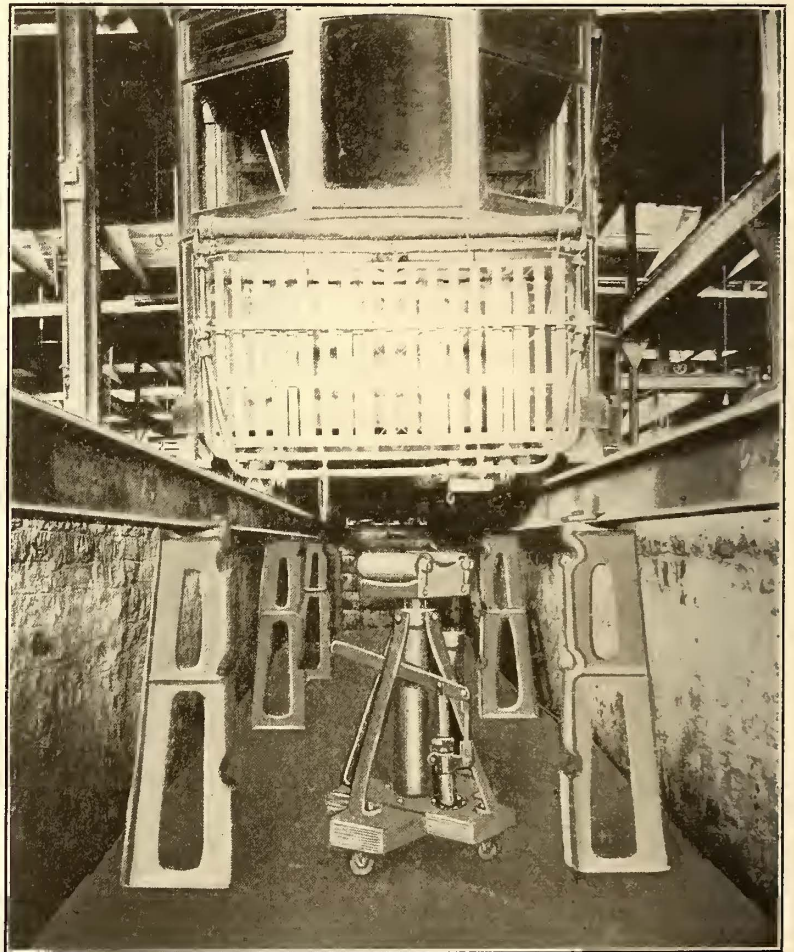


FIG. 2.—PITS AND HYDRAULIC LIFT AT KANSAS CITY

the pit and also the type of pit construction employed. The jack has a piston 3 ins. in diameter, with a pump piston or ram 1¼ ins. in diameter. The lift piston is packed with a cup leather, and the pump piston with the ordinary piston packing. In Fig. 1, the pump is seen at the right, and the valve, to stop the piston in any position, is seen at the left.

The pits used in Kansas City, as seen by Fig. 2, are very wide, so as to leave a space outside of each track rail, as described in a previous issue of the JOURNAL. The tracks are supported on cast-iron pillars.

The hydraulic jack is found superior to mechanical jacks, because very small movements can be obtained with it.

SOME FEATURES OF THE TICKET SYSTEM OF THE INDIANA UNION TRACTION COMPANY

In devising a ticket system for the Indiana Union Traction Company there were several conditions to be met and considered not often encountered on other interurban roads. The different divisions of this system intersect at several junction points. To travel from some portions of the system to others, it is necessary to change cars four times when passing through such junctions. As it was highly desirable to have the conductor on each car collect either a ticket or coupon from each passenger, a through ticket from one extreme point on the system to another must necessarily have several coupons attached to it. Were coupon tickets employed having the destination and junction points and selling station printed in the proper places, so many varieties of tickets would be required that several inconveniences would result. There are, in fact, about fifty stations on the system, and when the number of different forms is considered that would be necessary in order to supply each station with printed tickets to every other station, a system having tickets printed in full is at once seen to be out of the question.

Again, if the selling agent is compelled to fill out the body of the ticket, the agent's stub and each coupon, the work not only requires considerable time, but mistakes are likely to be of frequent occurrence. The time required to fill out such a skeleton ticket is, however, the greatest

drawback to its use on electric railways, and especially is this the case on the Indiana Union Traction Company's system. From Anderson, for instance, every two hours trains leave over three divisions at the same time. Were a ticket used which required several blank places to be filled in, extra help would have to be supplied the agent at this point just before these three trains left. The same conditions are found at other junction stations.

The inter-division ticket in use was gotten up by S. R. Dunbar, passenger agent of the system. It avoids to a very great extent the objections referred to, yet retains all of the essential features of a skeleton form of coupon ticket.

One of the most complicated forms of the inter-division ticket is reproduced. It is a round-trip ticket over four divisions. It consists of the ticket proper, the agent's stub, four "going-trip" coupons and three "return-trip" coupons. The limited amount of filing in that is required of the selling agent is at once observed. This ticket is shown filled in for a round trip from Muncie to Kokomo. The selling agent, after filling in the blanks, removes the agent's stub. The conductor on the Indianapolis-Muncie division removes the first "going-trip" stub. The body of the ticket makes evident to the conductor the destination and route of the passenger. At Anderson the passenger changes to a car on the Indianapolis-Muncie division, and the conductor removes the next going-trip stub. The remaining going-trip stubs are removed by the conductors on the Alexandria-Tipton and the Indianapolis-Logansport divisions. On the return trip the remaining stubs are taken up by the conductors, and finally the

conductor on the Indianapolis - Muncie division takes the ticket proper. It will at once be seen that each conductor has something to show that he has carried the passenger over his division.

After the stubs and ticket are turned in, the similar numbers on all of them permit of a comparison, and the junction points "A," "B," "C" may be identified for each of the stubs. While at first glance this round-trip form of ticket is somewhat confusing, by following the reading matter on each stub it may be seen that the

SINGLE TRIP INTER-DIVISION TICKET, OVER FOUR DIVISIONS.

7-23-05-1001-2M

INDIANA UNION TRACTION CO. AGENT'S STUB, INTER-DIVISION S. T. TICKET. From <u>Muncie</u> To <u>Kokomo</u> Via <u>Anderson</u> , <u>Alexandria</u> and <u>Tipton</u> Issued <u>Dec 12 1905</u> Amt. \$ <u>1.05</u> Form S. D. 4 <u>2201</u>	GOOD FOR ONE TRIP From Selling Station Stamped on Back to JUNCTION POINT A Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form S. D. 4	GOOD FOR ONE TRIP From JUNCTION POINT A To JUNCTION POINT B Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form S. D. 4	GOOD FOR ONE TRIP From JUNCTION POINT B To JUNCTION POINT C Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form S. D. 4
INDIANA UNION TRACTION CO. THIS TICKET WITH COUPONS ATTACHED, GOOD FOR ONE TRIP From <u>Muncie</u> To <u>Kokomo</u> Via <u>Anderson</u> , <u>Alexandria</u> and <u>Tipton</u> Issued <u>Dec 12 1905</u> Amt. \$ <u>1.05</u> Form S. D. 4 <u>2201</u>	GOOD FOR ONE TRIP From JUNCTION POINT A To JUNCTION POINT B Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form S. D. 4	GOOD FOR ONE TRIP From JUNCTION POINT B To JUNCTION POINT C Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form S. D. 4	GOOD FOR ONE TRIP From JUNCTION POINT C To JUNCTION POINT A Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form S. D. 4

S. R. Dunbar
General Manager.

ROUND TRIP INTER-DIVISION TICKET, OVER FOUR DIVISIONS

7-23-05-1M-2M

INDIANA UNION TRACTION CO. AGENT'S STUB, INTER-DIVISION R. T. TICKET. From <u>Muncie</u> To <u>Kokomo</u> Via <u>Anderson</u> , <u>Alexandria</u> and <u>Tipton</u> Issued <u>Dec 18 1905</u> Amt. \$ <u>1.20</u> Form R. D. 4 <u>1801</u>	GOOD FOR ONE TRIP From Selling Station Stamped on Back to JUNCTION POINT C Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form R. D. 4	GOOD FOR ONE TRIP From JUNCTION POINT C To JUNCTION POINT B Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form R. D. 4	GOOD FOR ONE TRIP From JUNCTION POINT B To JUNCTION POINT A Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form R. D. 4
INDIANA UNION TRACTION CO. THIS TICKET WITH RETURN TRIP COUPONS ATTACHED, GOOD FOR ONE TRIP From <u>Muncie</u> To <u>Kokomo</u> Via <u>Anderson</u> , <u>Alexandria</u> and <u>Tipton</u> Issued <u>Dec 18 1905</u> Amt. \$ <u>1.20</u> Form R. D. 4 <u>1801</u>	GOOD FOR ONE TRIP From JUNCTION POINT A To JUNCTION POINT B Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form R. D. 4	GOOD FOR ONE TRIP From JUNCTION POINT B To JUNCTION POINT C Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form R. D. 4	GOOD FOR ONE TRIP From JUNCTION POINT C To JUNCTION POINT A Shown on accompanying Ticket and subject to conditions specified thereon. VOID IF DETACHED Form R. D. 4

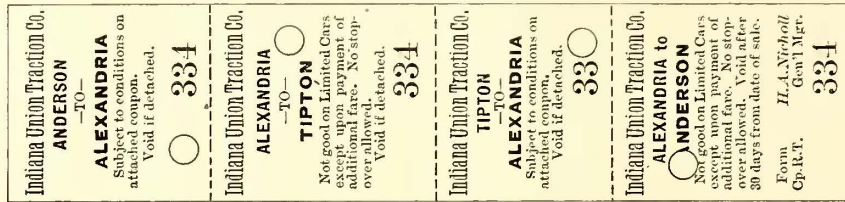
S. R. Dunbar
General Manager.

whole is very simple. With the idea of making the reading of the ticket easier, the printing is carried lengthwise of the ticket rather than across it as is the usual custom. This also permitted of a shorter ticket, as each coupon can be made narrower.

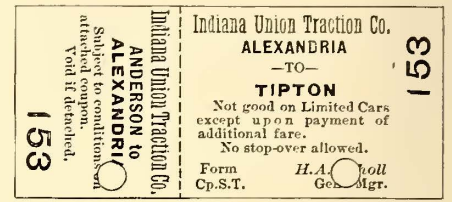
Eight different forms of these inter-division tickets are used, the separate forms bearing distinguishing letters and

in filling in the regular form of inter-division tickets. Round-trip as well as one-way tickets of this form are employed.

The use of interline tickets was responsible for the development of the train check, of which a reproduction is shown. The check is now used on the interurban lines of the Indiana Union Traction Company, and permits of an interline ticket having but one coupon for travel on this system. The "notice



ROUND TRIP CARD FORM OF INTER-DIVISION TICKET, CIRCLES INDICATE PUNCH MARKS



SINGLE TRIP CARD FORM OF INTER-DIVISION TICKET

numbers by which they are identified. On the ticket reproduced, these are R. D. 4. The letter R. signifies a round-trip ticket, while D. 4 indicates that it is good over four divisions. Other forms of round-trip tickets have two, three and five going-trip coupons attached, being good over two, three or five divisions of the road.

Single-trip inter-division tickets, known as forms S. D. 2,

to passenger" printed on the check explains its purpose. Assume that a passenger has purchased an interline ticket to Kokomo from one of the interurban lines leading into Muncie. When he boards the Indianapolis-Muncie division of the Indiana Union Traction Company at Muncie, the conductor collects the interline ticket and gives the passenger a train check punched, as shown in the reproduction. The conductor, however, retains the audit stub, which is evidence that he has carried a passenger from Muncie to Anderson, the junction point Anderson being punched. When the passenger transfers to the Anderson-Marion division of the road at Anderson, he gives up the train check first issued and receives a similar one punched from Muncie to Kokomo, but with the junction point Alexandria punched. On the next division he receives one with the junction point Tipton indicated. The conductor on the final division collects the train check issued on the next preceding division.

By this means each conductor retains evidence of having carried a passenger between two indicated points of his division. The space for the consecutive number is filled in by the conductor with the next number above that shown on the check he is collecting.

In addition to its use in connection with interline tickets, the train check is employed to return a passenger if he should get on the wrong train. It is also used when an agent has failed to provide a sufficient number of coupons on an inter-division ticket.

25	17	9	1	26	18	10	2	27	19	11	3	28	20	12	4	29	21	13	5	30	22	14	6	31	23	15	7		24	16	8
FROM	TO	Consecutive Number										TO	FROM																		
Muncie	Yorktown											Muncie	Yorktown																		
Daleville	Anderson											Daleville	Anderson																		
Chesterfield	Indianapolis											Chesterfield	Indianapolis																		
Anderson	Alexandria											Anderson	Alexandria																		
Dickkeys	Tipton											Dickkeys	Tipton																		
Pendleton	Kokomo											Pendleton	Kokomo																		
Ingalls												Ingalls																			
Fortville												Fortville																			
McCordsville												McCordsville																			
Dakladon												Dakladon																			
Lawrence												Lawrence																			
Howland's												Howland's																			
Indianapolis												Indianapolis																			
Mound's Park												Mound's Park																			
Middletown												Middletown																			
Hunt's												Hunt's																			
Linwood												Linwood																			
Arms'rong's												Arms'rong's																			
Alexandria												Alexandria																			
Summitville												Summitville																			
Fairmount												Fairmount																			
Jonesboro												Jonesboro																			
Gas City Jc.												Gas City Jc.																			
Marion												Marion																			
Dres'les												Dres'les																			
Dun dee												Dun dee																			
Elwood												Elwood																			
Cedar Cor.												Cedar Cor.																			
Hobbs												Hobbs																			
Welsh's Cor.												Welsh's Cor.																			

31	23	15	7	30	22	14	6	29	21	13	5	28	20	12	4	27	19	11	3	26	18	10	2	25	17	9	1
TO	FROM	Consecutive Number										TO	FROM														
38th Street	Anderson											38th Street	Anderson														
Broad Ripple	Indianapolis											Broad Ripple	Indianapolis														
No ra	Alexandria											No ra	Alexandria														
Pleasant Grove	Tipton											Pleasant Grove	Tipton														
Carmel	Kokomo											Carmel	Kokomo														
Grays												Grays															
Nobleville												Nobleville															
Cicero												Cicero															
Arcadia												Arcadia															
Atlanta												Atlanta															
Tipton												Tipton															
Jack son												Jack son															
Sharpville												Sharpville															
Fairfield												Fairfield															
Kokomo												Kokomo															
Jewell												Jewell															
Galveston												Galveston															
Lincoln												Lincoln															
Walton												Walton															
Hill Top												Hill Top															
Logansport												Logansport															
Cassville												Cassville															
Bennett's												Bennett's															
Miami												Miami															
Bunke r Hill												Bunke r Hill															
Geeves Overway												Geeves Overway															
Peru												Peru															

TRAIN CHECK USED BY THE INDIANA UNION TRACTION CO.

S. D. 3, S. D. 4 and S. D. 5, are also used. They consist of the ticket proper, the agent's stub and a proper number of coupons, the reading upon which is similar in most respects to that on the "going-trip" coupons of the round-trip tickets.

When the travel between two towns on different divisions of the road is extensive, a card form of inter-division ticket is supplied, having the selling and destination points already printed in. Such tickets are used between Anderson and Tipton, via Alexandria, and in this and other instances they eliminate a great deal of work on the part of the selling agent

CHECKING DAMAGE BY LIGHTNING

H. H. Adams, superintendent of shops of the United Railway & Electric Company, of Baltimore, has an efficient method of determining the points on the system that are especially vulnerable to lightning. In his office he keeps a large scale map of the system, and whenever a car crew reports that a car has been damaged by lightning, he sticks a pin in the map at the point where the car was at the time. It is surprising how quickly a record of this kind will show up the locations that seem to be especially susceptible to lightning discharges. In the course of the season a few points will have a miniature forest of pins grouped around them, while long stretches of track will show no pins at all. When a particular location begins to accumulate a collection of these tell-tale pins, a lightning arrester can be installed at this point and the trouble at once eliminated or at least materially reduced. From graphic records kept in this way over a period of years, it has been determined that the most vulnerable points are at junctions of lines and at sharp bends and curves.

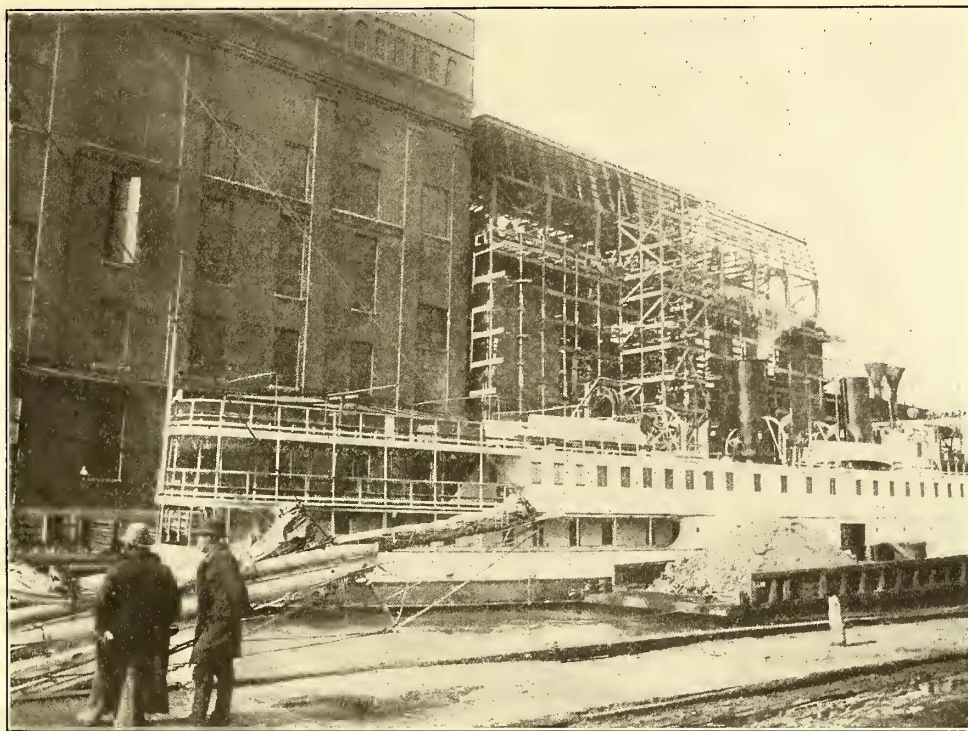
NOVEL METHOD OF SECURING STEAM FOR OVERLOADED POWER STATION AT BALTIMORE

Owing partly to the crippling of its main generating station on Pratt Street during the disastrous conflagration which swept the city of Baltimore two years ago, and partly to the healthy growth of its business, the United Railways & Electric Company, of Baltimore, was forced to face the approach of the present winter with the prospect of an insufficient steam generating capacity at its Pratt Street Station. The work of increasing the boiler capacity at this plant was well under way, but it was found that the additional boiler plant could not be made ready in time to help out on the heavy traffic expected at Christmas time.

While casting about for a solution to the dilemma, the company's engineers hit upon the scheme of augmenting the boiler capacity at this station with steam taken from the boilers of a steamboat. Accordingly, the company chartered the "Lord Baltimore," a large passenger steamer, engaged during the summer in the regular service between Baltimore and Philadelphia, but which was out of commission at the time and laid up for the winter. The steamer was brought alongside the dock adjacent to the power house, and by means of an ingenious arrangement, connections were made so that steam generated in the boilers on the steamboat could be utilized for operating the engines in the railway power station.

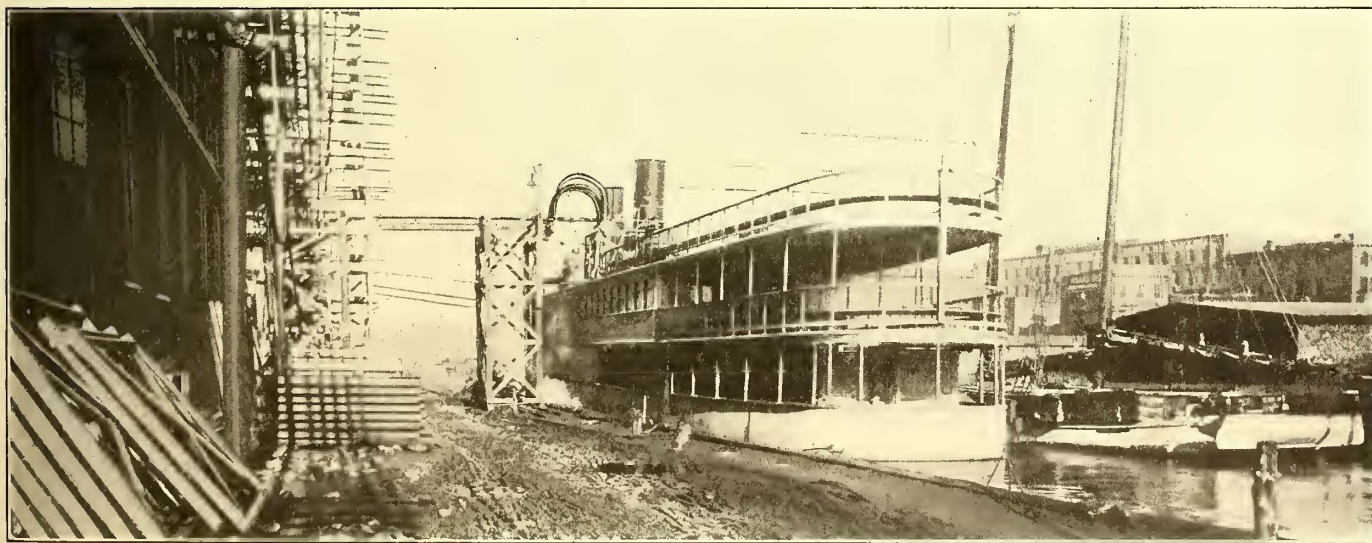
than to disconnect the boilers from the engines. The "Lord Baltimore" is one of the largest and fastest steamers on the Baltimore service, and her boilers were built to work at 200 lbs. pressure.

To utilize the steam from the boat, a 10-in. tap was taken off from the main 10-in. steam header in the boiler room of



STEAMBOAT "LORD BALTIMORE" SUPPLYING STEAM TO PRATT STREET POWER HOUSE OF UNITED RAILWAYS & ELECTRIC COMPANY, OF BALTIMORE

the power station, and this tap was extended to the water edge, where the steamer was moored. The end of the 10-in. tap is supported at the edge of the pier on trestle work, where it terminates in a 10-in. manifold. On the ship side, sup-

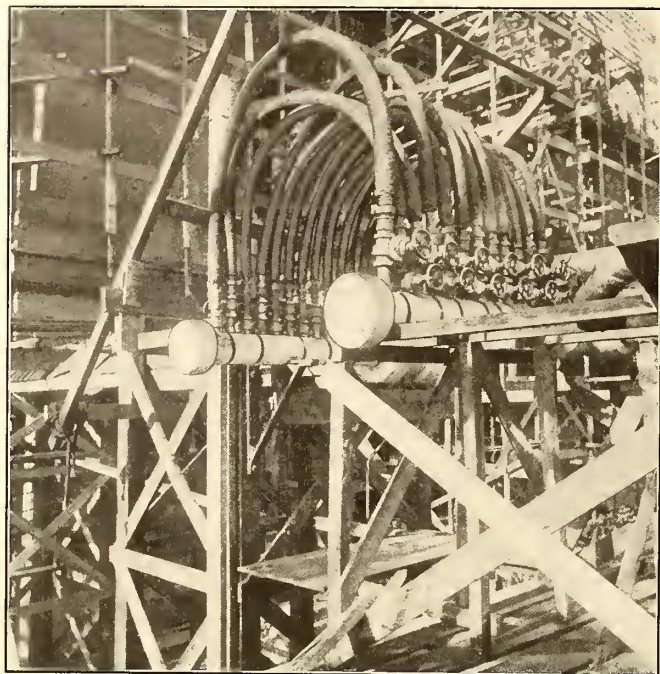


METHOD OF CONNECTING BOILERS OF STEAMBOAT TO BOILERS IN PRATT STREET POWER HOUSE

ported on the upper deck of the steamer, is a second manifold 8 ins. in diameter. These two steam manifolds are connected together by a series of flexible copper tubes to allow for the rise and fall of the steamer with the tides, the arrangement giving a maximum range of 7 ft. The 8-in. manifold on the ship is connected by a single 8-in. header to the main steam drums of the ship's boilers. In order to give proper control over the auxiliary steam supply from the boat, a 10-in. stop

ported on the upper deck of the steamer, is a second manifold 8 ins. in diameter. These two steam manifolds are connected together by a series of flexible copper tubes to allow for the rise and fall of the steamer with the tides, the arrangement giving a maximum range of 7 ft. The 8-in. manifold on the ship is connected by a single 8-in. header to the main steam drums of the ship's boilers. In order to give proper control over the auxiliary steam supply from the boat, a 10-in. stop

valve was placed in the long tap connection just inside the station boiler room, and to avoid any possibility of bleeding the station boilers in the event that the steam pressure in the ship's boilers should drop below 200 lbs., a non-return auto-



DETAILS OF FLEXIBLE COPPER TUBES CONNECTING STEAM BOAT WITH LAND PIPES TO ALLOW FOR RISE AND FALL OF TIDES

matic valve was placed in the tap connection near its outer end at the water edge.

The arrangement described in the foregoing was designed primarily to help out as an emergency measure during the Christmas travel, but it proved so satisfactory that it has been continued ever since, and is now utilized for several hours every day during the peak loads.

SURFACE TRAILER OPERATION IN BOSTON

For somewhat over a year the Boston Elevated Railway Company has been operating trailers as an experimental measure between Oak Square, Brighton, and Park Street subway station, via Coolidge's Corner, Brookline Village and Huntington Avenue. This radical departure from the company's usual method of operating single cars upon its surface routes was inaugurated with the idea of determining by actual experience the suitability of trailers in meeting variable conditions of traffic, the relative cost of operation, popularity with the public, ability to maintain schedule time and such additional points of interest as might from time to time develop in the application of two-car trains to the problem of surface transportation as presented in a single route lending itself more or less favorably to analysis. Although the operation of these trailers has not been carried far enough to establish broad conclusions as to their desirability for the company's surface work in general, a number of points worth discussing have been evaluated.

The equipment of each train consists of a motor car of 26½-ft. body and a trailer car of 25-ft. body, both of the standard closed vestibuled type of the Boston Elevated Railway Company, shown on page 349. The forward, or motor car, is equipped with four General Electric "70" motors, single trolley, double trucks and the new air-brake equipment, "schedule AMS" of the Westinghouse Air Brake Company.

The trailer car is also of the double-truck type, and it is equipped for air-brake operation through a single hose coupling connecting it with the motor car. Current for the lights and heaters is supplied to the trailer through a jumper cable from the motor car.

The air-brake equipment of these trains represents a notable advance over ordinary "straight-air" apparatus. Previous practice in the braking of motor-trailer trains in street railway service has almost entirely followed the plan of equipping the motor car only with braking apparatus. The new schedule "AMS" was described briefly in the STREET RAILWAY JOURNAL of Dec. 9, 1905, in connection with W. S. Bartholomew's recent New England Street Railway Club paper. It provides an equipment for both motor and trailer cars, and eliminates the necessity of having a straight-air brake, pure and simple, for the handling of the motor car singly, the added features being a straight-air release of the brakes from the brake cylinder of the head car and provision to enable applications to follow each other immediately without danger of depleting the auxiliary reservoir pressure. The triple valve of this equipment is of the plainest type, without a graduating value, but this triple is arranged with a quick recharge feature through a check valve of such capacity that the recharging of the auxiliary reservoir occurs in exact proportion to the release of the pressure from the brake cylinder and the recharge of the train pipe, so that one application can follow another as quickly as is desired. The graduations of the release are accomplished by piping the exhaust of the triple valve up to the brake valve, in the release position of which are in reality two positions—motor release and trailer release. The first movement of the brake handle in releasing permits the pressure to escape from the trailer car brake cylinder, while the pressure is held in the brake cylinder of the motor car, if so desired. The graduations are then made by the use of the straight-air release feature of the brake valve, out of the motor-car cylinder. The slack is taken care of by arranging a slightly higher braking effort on the motor car. The applications are made automatically and practically simultaneously on each car, and the results are that the trains are handled with great smoothness.

The bell signals between cars are given by electric buzzers located in the four vestibules. The forward car is manned by a motorman and conductor, the rear car having a conductor only. The conductor of the forward car is not allowed to give the starting signal to the motorman until he receives the signal from the rear car that all is ready for the car to proceed. The rear vestibule of the second car is equipped with an oil tail light, in harmony with the company's rule that all trailer cars on the system shall be so provided. In ordinary operation, the front vestibule door of the trailer car is kept closed, except at subway stations in the afternoon rush hours.

The distance from Oak Square, Brighton, to Park Street subway station, via Brookline Village, is 7.45 miles. These trains have also been operated over the route from Oak Square to Park Street, via Commonwealth Avenue, but only for a short period some months ago. In view of the fact that the Boston Elevated system is essentially of the radiating type, it is difficult to compare the performance of different classes of cars, since it is impossible to operate a single type of car over the entire length of a representative route. As the cars under special observation enter the congested district, they find themselves operating on the same tracks with numerous other cars which have been run upon the line from branch tracks, and it is extremely difficult to obtain any definite idea as to the relative popularity and effectiveness of any special type in such mixed service. For this reason the management of the Boston Elevated feels that further ex-

perience with the trailers is desirable, possibly on other routes, or with a car whose doors can be kept closed except during the time of stops.

Thus far the use of trailers on the Oak Square line appears to have no different effect upon the accident account than as though the cars were run separately. The improved braking equipment represents a certain factor of safety, and the operation of two cars as a single train unit at a longer time interval than would be the usual practice in making the same total mileage with two separate cars is also an element of increased safety upon the thoroughfares traversed. The Oak Square trains are run upon a 20-minute interval, and there seems to be no reason to anticipate any marked difference in the accident record than with single cars. If a type of car were used with doors closed while the car is in motion, it is probable that accidents to passengers would be very largely eliminated, in so far as they depended upon movements during exit and entrance.

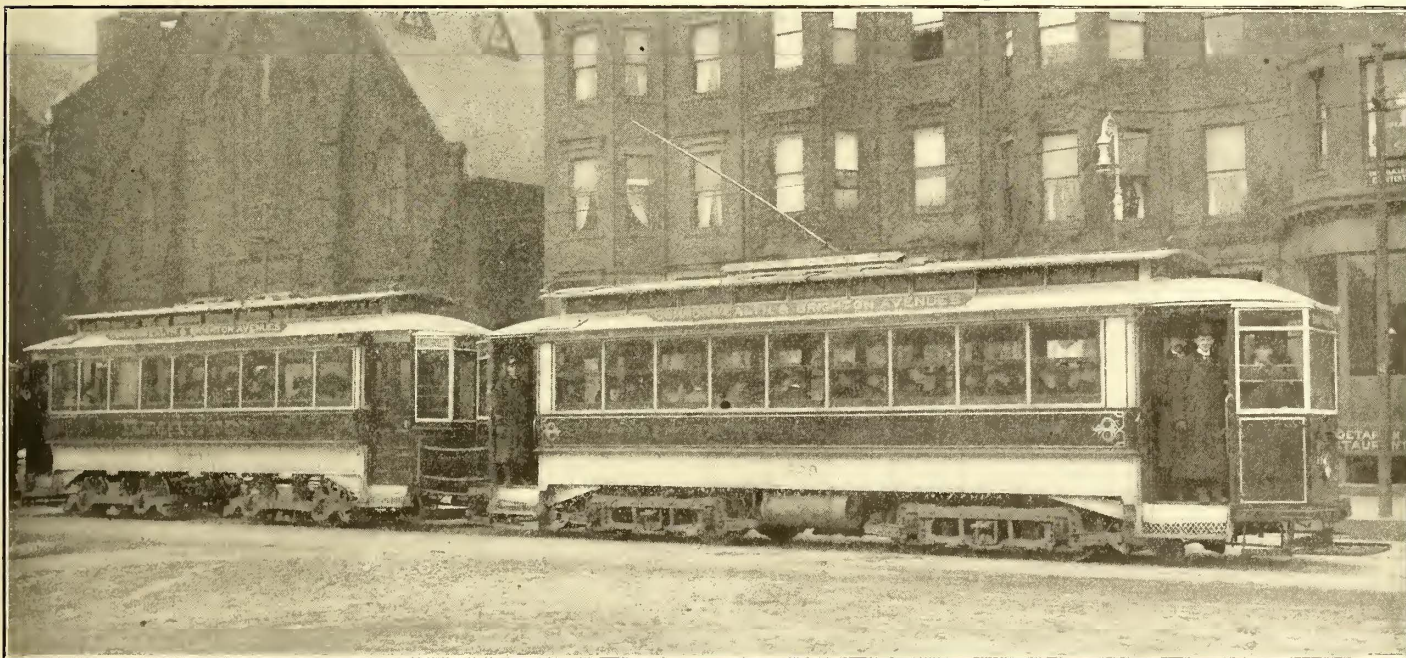
In regard to the popularity of the trains, the company has been asked to restore them upon one of the routes where they were tried during the rush hours with much success. The number of passengers per car-mile has been found to be less

ticable to operate upon it a train of surface cars actually vestibuled in the center like a steam railroad train.

In October, 1905, a series of tests were made by the company to compare the power consumption of a four-motor car with trailer, a four-motor car, and a two-motor car in operation upon the Oak Square-Park Street route, via Brookline Village. These tests extended through a period of about twelve days, about thirty runs being averaged for each type of rolling stock. A summary of the results is tabulated herewith:

	Av. Temp.	Motors	Stops per Mile	Av. No. of Passengers	Av. Speed M. P. H.	Av. Kw.	Av. Watt Hrs. per Ton Mile	Watt Hrs. per Car Mile.	Weight, Tons
4 Motor car and trailer	63.9	4 GE-70	5.	M 33 3 T 30 5	9.8	37.6	124	3,829	30.8
4 Motor car	62.1	4 GE-70	4.7	67.7	10.3	30.4	145	2,885	19.9
2 Motor car	62.1	2 GE-70	5.5	61.7	9.5	19.1	121	2,029	16.9

The runs with the two-motor car were made between Allston and Park Street, via Brookline Village, a distance of



COMBINATION OF MOTOR CAR AND TRAILER OPERATED IN BOSTON. THE TRAILER IS EQUIPPED FOR AIR-BRAKE OPERATION

with the trains than with single cars, which means that fewer passengers have been obliged to stand in the trains. On the Oak Square line the trains are operated throughout the entire day, but their special usefulness appears in times of heavy traffic. On the line where they were operated during rush hours only, the interval was about 7.5 minutes. An impression prevails in some quarters that the length of stops is greater with the trailer outfit, but careful tests have shown this to be erroneous. Records kept of preceding and succeeding cars on a common route showed practically no difference in the maintenance of schedule time between the single cars with two-motor equipments and the motor-trailer trains. As the total motive power is the same per car in each case, the speed characteristics do not vary perceptibly. The trailer equipment rides comfortably, and there is very little shock in coming to a stop. The cars are coupled together by a draw-bar and by two sets of three coiled springs, one set on each side of the vestibules. On account of the numerous sharp curves upon the Boston system it would not be prac-

5.57 miles upon the regular route between Oak Square, Brookline and Park Street.

This journal is indebted to C. S. Sergeant, vice-president of the Boston Elevated Railway Company, for the particulars given herewith.

The Indianapolis "Morning Star" has adopted a novel and successful plan of stimulating advertising by the merchants of Indianapolis in that journal. The paper has inaugurated a plan of free excursions to the city over the interurban lines. The managers sent out 2650 tickets, good for transportation to the city and also good for the return trip when stamped by three Indianapolis stores advertising in the "Star," of whom purchases had been made. The first excursion was made Thursday, Feb. 8, and every ticket is said to have been used. One store stamped over 1000 tickets, and all the merchants report a big trade, and it is estimated that the excursionists expended \$25,000 while in the city.

SOME CAUSES OF EXCESSIVE WHEEL WEAR

BY FRANKLIN M. NICHOLL

It would be safe to assume that 75 per cent of our electric railway companies are troubled more or less with excessive and irregular flange and tread wear of their wheels. In the majority of cases this trouble occurs in its worst form where the cars are operated in one direction and from one controller—that is, single-ended. The shape assumed by the tread and flange is usually indicative of the cause of the irregular wear. Generally the wear of the lead wheels in a truck on a single-end car is more rapid than that of the follower wheels, and this indicates an improperly designed truck. On the other hand, the production of sharp flanges on wheels in diagonally opposite corners of the truck, and of square flanges of the mate wheels, tends to show that there is excessive play at the journals. In a similar manner, by reasoning from effect to cause, other faults may be discovered.

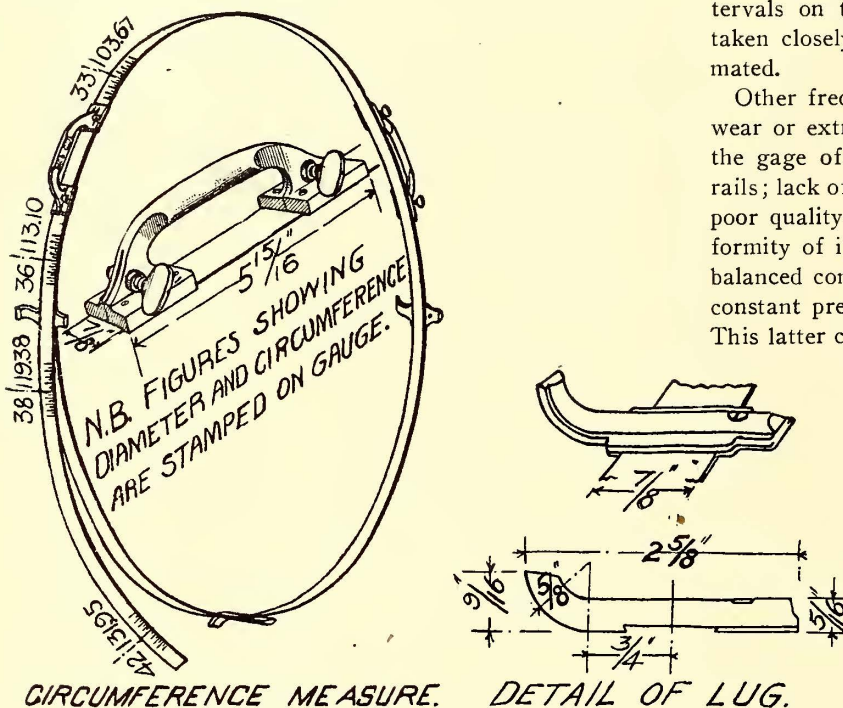


FIG. 1.—CIRCUMFERENCE MEASURE FOR TAPING CAR WHEELS, AND DETAIL OF LUG

The most frequent cause of irregular wear is improper design of trucks. Faulty design allows the centrifugal forces to center at various points in the truck, thereby shifting the center of gravity horizontally, causing unequal strains on the wheel flanges when on both curves and tangents. When this condition exists in trucks of "single-ended" cars, it will, almost invariably, cause the lead wheels to wear quickly and show the irregular wear far in advance of trailer wheels.

Another common cause of excessive and irregular wheel wear is the presence of excessive longitudinal play at the journals. This allows the center line of the axle to get out of square with the track. Where too much longitudinal play exists at the journals or between the journal box and the pedestal, the wheel nearest the gear, on account of the action of the motor, has a tendency to go forward, while the mate wheel has the reverse tendency, and this aggravates the condition. In this case wheels in diagonally opposite positions in the truck will wear the flanges alike. One diagonally opposite set will be flat or square, and the other sharp or pointed. This is plainly due to the play at the journals or to a diamond-shaped truck frame.

The production of a sharp flange on one wheel, with a double flange on the mate wheel, is often caused by the improper mating of wheels as regards diameters. The slightest difference in circumferences of the wheels on the same axle will throw additional weight and wear on the smaller or slow wheel, and will crowd the flange and cause it to wear sharp, while the flange of the mate wheel is drawn away from contact with the rail and receives no wear. On this latter wheel a new or double flange of irregular shape is thus formed on the tread. In the mating of wheels, many electric railways do not recognize the importance of the use of the circumference measure, Fig. 1. The calipering of wheels, no matter how carefully done, does not serve the purpose. The distance to be spanned requires calipers of large dimensions, and if these are of serviceable weight, they must be of light material, and hence are too flexible for exactness. By the use of the circumference measure, as shown, wheels may be measured with the utmost exactness. Lugs, conforming in shape to the throat of the flange, are provided at frequent intervals on the tape, and these enable measurements to be taken closely and in like positions on the two wheels to be mated.

Other frequent causes of excessive wheel wear are uneven wear or extreme hardness of brake-shoes; large variation in the gage of the track in connection with worn or narrow rails; lack of and insufficient elevation of the track on curves; poor quality of the material in the wheel, and lack of uniformity of its texture. Sometimes the cause may be an unbalanced condition of the car body, which throws undue and constant pressure on all the wheels on one side of the car. This latter condition is a very serious and expensive one, and

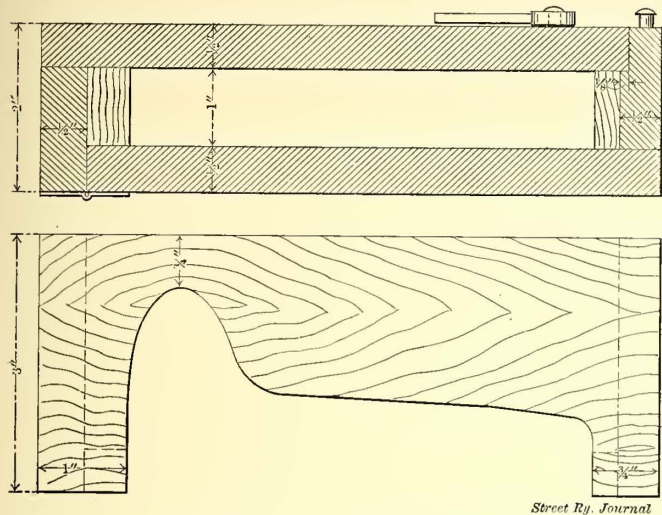
is especially the case with single-end cars. It can best be remedied by placing counteracting weights on one side of the car, thus righting the car body. Installing heavier springs in the trucks on the one side of the truck, as is sometimes done, does not equalize the weight, and therefore does not remove the excessive wear.

The proper clearance between side bearings, permitting the free radiation of the truck and its adjustment to the inequalities of track, is also essential to good wheel wear, though of greater importance from a point of safety. Steam railroads usually allow 1-16 in. on each side between the side bearings of passenger coaches, and $\frac{3}{8}$ in. on freight cars. In each case due allowance is made for deflection of bolsters, and adjustment is provided for wear of center plates. These center plates are narrow under the bearing to aid the free radiation of the truck.

For the purpose of maintaining a more complete wheel record, and in order that the various causes of excessive wear, as above mentioned, may be determined and noted in the early life of a wheel, the following method will be found desirable.

Having adopted a certain standard of design or designs of tread and flange, a fac simile of the contour of the face of the wheel should accompany the record of each wheel. At regular intervals of not less than thirty days, impressions should be taken of the wearing surface of all wheels by means of plaster of paris casts. The sharp outline of the cast may then be drawn by means of a hard pencil on the record within the original fac simile, and the most minute detail of wear may then be observed. Comparisons may then be made with mile-ages, as shown opposite each outline. The plaster impressions may be taken very easily, and without the removal of wheels from the truck, or the truck from the car. The entire

operation does not require more than 15 minutes, and with a number of molds one man should be able to complete one car an hour, or ten cars per day. The mold, Fig. 2, is constructed of pine or other white wood in the form of a box without a top. The bottom is cut away to allow placing on the wheel. The two sides and ends are hinged, and a hook is provided for opening and closing. The interior surface of the box is shellaced and rubbed down several times, and when taking an impression, the surface of the wheel is oiled to prevent the plaster from adhering and to obtain a well-defined outline. To



Street Ry. Journal

FIG. 2.—MOLDING FOR MAKING PLASTER CASTS OF WHEEL FACE

prevent the fluid plaster from running through the openings at the corners of the form, caused by the wear of the wheel, oil-soaked waste is used to surround the mold, and after the removal of the mold from the cast, a sharp knife is used to trim the impression to obtain the true contour.

This method of taking casts may also be advantageously used during tests to determine the different effects on the wheels of various types of brake-shoes. In steam railway practice, the method is employed extensively to obtain impressions of defective wheels under foreign cars which have caused, or are thought to have caused, an accident.

On interurban roads operating a small number of heavy "single-ended" cars with steel-tired wheels, and where facilities for turning and truing are not at hand, the cost of maintenance of wheels, due to the excessive flange and tread wear, amounts to a large proportion of the cost of maintenance of entire rolling stock, and thus decreases, to a large degree, the net profits from operation.

◆◆◆

THE MONORAIL DISCUSSED BY BROOKLYN ENGINEERS

The Brooklyn Engineers' Club was entertained recently by F. B. Behr, the English engineer, who in an illustrated lecture explained the principles of the monorail system which he is advocating as a means to relieve some of the congestion on the local street railways. With stereopticon pictures Mr. Behr showed interiors of the cars which would be run on his road, sections of the experimental track in Germany, and drawings giving the mechanical construction of the cars. Most of the lecture which dealt with local conditions had to do with the line Mr. Behr proposes to run down Fourth Avenue, Brooklyn, to Coney Island, starting from the interborough terminus at Flatbush Avenue.

DETERMINATION OF FEEDER-DROP

BY J. E. WALLACE

In the "Electrical World and Engineer" for Nov. 5, 1904, the present writer was the author of a short article, under the title of "Economics of a 200-Mile Transmission," in which were given various formulæ for the determination of the most economic efficiency of transmission under various conditions. The article was the subject of kindly editorial comment, and later received considerable attention in the issue of the same paper for Dec. 31, 1904, the writer having used it as a basis for the discussion of a paper read by a prominent engineer before the American Institute of Electrical Engineers. Since no rebuttal has been made to the arguments offered by the writer on that occasion, it may be presumed that the mathematics underlying the investigation were correct. The same mathematics form the basis of the present writing.

In several instances the writer has found it the practice of superintendents and engineers to estimate the drop they will allow at a given point, and then use the following formula to determine the size of feeders:

$$\frac{11.1 \times \text{distance in feet} \times \text{amperes}}{\text{drop in feeder}} = \text{circular mils}$$

Independent of the drop in the track returns, the actual drop in the feeder cables, in accordance with Roebbling standards, is:

$$\frac{10.16 \times \text{distance in feet} \times \text{amperes}}{\text{circular mils}}$$

The writer is not acquainted with the reason for the selection of the constant 11.1; whether it was from a test under actual practice and that the constant was intended to include an average track drop, or whether at an earlier period in the history of the art the wire mills were not able to produce as pure commercial copper as at present. In any event, the use of the higher constant increases the size of the feeder about 8.5 per cent to offset any track drop, irrespective of the distance from the power house, or the amount of current involved. While such methods of procedure may produce results that satisfy the operating department, they do not promise, unless handled with rare judgment, to lead to results best suited to creating dividends for the stockholders.

Under the conditions that usually exist in connection with railroad work, pole construction costs need not be included among the items involved in an economic consideration of a drop best suited to a given distance. The following formula, based on the delivery of the cheapest kilowatt, will determine a drop which takes due regard to the cost of power annually absorbed by the line as differentiated against the annual charges on the line investment, but omits considerations of the pole construction:

$$\text{Drop} = \frac{E}{2} \left[1 - \frac{Q T + \frac{M}{E^2} - \sqrt{\frac{M}{E^2} \left(Q T + \frac{M}{E^2} \right)}}{Q T} \right]$$

in which

- E represents station voltage.
- Q represents generating cost of power in terms of a kw-year.
- T represents hours operation per day divided by 24.
- M represents product of the various line constants, distances, specific weight and resistance of conductor, price, annual charges, etc.

The feeder drop having been established for any particular distance, it is a simple matter to calculate the size of feeder required, either by the use of the first-mentioned formula, with Roebbling's constant, or other short methods.

The writer has found a curve chart of very great assistance

in making such calculations, and herewith presents such a chart which he had occasion to make for the purpose of checking up a system using entirely overhead feeders. While it is based on the market price of copper being 15 cents, in other respects it is fairly representative of conditions that might now exist in many systems throughout the country, but each system should have a chart calculated in accordance with its own conditions. Since in the ordinary course of events copper is bought freely at prices below 15 cents, and somewhat sparingly when the price is above, a chart on a 15-cent basis is used for the purpose of this writing. In connection with these curves, a fact which may be very interesting to the readers is that the curves start from the power house end of the line in conformance with values as prescribed by Kelvin's law.

In checking up a system, the method pursued by the writer is to take observations at the power stations, or sub-stations, for the purpose of establishing the average current demands of each section of trackage, and then apportion the results over each mile of track pro rata to the tonnage of traffic over the track, unless some heavy grade occur in the section. In

frequent points along the line. Electrically, the result is the same as though one large cable were used from the power house to the nearest feeding point and then tapered off as the demands grew less. The writer does not consider such methods as being in the line of good practice. Cables should run independently from the bus-bar to various points on the line, and there only be tied into the general system. The result will be a trolley potential slightly lower at points near the power house, but out on the end of the line a much better potential will be found than would otherwise result.

To illustrate, a section of track, some 5 miles in length, called for 3,500,000 circ. mils of copper leaving the power house. This was best equipped by installing a 500,000-circ.-mil cable, frequently tied into the trolley and carried to nearly the end of the track, and three cables of 1,000,000 circ. mils each, run independently to proportionate points and there connected into the 500,000-circ.-mil cable.

The formula given above for an economic feeder drop is one-half that which should be found in an all-copper circuit, and on the basis of the same current density in the feeder, is the actual drop that would occur with zero resistance in the ground returns. It is, therefore,

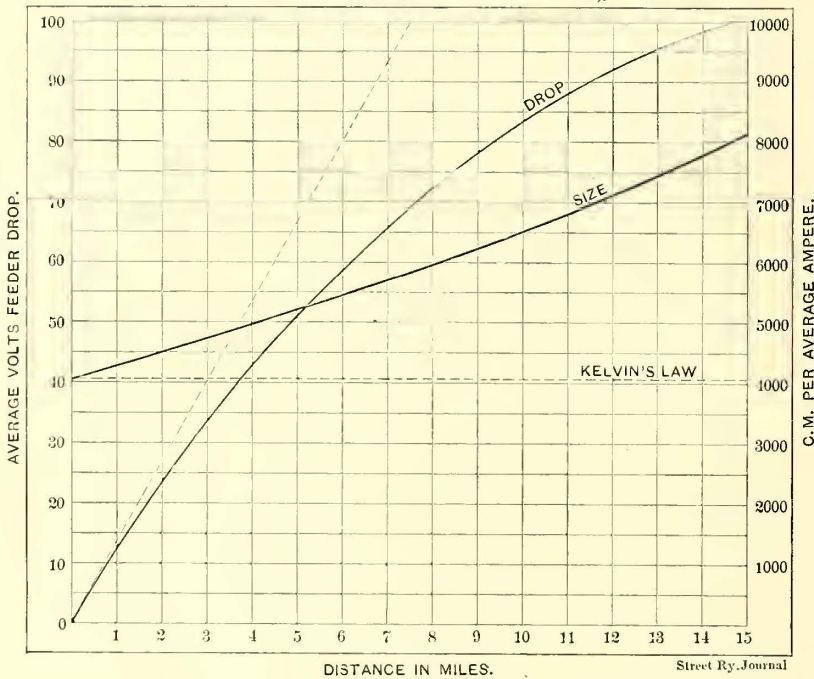
requisite that the tracks shall have a conductivity at least the equal to the feeders carrying the current that returns through a given piece of track. Properly bonded, many track systems will meet this condition, but it frequently occurs that at some point near the source of a current supply, there is a zone in which the conductivity of the feeders overbalances that of the tracks, in which event, aside from the consideration of electrolysis, it is economic to reinforce the conductivity of the tracks. In connection with ordinary American track steel, the writer uses 12 to 1 as the ratio of conductivity of copper to an equal cross-section of steel.

In cases where the switchboard is not available to take observations on current demands, the feeder determinations can be made by the method of watts per ton mile. Watts per ton mile will vary between the limits of 155 and 100; the former holds for urban service with light cars and frequent stops, the latter for interurban service with moderately heavy cars and comparatively infrequent stops. Low grades, with traffic in both directions, do not increase this average materially. With the ordinary car weighing from 15 to 18 tons and making about five or six stops to the mile, 140 will be a fair average.

If electric heaters are used, the current demands per car for periods of the year will be increased about 25 per cent in northern latitudes, the demands, of course, tapering up to a maximum and gradually falling off. After the energy in watts for a given section of trackage has been obtained, it is a simple matter to refer to the chart, and from it determine the amperes and, finally, the size of the feeders. An average track drop for a 70-lb. rail is 3.8 volts per mile per 100 amps., and this should be added to the drop given in the chart to determine the average voltage at the car when the amperes are calculated from the watt consumption.

Naturally, as the voltage decreases, the current demanded per ton mile increases. It is not absolutely correct, therefore, to take the average amperes shown at the power house and apportion them to each mile of track, as has been suggested above, but the chart offers a very convenient aid to those who desire to make the exact calculations involved in the fact that the ampere consumption per ton-mile

COST OF POWER 8 MILLS PER K.W.H.
COPPER COST 17 ¢ ERECTED -- OPERATION 20 HOURS DAY.
INTEREST AND MAINTENANCE OF FEEDERS 7%



CURVE CHART FOR CALCULATING FEEDER DROP

this event, it is best to ascertain if more than a pro rata share of current is required by the traffic. Having established the average current demands of each mile of track in the section involved, the next step is to consult the chart and learn how many circular mils should be added to the feeders on account of the current demands and distances from the power house of each individual mile of track. Totaling up the various items will give the number of circular mils of feeders which should leave the power house to feed the section under consideration. Should the section consist of a long line with one end near the power house, some judgment must be exercised in the matter of subdividing the feeder into standard sized cables, with the object of running each cable to a given point out on the line before connecting into the trolley circuit, or contact rail, as the case may be.

In some instances it is the practice of a management, where a group of feeders leaves the power house to feed a given section of track, to tie all cables together and to the trolley at

increases as the car gets further from the power house.

The starting current of a car is approximately three times in excess of the average current, and where few cars are on a feeder, they may quite frequently all start together, causing the maximum drop in both feeder and tracks. This fact, taken in conjunction with satisfactory operation of cars at distant points, makes the economic adjustment of long feeders a troublesome problem, and to meet the situation it is at times considered best to resort to boosters rather than go into alternating current and sub-stations, or storage batteries, either of which are costly, as well as requiring separate attendance.

The writer has met engineers who assert, in connection with long feeders and a given average current flow, that if a certain drop were proper and economic without a booster, a much greater drop would be allowable with a booster. An analysis of the facts in the case will not substantiate the truth of such a statement. The reader is directed to consult the curve sheet shown in connection with the article by the writer, cited as published in the "Electrical World and Engineer," Nov. 5, 1904, and he will there see that for a given distance the economic relation existing between voltage and line efficiency calls for a higher line efficiency as the voltage increases. On consideration it will be apparent that if the station voltage is increased and the line drop and current held constant, the efficiency of the transmission is increased. Therefore, the booster seems to act in the direction of automatically adjusting itself to the economies involved. Kelvin's law, for a given average current flow in a feeder, would demand the same average line drop with or without a booster; but, as a matter of fact, if the boosting apparatus were machinery of 100 per cent efficiency and did not increase the cost of a kilowatt delivered to the line, the exact economics of the situation would call for a slightly greater average feeder drop with the increased voltage, but the inefficiency of the boosting apparatus will balance up any such matters, and the writer, for a given current average, recommends the same size feeder with or without a booster.

The safe use of boosters requires some thought in the matter of preventing or providing for cars bunching on that portion of the line fed by the booster, and if one end of a long line is fed direct from the power house and the other end boosted, the boosted feeder will, of course, take a greater proportion of the trackage than if no booster were used, hence the feeder should be calculated accordingly. For every-day work, boosters are not very much in favor with operating engineers of experience, except in connection with a very limited number of cars. They have their place, however, and doubtless will always be used to help out situations, particularly if the situation involves a compact urban system with one or two long lines reaching into districts which do not supply a heavy volume of traffic, or if the traffic is fairly regular the year around, with exception of a limited number of days, when, due to special conditions of fairs, races, picnics, etc., there is very heavy traffic. In any such cases, the average current, upon which is based the feeder drop, should include the current demands of the special traffic.

The storage battery, as a means of holding up the voltage on the end of long feeders, has features which make it very desirable as compared to boosters. The latter accentuates the pulls on the power-house machinery, caused by cars starting simultaneously, whereas the storage battery tends to give the power house an even average rather than a fluctuating load.

The West Jersey & Seashore Railroad, to be equipped with electricity between Camden and Atlantic City, N. J., will increase its capital to \$10,000,000. The company is one of the subsidiary companies of the Pennsylvania Railroad Company.

STANDARDIZING TRUCKS

BY WARREN L. BOYER

In nearly every issue of the STREET RAILWAY JOURNAL for the past few months reference has been made to standardizing electric railway equipment, and the tendency of every operator is to work to this end. Some of the largest systems in this country have men employed to do nothing but follow this part of work, their time being devoted to find the simplest and most economical equipment to meet their requirements. Where one company has absorbed another, a mixed equipment is practically inevitable, and the larger the number of roads brought under the one head the longer will this list of mixed equipment be. The result is that unless corrected the cost of maintenance will not be reduced by consolidation, except in labor, and if the cars of one line are operated over lines previously foreign, an extra line of supplies must be provided to meet the requirements of the foreign car. If this is not done, the car must either be taken out of service until the supply parts are obtained from the home line or be run back as a "cripple," which may result in breaking the schedule, especially so if the car must be towed home. This condition is more serious to-day than it ever has been, for numerous suburban cars run over foreign lines 60 miles and 70 miles from their own base of supplies, which means two to four hours run even when the car is in good condition. Any depot master or foreman appreciates what it means to carry supplies for a mixed equipment, for there are numerous cases where he is "just out" of that special trolley pole, or maybe that size or style of brass, even though he has quite a large supply of another kind, which will not do, so the car must be tied up until proper parts are received from headquarters.

A great many operators find fault with manufacturers and supply agencies for delays in filling orders for supplies, which are really unavoidable in some cases, for if one stops to consider what an enormous stock these houses would have to carry to meet each and every demand, he would not be quite so impatient. The condition of the iron market to-day is such that even standard sizes cannot be delivered under from three to six months, so the result is apparent. The standardizing of parts for railways would not only cut down the cost for them, but would also enable the manufacturer to carry a larger supply of those parts needed for repairs, so he could fill orders promptly. It is very easy indeed to say nothing can be done in standardizing, but it can be if given the proper support. The results probably would not be apparent for several years, but would gradually make themselves felt.

Let us consider trucks. Why cannot all trucks of a class be constructed to the same dimensions in regard to the following points?

- (1) Distance from center to center of side frames.
- (2) Length of wheel base.
- (3) Height from rail to swivel plate.
- (4) Height from side bearings to swivel plate.
- (5) Distance from center to center of side bearings.
- (6) Width of car body swivel plate, size and spacing of holes and same size and shape of ring or boss to engage truck plate.

Each of these topics will be considered:

DISTANCE FROM CENTER TO CENTER OF SIDE FRAMES

At first thought, one who does not go into details naturally thinks this is not an important point. But the distance from center to center of side frames governs absolutely the length of axle, for the latter must be central with the journal bearings so that the entire load is properly supported, and there is no good reason, except that of gage, for this distance to

vary. The present variations came from the practice of different truck builders in making their centers of frames to suit different trucks. Some even went so far as to change centers of frames with a change of wheel tread, so that a truck originally built for a 2-in. tread wheel would not allow the use of a wheel over that width tread without cutting away some of the side frame to permit the change. If it should not seem desirable to adopt one standard truck for certain reasons, there is no reason why all short wheel base trucks cannot be constructed of one width and with standard journals, and another standard for a long wheel base with M. C. B. journals. The frames should be made wide enough for the widest tread wheels generally used in the class of service to which the truck is adapted. The change in these centers will not affect the riding qualities or strength of the truck.

WHEEL BASE

Wheel base is a very important question in truck construction as well as in operation. Opinion at the present time appears to be in favor of a wheel base longer than the track gage, and up to a certain limit this is certainly desirable. A crude illustration in favor of a longer wheel base is a desk drawer. A wide drawer that does not extend into the desk very far will not pull out easily unless drawn from its exact center or from each side at the same time, but a drawer that extends further into the desk can be drawn out easily, as the binding cross-corners are practically eliminated. This same principle holds good in long wheel bases as regards the strain on the flanges. In addition the longer wheel base permits the use of a better bolster construction, such as providing wearing pieces, to take up the lost motion of the bolster between transoms. These eliminate the disagreeable jerking motion received when the brakes are applied. It allows more room for a suitable inside brake rigging. Trucks for outside-hung motors vary in wheel base from 4 ft. to 4 ft. 10 ins., and for inside-hung motors from 6 ft. to 7 ft. 4 ins. In most cases the dimension adopted is determined by the size of the motor and the construction of the bolster. A 6-ft. wheel base is rarely used, for with any substantial bolster and transom a small motor only can be employed, and clearances even then are very small. The writer thinks a 4-ft. 10-in. wheel base for outside-hung motors and a 6-ft. 10-in. or even a 7-ft. wheel base for inside-hung motors would be the most practical to adopt as standards. This would enable all truck builders to follow their own construction and still have room for the largest motors used to-day. A difference of 2 ins. or 3 ins. in wheel base would not affect the car builders in the least, and really would be a great advantage to them, for they could come to a standard location for platform knees, etc.

HEIGHT FROM RAIL TO SWIVEL PLATE

Height from rail to swivel plate is another point of importance, and proper car construction is often prevented if a low limit is set for the height of the car body from the rail. This height can, without doubt, be standardized for trucks of a class where the same diameter wheels and size of journal are used, and could be based on the same principles and requirements as in the matter of truck centers.

HEIGHT FROM CENTER BEARINGS TO SWIVEL PLATE AND DISTANCE FROM CENTER TO CENTER OF SIDE BEARINGS

These two subjects can be considered together, and while two separate dimensions are required, they must be in harmony. If this is done, any car body bolster would fit any truck adapted to that class, and would save considerable changing, both for the builder and operator. Master mechanics will appreciate this point more than anyone. The trucks govern these dimensions entirely, and they do not change with a change in the width of the car body.

SWIVEL PLATE AND RING TO ENGAGE TRUCK PLATE

This is another point of importance, for any make of trucks of the same class ought to fit. At the present time the car body bolsters are not of a standard width for the same weight of car, and vary from 6 ins. to 12 ins. This, of course, changes the spacing of the holes and the width of the plate between lugs. This is a point that could be standardized very easily and would save considerable annoyance.

THE INTERURBAN ROADBED

BY R. H. BALDWIN

The choosing of the proper grades for interurban lines is a more difficult matter than at first thought appears. In general, the engineer is prone to follow the old maxim of making cuts and fills balance. But this is an erroneous basis. The different bases in excavation and embankment give greater cross section for cuts than for fills, and this fact totally demolishes any possible chance of even approximate balancing. What may appear as a well-balanced profile will give quite different results in cross sections. Behan, in "Railway Location," says, and truly, "that the engineer should be able to show a more scientific reason in laying a grade line than the balancing of cuts and fills." One condition which often makes it difficult to secure a good roadbed is that the interurban engineer is sometimes restricted to a narrow right of way simply because some road over in the next county, located on a prairie, has but a 33-ft. right of way. The projected road, even with 2 per cent grade, may be obliged to have 20-ft. cuts and 15-ft. fills, but he is expected to work to as narrow a right of way as on a prairie. This was brought home to the writer in making a 65-mile location in Northern Wisconsin last spring. The promoters (?) had gone ahead and secured options on a strip 2 rods wide along the right of way of the steam line which they proposed to put out of business. The road was not built and never will be. The grading would have been about 12,000 yds. to 18,000 yds. per mile, as nearly as can be remembered.

This brings up another error of frequent occurrence. The early electric lines were built on 12-ft. banks without ballast. Some engineers still follow the old specification of an 18-ft. base in cuts for interurban lines. This leaves little or no room for ditching unless the cuts are widened out as borrow pits. If they are not widened, and the overhead line is bracket work, the pole gang will find that the function of the ditch as a water course is soon ended after they have planted their poles in it. Cutting outlets back of the poles does not help matters. The impeded drainage settles down around the pole, softens the ground, loosens up the pole, and the whole alignment looks like a country fence before the end of the season. Let us have 20-ft. base cuts, with ample ditches.

CONVERTING THE LINES AT MONTEREY

J. H. Wallace, manager of the Monterey Railway, Light & Power Company, of Monterey, Mex., states that the Ex-presa Mexicana, Slayden and Oriente y Sur properties have been purchased and are now operated under a syndicate of Canadian capitalists, and that the entire system is to be converted into an electric railway. The company's officers have not yet been named. This syndicate controls the water works, sewer system, light and power and electric railway franchise, all of which it is contemplated having in operation by February, 1907, if not sooner. A new electric line is also being constructed from the city of Topo Chico Hot Springs.

CONVENIENT FORM OF ACCIDENT REPORT

C. A. Avant, claim attorney for the Birmingham Railway Light & Power Company, of Birmingham, Ala., has devised

prehensive account of the details connected with the occurrence. It will be noticed from the sample blank reproduced in Fig. 1 that the form contains a number of questions, many of which the employees can answer by merely putting a

No. *70-6000* Birmingham Railway, Light & Power Co. (Date) *Jan. 27, 1906*
 Form O 1-1906
PERSON FALLING—ACCIDENT REPORT.
 Nature of accident—Person falling—Electrified.
Person fell from car.
 Name of injured person—Unknown—man, woman, boy or girl.
Mariah Jenkins
 ADDRESS: *Smithfield Ala.*
 Place of ACCIDENT: *2nd Ave. between 20th & 21st Sts*
 LINE: *Kate City* CAR No. *329* NORTH EAST SOUTH WEST

COLOR?	White Black <input checked="" type="checkbox"/>	TIME?	<i>9:20 A. M.</i>
About HOW OLD?	About <i>38</i> Years	Daylight?	Yes <input checked="" type="checkbox"/> No. Twilight.
Was person ALONE?	Yes <input checked="" type="checkbox"/> Woman Man. Child.	Standing Still.	
Did person have any BUNDLES?	Yes <input checked="" type="checkbox"/> No.	Starting.	
Was person DRUNK?	Yes <input type="checkbox"/> No. Drinking. Don't know. <input checked="" type="checkbox"/>	CAR WAS Slowing up.	
Was person getting ON or OFF?	On. <input checked="" type="checkbox"/> Off. <input checked="" type="checkbox"/>	CAR WAS On 5 Points.	<input checked="" type="checkbox"/>
Front or rear PLATFORM?	Front. <input checked="" type="checkbox"/> Rear. <input type="checkbox"/> Running Board	CAR WAS At full speed.	
		CAR WAS On Time.	<input checked="" type="checkbox"/>
		Minutes Late.	
		Did car stop at last station?	Yes <input checked="" type="checkbox"/> No.

To what part of car was Conductor? *On rear platform*
 Where and in what position was injured person when you first saw him? *Jumping from car*
 Was any assistance given him, and by whom? *Carried to St. Vincente Hospital*
 What did he say? *Saw her friend on side walk and wanted to get off.*
 Did he walk away? *Walked away.*
 Where was he carried? *Carried to hospital*

INSTRUCTIONS—Make cross mark (X) BEHIND the answers which apply

SPECIAL STATEMENT OF CONDUCTOR.

How was your attention first called to accident?
By seeing the woman and the basket falling.

Describe here what happened, what you saw, and what other passengers said.
This woman saw a man on the street and when he waved his hand at her she picked up her basket of clothes and went out the front door and jumped off before the motorman could stop. She dropped her basket and got her clothes muddy. The passengers said she should have known better than to jump off of the car while it was moving, and that the man on the sidewalk was to blame for the trouble, that it was no fault of ours. She seemed to be very frightened and excited.

Describe how person appeared to be hurt.

Was clothing torn?

If dispute about transfer, get number of transfer.

(If you need more space, use other side.)

Accident reported verbally or by phone to Mr. Dr. _____ was called.
 Conductor *T. J. Kennedy* Badge No. *654*

WITNESSES

Name *T. Hawkins*
 Address *Bessemer, Ala.*

Name *J. T. Thompson*
 Address *Ensley, Ala.*

Name *Henry Barnard*
 Address *Pratt City, Ala.*

Name *J. R. Compton*
 Address *Shoodlawn, Ala.*

Name *E. D. Drummond*
 Address *West Highlands, City.*

Name *Y. L. Senn*
 Address *East Lake, Ala.*

(If you need more space, use other side.)

SPECIAL STATEMENT OF MOTORMAN.

Describe here what happened, what you saw, and what other passengers said.
The first I remember of the accident was when the man began waving his hand about this time the woman with her basket of clothes run out and jumped off falling and dropping her basket. I stopped the car as soon as I could.

How was your attention first called to accident?
 Motorman *R. H. Greer* Badge No. *186*

FIG. 1.—FORM USED AT BIRMINGHAM, ALA. FOR REPORTING ACCIDENTS. MUCH OF THE INFORMATION REQUIRED IS GIVEN BY MAKING CROSS MARKS AFTER CERTAIN CAREFULLY SELECTED QUESTIONS

No. _____ Birmingham Railway, Light & Power Co. (Date) *190*
 C 3
WAGON, PERSON OR CAR STRUCK—ACCIDENT REPORT.
 NATURE OF ACCIDENT
 Name of Injured Person, Owner and Driver of vehicle. If unknown, was it man, woman, boy or girl.
 ADDRESS:
 Place of ACCIDENT:
 LINE: _____ CAR No. _____ NORTH EAST SOUTH WEST

COLOR?	White Black	TIME?	_____ M.
About HOW OLD?	About _____ Years	Daylight?	Yes. | No. Twilight.
Who was with PERSON?	Alone. | Woman. Man. | Child.	Standing Still.	
Was person DRUNK?	Yes | No. Drinking. Don't know.	CAR WAS Starting.	
Kind of VEHICLE?		CAR WAS Slowing up.	
TRACK WAS	Dry. Wet.	CAR WAS On 5 Points.	
IF STOCK	Horse Mule Cow Hog	CAR WAS At full speed.	
	Size Color Quality	CAR WAS On Time.	
		Minutes Late.	
		Did car stop at last street or station?	Yes. | No.

About how far ahead of car was injured person when Motorman first saw him? _____ feet.
 How far from track? _____ Right side. Left side.
 In what direction was he going? With car From right. Toward car From left.
 Did he notice car before it struck? Yes. | No.
 If so, what did he do?
 Was he thrown?
 What did he say?
 Where did he go? Walked away. Carried to _____
 Distance in paces from point of accident to front of car where stopped? _____ paces.

INSTRUCTIONS—Make cross mark (X) BEHIND the answers which apply

SPECIAL STATEMENT OF MOTORMAN.

Describe here what happened, what you saw, and what other witnesses said.

Describe how person was hurt, or how much vehicle was damaged.

(If you need more space, use other side.)

Accident reported verbally or by phone to Mr. Dr. _____ was called.
 Motorman _____ Badge No. _____

WITNESSES.

Name
 Address

Name
 Address

Name
 Address

Name
 Address

Name
 Address

(If you need more space, use other side.)

SPECIAL STATEMENT OF CONDUCTOR.

Describe the vehicle and animals.
 Describe injury to person or animals, and damage to vehicle.
 Was there car passing in OPP. direction?

Conductor _____
 Badge No. _____

FIG. 2.—FORM USED AT BIRMINGHAM, ALA., FOR REPORTING FRONT-END ACCIDENTS

an accident report blank upon which conductors and motormen make their reports of all accidents that occur. This form has been designed with the idea of reducing in so far as possible the amount of writing necessary to give a com-

prehensive account of the details connected with the occurrence. It is believed that this practice of giving the conductor and motorman a definite set of questions to answer, covering the essential points of the case, has resulted in more satisfactory reports than when the em-

ployee is merely instructed to give a complete account of the occurrence in his own words. When the information desired is not indicated by concrete questions, many employees will give a rambling statement of an accident without covering the essential details, and the statements will be of little real value to the claim department in working up its cases. The set of questions as printed on the blank used at Birmingham serves to direct the employee's attention to the important points and aids him in giving a concise, condensed and correct statement of the occurrence in a few words.

It will be observed the questions asked are practically the ones the employee would be obliged to answer if put on the witness stand, and the form as prepared is virtually a legal examination of the conductor and motorman concerning their knowledge of the accident.

Some question might arise as to the validity of an answer

WAGON, PERSON OR CAR STRUCK.

SUPPLEMENTARY TO ACCIDENT REPORT No. _____

190

(Name of Injured Person) _____ (Place of Accident) _____

Weather _____ Condition of ground _____ (wet, dry, muddy, ice, snow)

Grade at point of accident in direction of car _____

Grade for 200 feet approaching point of accident _____

Kind and condition of paving or landing place _____

Was injured person's view of car obstructed and by what _____

Was motorman's view of injured person obstructed and by what _____

Location and distance of nearest street lamp _____

Was it burning at time of accident _____

Report on condition of car. Information obtained from M. M. _____

Condition of brakes _____

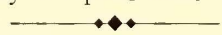
Condition of headlight _____

Special report about condition of car. Describe injury to car or marks on it _____

FIG. 3.—FORM USED AT BIRMINGHAM, ALA., FOR MAKING SUPPLEMENTARY REPORTS OF ACCIDENTS

made by a cross mark after a given question, but the company's attorneys have advised that an answer made in this way is as binding in law as would be a written answer. This question has been well established, although as a matter of fact, the employee's reports are not intended to be used in court but are merely for the information of the claim department. However, the original reports can be produced as competent evidence, if the necessity arises.

In the routine work of the claim department three copies are made in typewriting from the original report; one copy going to the general manager, one to the general attorney and one to the claim attorney. As the forms permit of giving a great deal of information by placing cross marks in the proper spaces the routine work of copying reports has been greatly simplified. The same idea has been carried out in preparing other forms used in connection with the work of the claim department. Fig. 2 is the blank used by motormen and conductors in reporting accidents caused by the front end of the car, such as striking a wagon, person or another car. Fig. 3 is a blank used by inspectors in making reports supplementary to reports made by car men.



It is announced that W. R. Grace & Co., of New York, have obtained a contract for the construction of an electric railway at Lima, Peru. American electric apparatus and American railway material will be used entirely. The line will be over 30 miles, and is expected to be in operation within a year.

NOTES FROM NEW ORLEANS

Among other things with which the street railway visitor to New Orleans is forcibly impressed, there are two in connection with the system of the New Orleans Railway Light & Power Company, which stand out with particular prominence. In the first place, a casual inspection of the New Orleans soil will probably lead to wonderment as to how engineering operations, involving the building foundations for power stations, track work or permanent structures of any kind can be carried on with any degree of success. As told in the school geographies, the level of the city for the most part is from 6 ft. to 8 ft. below the level of the Mississippi River, which at this point makes a wide, sweeping bend, so that the city is practically surrounded on three sides by the river, whose waters are held back by levees. Throughout the greater part of the city, and especially along the water front, the top soil is a deposit of river silt left from the time when the river flowed unconfined over the area. Under the stratum of silt is one of clay, a comparatively hard clinging material when dry, but when wet forming a treacherous, unreliable mud, prone to wedge and cave-in when excavations are made. Rock strata are unknown. The levees may serve to prevent the current of the river from encroaching upon the city, but they have little effect in preventing the seepage of water, and the sub-soil throughout the entire area of the city is so thoroughly impregnated with moisture that a hole dug at any point will practically fill with water within the hour. In spite of these conditions a number of important engineering undertakings are now being carried on successfully, but as can be readily imagined, only by the employment of methods originated for this particular locality. The most important of these undertakings from the standpoint of the city, is the complete new system of sewerage and drains now nearing completion. From a street railway standpoint, the new methods of constructing the foundations of power houses and new track work are of special interest.

The other striking feature in New Orleans is the street railway situation on Canal Street. Canal Street is a broad thoroughfare, 137 ft. from curb to curb, and is the main business street of the city. All of the street railway lines in the city concentrate upon the lower twelve blocks of this thoroughfare. A raised strip 60 ft. wide in the center of the street, known as the neutral ground, is given over exclusively to electric railway tracks, and in the congestion district there are five parallel lines of track, the two outer lines being built to double gage and the inner line being for switching and layover purposes. During rush hours about 350 cars pass in each direction per hour in and out of Canal Street. That is, if a given point anywhere in the ten or twelve blocks constituting the congested section should be occupied by an observer, he would be able to count in the neighborhood of 700 cars per hour passing on the five tracks. To further complicate the situation, at every cross street in the twelve blocks there are double or single track curves by which some one of the lines enters or leaves Canal Street, and these curves, of course, have to cut all of the other main tracks. At each block the cross streets cut across the neutral ground, giving a passageway for teams and pedestrians. This situation is probably unparalleled in any other large city. In spite of difficulties, the cars are operated in and out with clock-like regularity and, what seems more remarkable, the accident count on this particular stretch of street is lower than anywhere else on the system. This freedom from accidents is probably due in part to the stationing of policemen and inspectors at each cross street during rush hours and partly to

the fact that when using this section of Canal Street, both street railway employees and the public are keenly alive to the situation, and are keyed-up to a high pitch of watchfulness and precaution. The methods of operating on Canal Street will be more fully described in an early issue of this paper.

The New Orleans Railway & Light Company now operates all the street railways in the city of New Orleans. This company and its constituent companies have a street-railway franchise for about 50 years, a contract to furnish municipal lighting to the city for a period of 10 years from Oct. 1, 1905, furnish current for residential and commercial lighting and sell a large amount of current for power purposes to private corporations and individuals. The company also has the exclusive right to sell gas in the city of New Orleans until 1926.

During the past three years, the property has passed through a receivership under the management of E. C. Foster, formerly general manager of the Massachusetts Electric Companies, of Boston. The outstanding securities have been scaled down and the property has been placed on a firm financial basis. About \$3,000,000 are being expended on physical improvements, and under the present management the company's prospects give promise of an exceedingly bright future. New Orleans now has a population of about 340,000 and the 180 miles of electric railway track are well located to serve the business and residential sections to the best advantage. Despite the loss of traffic due to the recent yellow fever scare, the gross earnings of the railway system showed an increase over the corresponding period of 1905, for the first 30 days of January, 1906, of \$53,500.

As regards power facilities, the rapid increase in the company's business has taxed the generating station capacity to the utmost, and the present demand for power very closely approaches the load that had been estimated for 1908. Extensions of considerable magnitude are being made at the two main power stations, one known as the Market Street power house and the other as the Claiborne plant. The addition to the Market Street station will include three 1500-kw and one 5000-kw Curtis turbo-generating units. Many of the engineering features in connection with the work at both plants, especially the condenser layouts, are unique and of considerable interest. The work will be described in full in an early issue of the STREET RAILWAY JOURNAL.

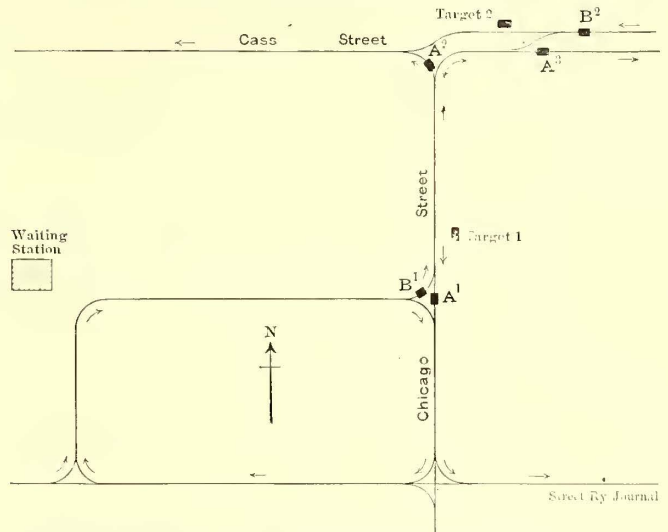
A considerable portion of earnings is now being expended on maintenance of track and lines, and in addition several miles of track are being entirely reconstructed. Owing to the nature of the soil it has been the practice in New Orleans to put a layer of 1-in. planking underneath the ballast. This planking serves to distribute the weight of the track and ballast evenly over the surface of mud upon which all tracks in the city are laid. Many miles of track laid in this way have been down ten to twelve years, and are still in good condition, despite the unstable foundation.

The company is now awaiting the arrival of seventy-five new cars recently ordered, and these, with the improvements in all departments now completed or under way, will enable the company to take full advantage of the tide of growth, prosperity and commercial activity, which is rapidly carrying New Orleans to her rightful position as the Queen City of the New South.

The Chicago Post Office has arranged to use the Chicago freight subway, between the La Salle Street railroad station and the post office, for mail transportation. This marks the opening of the underground mail system, which eventually will be opened between the main post office and all the railroad stations.

BLOCK SIGNAL SYSTEM IN JOLIET

An ingenious application of Eureka electric automatic signals for protecting a short section of single track in Joliet has recently been installed by J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway Company. The accompanying diagram shows a portion of the railway system in Joliet. The double track on Cass Street, east of Chicago Street, is the main outlet to the east and north of the city, including the line to Chicago and Lockport. All cars coming over this line into the city use the cross-over, then pass down Chicago Street and around a loop. They return through Clinton Street to the single track on Chicago Street, and then go out east and west on Cass Street. The piece of track on Cass Street, between the cross-over and the track on West Cass Street, is not used.



PLAN OF TRACKS ENTERING JOLIET FROM CHICAGO, SHOWING THE LOCATION OF THE BLOCK-SIGNAL TARGETS AND CONTACT MAKERS

The signals of the Eureka car-counting system are located at the points marked "Target 1" and "Target 2." When the cars coming in on Cass Street reach the cross-over and find Target 2 clear, they pass through contact marker B². This sets Target 1 at "danger." If only one car goes through the block, it clears the signal when it passes the contact maker A¹. Cars going in the opposite direction set Target 2 to "danger" when they pass contact maker B¹. If the car is one which passes out east on Cass Street, it will clear the block when it passes contact maker A³, or if it is going west it will clear the block when it passes contact maker A². At certain hours of the day there are three cars leaving the loop going west on Cass Street and two cars going east on Cass Street. When this occurs, Target 2 is set by the first car passing B¹, and is not cleared until all the cars which have passed B¹ have also passed over A² or A³. Contact maker B¹ is set on the curve so that it is not operated by cars not using the single-track section described.

Before the installation of this signal device, the Chicago & Joliet Railway Company was obliged to maintain a flagman at the corner of Cass and Chicago Streets on Sundays, holidays and other days when the travel was heavy. The installation of signals has therefore saved considerable expense and annoyance. The signals have been in operation about two months.

The American Railways Company, which owns the Joliet system, has also been using, since the spring of 1905, the Eureka automatic signal system on its Altoona & Logan Valley Railway, where it has seventeen sets of signals, counting cars up to twenty-five in number.

CORRESPONDENCE

GUARANTEES ON POWER PLANTS

Feb. 14, 1906.

EDITORS STREET RAILWAY JOURNAL:

As regular readers of your journal, we are interested in the editorial entitled "Guarantees on Power Plants," in your issue of Jan. 20. We entirely agree with you that the cost per kw-hour is the vital point for power stations, but we also believe that guarantees can be no real substitute for expert knowledge. Any competent engineer has the records of the principal stations of the world available, and he can find out exactly how low costs per kilowatt are attained, and can select each item of the plant on commercial results. But if he insists on putting the entire equipment in the hands of one contractor, in order to get a thorough guarantee, he must inevitably take what they make; and no one concern makes the best boiler, the best stoker, the best heater, the best engine or turbine, and the best generator.

In this age of specialization, it seems only reasonable to expect a firm making one line of apparatus, say stokers or engines, and manufacturing nothing else, to be more efficient in that line than a firm ready to make anything. Our experience is that many of the big contracting firms make or buy the cheapest accessories, and that their guarantees are so limited that, as you say, they can be dodged. We have always urged investigation of operating results, as limited guarantees can be fulfilled under special conditions that bear small relation to operating practice. We consider guarantees a most undesirable basis for business, the only safe guide being operating results. Many engineers are very fond of guarantees, but the largest and most successful companies do not care for them, and insist on judging for themselves before buying; consequently they are able to buy cheaper, and the business is much more satisfactory on both sides. We think you should warn your readers against accepting any guarantees as a substitute for actual knowledge and study.

MANUFACTURER.

PILOTS ON INTERURBAN CARS

New York, Feb. 12, 1906.

EDITORS STREET RAILWAY JOURNAL:

It might be of interest to learn the opinions of the interurban managers on the above subject. Are they worth while or not? Abroad, the question would be answered in the negative almost unanimously. The Englishman never could see, and probably never will see, any good reason why the American equips all his steam locomotives with them. In the early days, when cows considered that the juiciest weeds and the best grazing were to be found on the right of way, they served their purpose by "catching" large numbers of these four-legged trespassers. Of late years they have apparently done little good beyond tossing men off the track, and occasionally scattering a pile of ties maliciously placed there, sometimes thus escaping derailment. Possibly that is sufficient reason for their retention. At any rate, they are probably here to stay for the sake of tradition, if not because the law requires them in most States.

Formerly the locomotive pilot was a well-designed, graceful looking affair, and added much to the general appearance of the engine. That was before the law prohibited the use of the long coupling bar, which was carried on the center of the pilot and was lifted up to the car coupler, and the pin dropped through the hole in its end when in use. When the M. C. B. vertical plane coupler had to be fitted to the engine front, it

could not be made as long as the old coupling bar, and the longer it was made the worse it looked. The only recourse then was to shorten the pilot, because in coupling to other cars, especially freight cars with outside brake beams and tenders with the same, the point of the pilot struck the brake beam before the coupling could be made. The writer has spent many hours trying to design a good looking pilot under these limitations of space, and with the necessity of leaving a large square hole in the center for the coupler. The air-brake couplings pass through the slats and add nothing to its appearance. The result is that while some roads do better than others in their designs, the pilots all have that short, stubby character, which cannot easily be prevented. The standard height above the top of the rail, on different roads, varies from 5 ins. to 7 ins.

If the interurban car should be equipped with a pilot, or pilots, should it be attached to the buffer beam and project ahead of it? or should it be beneath the platform, with the point little, if any, in advance of the buffer? In either position, why should it not be armored with sheet steel or filled in with wood in winter and used as a snow plow? In the writer's opinion, that is one of the best reasons for its adoption. Are there any laws compelling its use on interurban roads? Interurban cars, running double-ended, frequently have trouble with snow piling up beneath the rear pilot, unless its point can be raised several inches and lowered again when going the other way.

Most interurban pilots are of the flimsiest, weakest construction imaginable; some are not even made of hard wood. They are often seen without any heel braces, the most important element in their design if they are expected to push anything off the track without collapsing. If pilots are made of wood, the strength should be in the bottom triangle, making the heel beam or rear side of the triangle substantial enough to attach one or two heel braces, which lead upward and backward to the car body. Pilots made entirely of iron, which are the standard on some steam roads, would look well on interurban cars, and would probably answer the purpose as well as wood.

If interurban cars are intended to run double-ended, and be coupled together, or haul trailers, the pilot must go under the platform, which seems to be the best place for it under any conditions.

E. C. BOYNTON.

FIGURES ON CAR LUBRICATION

THE CALUMET ELECTRIC STREET RAILWAY COMPANY
OF CHICAGO

Chicago, Feb. 20, 1906.

EDITORS STREET RAILWAY JOURNAL:

Relative to comparative figures for the cost of lubrication of cars, it is impossible from published figures to get any comparative results. It occurs to me that the better method would be to figure the ton-journal mile, or for convenience, possibly 1000 miles. By this, of course, I mean what it would cost to lubricate one journal per ton per 1000 miles. A further distinction should be made between surface and elevated roads. I believe, if you start this agitation, it will result in some tangible method by which we could make comparisons.

H. M. SLOAN,
General Manager.

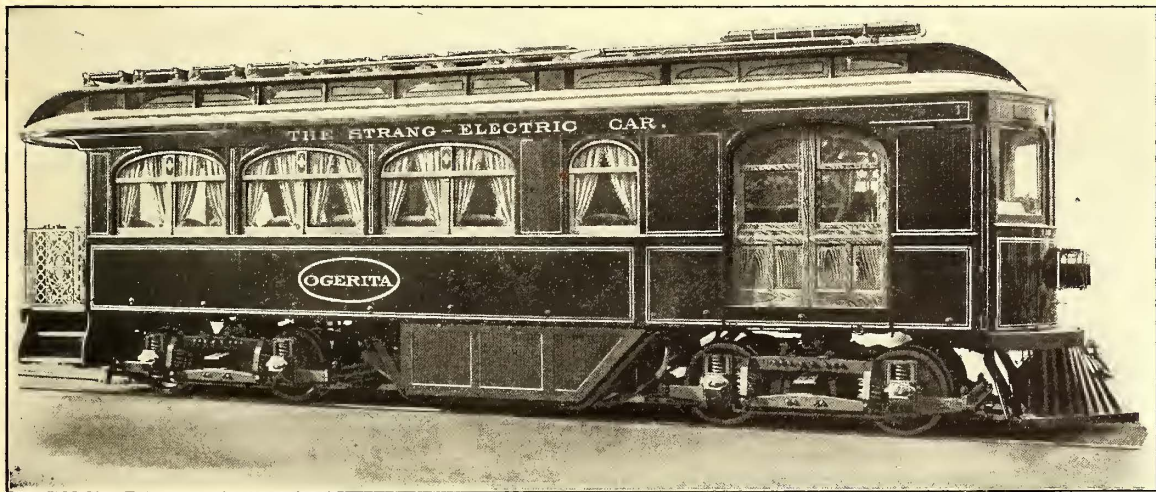
The Knoxville Railway & Light Company is completing the erection of a large car house which has been designed and is being erected by Ford, Bacon & Davis. The car house measures 300 ft. x 75 ft., and is divided into two bays separated by a fireproof wall. Adjoining the car house are some repair shops 100 ft. x 200 ft.

A NEW TYPE OF GASOLINE-ELECTRIC CAR

The gasoline-electric car shown in the accompanying illustrations was recently built for the Strang-Electric Car Company, of New York, by the J. G. Brill Company. Trial trips have been made over the main line of the Baltimore & Ohio Railroad, between Philadelphia and Wilmington, and officials of that railroad, of the Pennsylvania Railroad Company, of the American Locomotive Company, and prominent railway men from New York and elsewhere, have made up the parties and have watched the operation of the car with interest. This car has left the car works at Philadelphia on a trip to the Pacific coast by way of the Pennsylvania Railroad to Jersey City, the West Shore and New York Central lines to Buffalo, Lake Shore & Michigan Southern to Chicago, from Chicago over the Chicago, Alton & Rock Island Railroad to St. Louis and Kansas City, then over the St. Louis & San Francisco Railroad and Southern Pacific to San Francisco. The return trip will be made over the same route to Chicago, and from there over the Pennsylvania Railroad to Philadelphia. The Brill Company is building other cars of the same type for this company, which will measure 52 ft. 9 ins.

as the gear and friction clutches used in automobiles are not suitable for a heavy car for railroad use, because they have no elasticity in starting and are unreliable; second, that direct operation by a gas engine requires one which is large enough for the highest possible demand, regardless of the average power required, as there is no reserve power for temporary overloads; and third, the difficulty of starting a direct-connected gas engine is a serious obstacle, since it must be done by the application of extraneous power. Therefore, while the gas engine is the lightest and most efficient power producer, the difficulty of its control renders direct connection with the axles impracticable. By combining the two systems, using the gasoline engine for primary power, electric transmission and control taking care of the peak of the load of the storage battery, it is claimed that an ideal system for independent electric cars is obtained.

The general plan of the system is shown in the diagram, and consists of a gas engine with a direct-connected generator, electric transmission and control, direct connection between the generator and the truck motors and a storage battery. Attention is particularly directed to the fact that this system requires an engine only large enough to develop



SPECIAL CAR OPERATED BY THE GASOLINE SYSTEM

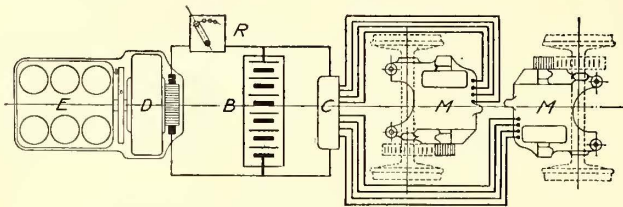
over the vestibules. These cars will have smoking and passenger compartments and are to be mounted on high-speed trucks of the No. 27-E type. They are for use on the line of the Missouri & Kansas Interurban Railway, running over the Santa Fe trail from Kansas City, Mo., to Olathe and southwestern Kansas.

The Strang-Electric Car Company believes that the system which it has perfected will meet all the requirements for independent operation. The system combines a gasoline engine, generator and storage battery. The engine furnishes the power to run the generator, which generates electricity for the truck motors, and the storage battery receives the surplus power from the generator, when the load is light, to furnish automatically the excess power required during acceleration and on steep grades. The use of a generator and motors to transmit power between the engine and the wheels of a motor car may, to many, seem unnecessary. This combination, however, has proved highly satisfactory. Considered merely as a clutch and change gear, it is superior in simplicity and economy to any mechanical appliance for a similar purpose. The advantages of the gasoline engine over other prime power producers, are its light weight and economical operation. The reasons which are given for not driving the car directly by a gas engine are, first, that a practical means of transmission has never been discovered,

the average power used. The engine was built by the Strang-Electric Car Company and designed by its chief engineer, Lars G. Nilson, is of the four-cycle type and has six 8-in. x 10-in. cylinders.

To secure a short crank shaft and reduce vibration to the minimum, the cylinders are partially opposed, three on each side, and are set at an angle of 90 degs. to each other. An advantage of this construction is in the accessibility of the parts. The bearings and wearing surfaces in general are much larger than customary, but the weight of the entire engine is reduced by using aluminum for covering parts where there is no strain. The engine frame is a substantial cast-steel structure, securely bolted to a rectangular base of the same material. The vaporizer is arranged to work with the utmost economy with all kinds of loads. Kerosene, alcohol or crude oil may be used instead of gasoline with a slight change of adjustment of the vaporizer. The ignition is of high-tension, or "jump spark" type, with coils of a special design, one coil for each cylinder, and all operating from one interrupter. The commutator is driven from the end of the cam shaft and is outside the casing at the rear of the engine. The oil is contained in a reservoir placed beside the base of the engine and pumped to the different bearings; it is returned to a filter located over the reservoir. A centrifugal pump, belted to the fly-wheel,

draws water from a tank in the vestibule at the center of the car and forces it through the cylinder jackets and to radiating pipes upon the roof. In cold weather, the passenger department is heated by the water from the cylinder jackets. The gasoline is stored in a tank underneath the car floor, is pumped to an overflow cup at the side of the vaporizer, and the excess returned by another pipe to the tank. The cells of the storage battery are placed on a cradle underneath the center of the car. By the use of 250 volts, instead of the usual 500, the number of cells is reduced and a more reliable insulation secured. The electrical equipment consists of a 50-kw 250-volt d. c. generator, 400 r. p. m. directly coupled to the gasoline engine; two 50-hp series-wound motors of standard railway type, two K-13 controllers; and a storage battery of 112 cells having 200 amp-hours capacity.



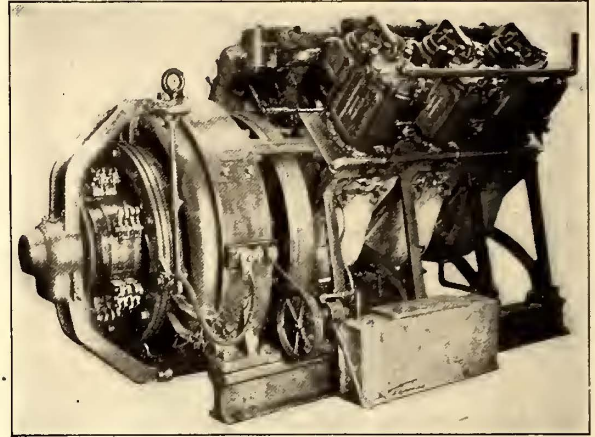
GENERAL PLAN OF THE STRANG SYSTEM

E—Engine
D—Dynamo
B—Battery
C—Controller
M—Motors
R—Starting Rheostat

In the gasoline-electric system adopted, the inclusion of the storage battery enables the engine to run practically at the same speed at all times, with the air and fuel adjusted once and for all for the best possible combustion. As to preventing the battery from being overcharged while

with the speed of the engine or the motors, but is simply an additional safeguard against overcharging the batteries, is entirely automatic and solely for the purpose of economizing fuel and saving the battery when the car is running light or standing still.

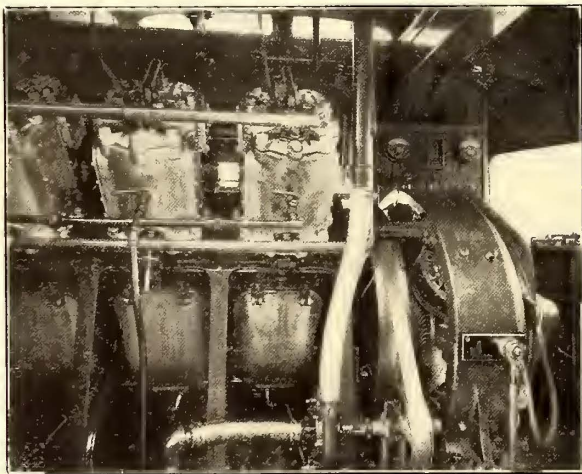
The switchboard is placed against the left side of the engine compartment within easy reach of the operator. It includes a voltmeter, ammeter, starting rheostat and spark control. The platform at the rear of the car is equipped with



GASOLINE ENGINE WITH DYNAMO

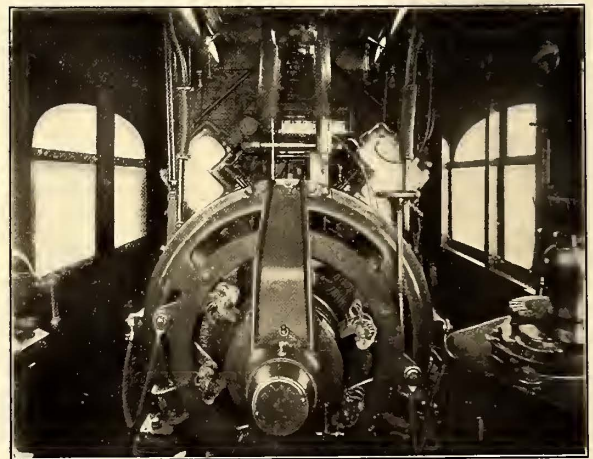
a controller and a combination volt and ammeter. The maximum speed of the car which can be maintained is 50 m. p. h. The average gasoline consumption is 0.45 gallon per car mile. One hundred gallons of gasoline are carried, which gives a mileage radius of 225 miles.

The car illustrated measures 36 ft. 6½ ins. over the body, and 41 ft. 6½ ins. over the crown pieces; width over the sills, including the sheathing, 8 ft. 4 ins. The passenger compartment is finished in mahogany, richly carved and inlaid. The ceilings are of the semi-empire style, tinted light green and decorated with gold. A handsome rug covers the



A VIEW OF THE ENGINE THROUGH THE SIDE DOOR

running with a light load, it will be remembered that it requires a pressure of two and one-half volts to charge a storage battery, while during discharge the pressure falls to about two volts. The average voltage supplied to the motors practically corresponds to their rating and, therefore, with a light load they will run faster in the endeavor to use it up, while with a heavy load the voltage will fall sufficiently to allow the batteries to assist the engine in furnishing the necessary current. In other words, the electric transmission being elastic there is always a tendency to adjust the speed of the car to that which is most suitable and economical for the primary power equipment. Moreover, the engine is provided with automatic governing devices dependent entirely upon the condition of the batteries and the consumption of current. This arrangement has nothing to do



THE ENGINE ROOM AS SEEN THROUGH THE FRONT WINDOW

hardwood floor and silk curtains and draperies and rich upholstery, all of a dark green color, make a very attractive interior. Between the engine room and the passenger compartment is a small compartment separated by sliding doors with glass in the upper part, in which are located a toilet room on one side and a closet on the other. The large observation platform at the rear end has trap doors to close over the step openings, and a dasher and gates composed of old brass grill work. The car is mounted on No. 27-E-1½ high-speed trucks with steel-rolled wheels.

the tickets. It is held that no material object is gained by numbering conductors' receipts as the receipts are only good for a single trip, and should a passenger when asked for a fare present an old receipt, claiming he had paid his fare, the conductor is able to tell by the serial number whether or not the receipt was issued on the current trip.

As used, the conductor's coupon is surcharged with the word "Duplicate" printed in red.

NEW EQUIPMENT FOR AN ARIZONA RAILWAY

The type of car shown in the illustrations is one which has lately been delivered to the Prescott (Ariz.) & Mt. Union Railway Company (Ariz.), by the American Car Company.



CONVERTIBLE CAR, OPEN

The railway is a new line which runs between the city of Prescott and Mt. Union, an important mining point a few miles



CONVERTIBLE CAR, PARTLY CLOSED

distant. In summer, the days are hot but the evenings quite cool, and, therefore, a car of the convertible type, which



INTERIOR OF PRESCOTT & MOUNT UNION CAR

can be changed from closed to open and vice versa in a few minutes, is particularly suitable. The car is of the Brill type and measures 20 ft. 7 ins. over the body and 30 ft. over

the vestibule; width over the sills, including the sill plates, 7 ft. 6½ ins., and over the posts at the belt, 8 ft. 4½ ins.; sweep of the posts, 5 ft.; distance from the center to the center of the side posts, 2 ft. 7 ins.; height from the floor to the ceiling, 8 ft. 7 ins.; from the track to the under side of the side sills, 2 ft. 5¾ ins., and from the sills under the trolley board, 9 ft. 5¾ ins.; height from the track to the platform step, 14 ins., and from step to the platform, 12 ins. The side sills are 5¼ ins. x 5½ ins.; the wheel pieces, 5¾ ins. x 7 ins., and the end sills, 4¼ ins. x 6 ins. Z-iron bars, 3¼ ins. x 5-16 ins. are inside of the side sills and rest upon the wheel pieces. The car is mounted on No. 21-E trucks, with 7 ft. 6 in. wheel base and 4 in. axles. Two 25-hp motors are used. The weight of the car and the trucks without the motors is 15,300 lbs. The seats, platform gongs, bells and other specialties are of Brill manufacture.

A PRACTICAL SASH BALANCE

The National Lock Washer Company, of Newark, N. J., is making a very neat device, known as the National sash balance, which, as its name implies, is used for balancing the weight of the sash. It is a specially made spring roller, which is held in brackets at the highest part of the sash slide. It is placed out of sight, and so made that it is impossible to get out of order. This roller is held to the sash by two belts, one at each end of roller. These belts are connected with the roller by brass straps locked in groove of roller, and the lower ends connected to the sash by hooks secured to the belting by



CUT-AWAY VIEW, SHOWING SASH BALANCE

brass straps. These hooks fit into eyes which screw into top of the sash, thus making it easy to take out the sash when necessary. The screw eyes can also be raised or lowered one or more turns to equalize the belt on each side. If a stronger tension is required, one belt at a time can be unhooked and passed around the roller. If less tension is required, belt can be unhooked and one turn taken off, making it unnecessary to ever take roller down to regulate or adjust it. All of the wearing parts are of sheet brass, making it practically indestructible. The movement of the sash with this balance is easy and noiseless. The belting connections are simple and strong, and do not come in front of the glass where upper sash is used. It is easily fitted to sash and takes up little space. This device operating with the company's National sash lock, automatically locks the window at any height. This balance can be adjusted to any weight of sash, so that when levers of the lock are released, sash will be raised at once.

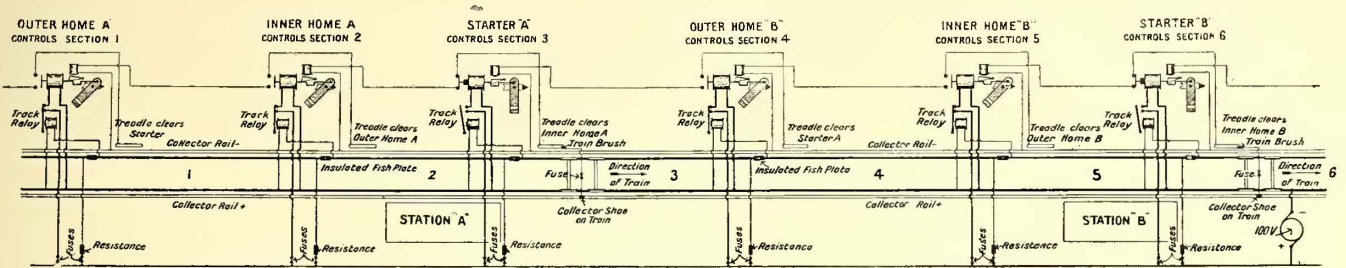
BLOCK SIGNALLING ON THE GREAT NORTHERN & CITY RAILWAY

An electric block-signal system, with a number of novel features, has recently been installed by the Automatic Block Signal Company, on the system of the Great Northern & City Railway, of London. This company operates one of the latest underground electric railways of London, and its system was described in the STREET RAILWAY JOURNAL for March 5, 1904.

As it was considered desirable on underground railways to do away as far as possible with moving parts in the run-

block-treadle control energized by the same current as works the trains was introduced. The track and treadle circuits can be said to be interlocked with each other in the same manner as an ordinary mechanical semaphore signal is pulled off by two signalmen from their respective boxes.

Thus, no signal can go to "line clear" unless a train has passed completely out of the block section and entered the next block to the extent of the overlap, which is usually about 350 ft. to 400 ft. or more, according to local conditions, as the tail brush is fixed on the last vehicle of each train. The contact of the treadle brush with the block treadle fixed alongside the track serves to remove the block from the sig-

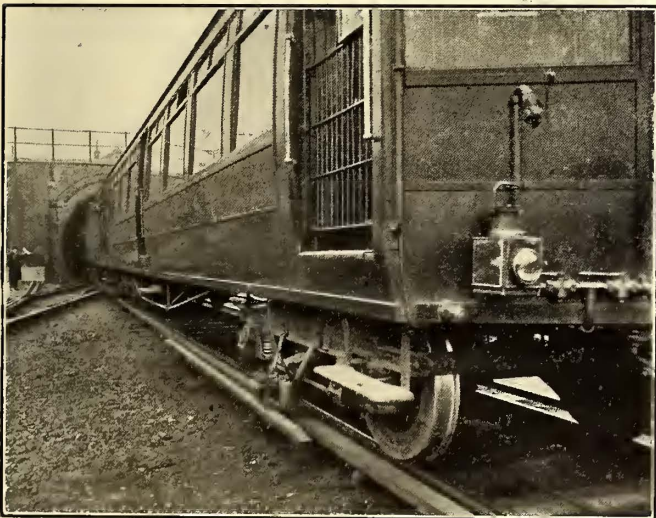


DIAGRAMMATIC LAYOUT OF SIGNAL SYSTEM ON THE GREAT NORTHERN & CITY RAILWAY

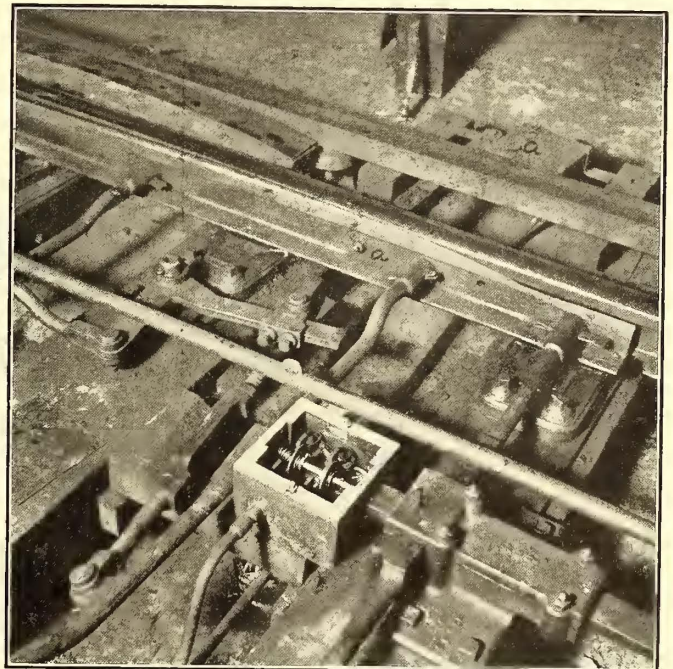
ning tunnels, where restricted clearance and frequent train service allow of no time for inspection along the track during traffic hours, the system was so arranged that all the controlling and moving apparatus are installed in the signal towers, where the essential parts are accessible at all times and can be seen in operation and easily maintained. The signalling is automatic at through stations, and semi-automatic at stations equipped with switches and crossings and at terminals.

The running rails on the Great Northern and City Railway are not utilized as a return for the train current, and therefore were available and have been used for the track-circuit signal control. Both running rails are bonded, one rail being bonded continuously, and the other bonded and

nal to the section or sections in the rear. That is, the function of the track relay is to drop its armature, putting the signal to danger by opening the local signalling circuit when any pair of wheels enters the section it controls. Once the signal has gone to danger, it remains locked there by a stop which falls into place by gravity, and can only be removed when the train has passed the corresponding treadle in advance. It will be observed that should a train become de-



TAIL BRUSH PASSING OVER TREADLE



SWITCH AND BOLT LOCK DETECTORS

divided up into sections to correspond with the sections controlled by each signal. Simple direct-working relays are placed across the track rails at one end of each section, and the current is fed in at the opposite end of each section, at a pressure varying from 3 volts to 7 volts. This current is supplied from a 100-volt generator, and the pressure is reduced by lamp resistances between the 100-volt main and the track rails. To guard against any irregular operation of the track relays by stray currents, a

railed, or divided and leave a portion behind—a remote possibility on modern electric railways with air brakes running from end to end of the train—or should a single car be derailed in such manner that its wheels are free of the running rails, and the track relay being thus clear, the treadle control would still be there to protect the block, and provide an additional safeguard.

The diagram shows a train which, having entered a section, has placed the starter at danger, and the train treadle brush

in the act of clearing the lock on inner home signal in the rear. All the signals drop to danger should the 100-volt circuit fail. If the 500-volt circuit should fail, the passing of the train over a treadle will not energize the treadle, and, consequently, although the signal drops to red immediately behind the train, as it should, the signal controlling the section further in the rear also remains at red.

The tunnel signals contain no moving parts, and the red and green signals are given by the switching in and out of incandescent lamps behind fixed red and green bull's-eyes. The signals in the open are controlled and interlocked in exactly the same way as the tunnel signals with the addition of a semaphore arm worked by an electric motor. All signals are repeated back into the towers, a valuable feature which is found a great convenience in operation, as the position of the trains can be ascertained at once when required.

The operation of signals at termini and cross-over roads is semi-automatic, as the trains set the signals automatically to "danger" on entering the section, but the signalman puts the signals to clear by hand providing the road is properly set and the line clear. The signal circuit at these situations depends for its continuity on the road being set correctly both at the switches and in the signal cabin. A view on page 363 shows the switch detector attached to the tongue of the switch by means of an arm which works an electric contact switch, *a*. There are two such arms at each facing switch, one on each side of the switch, so as to turn the switch to the left or right. This, combined with the switch-lock detector *b* insures the signal coming off only when everything at the switches is in good working order.

The signal tower contains mechanical levers for the switches and the signal-controlling gear. One interlocks with the other, and the signalman is guarded against any

no signal can be put to clear by a signalman at either automatic or semi-automatic stations, and in the former case, only under special circumstances unless the road is clear and properly set.

The equipment was installed under the direction of R. P. Brousson, engineer and traffic manager of the line, by J. E. Spagnoletti & Co., contractors. Ætna insulators, supplied by R. W. Blackwell & Co., were used for the treadles.

SINGLE-PHASE EXTENSION IN MILWAUKEE

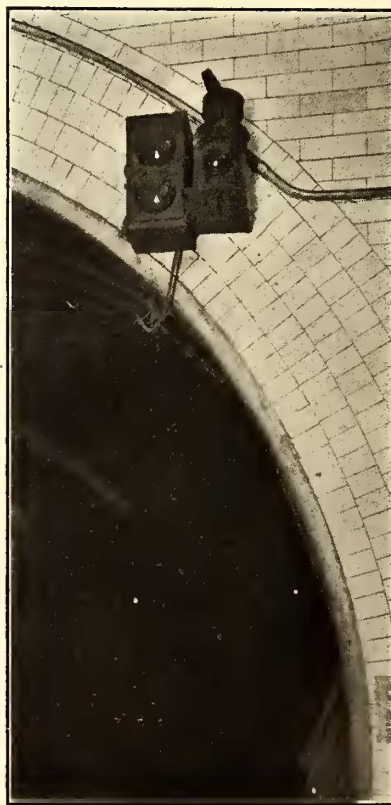
The Milwaukee Electric Railway & Light Company has recently placed an order with the General Electric Company, of Schenectady, N. Y., for a single-phase apparatus for the equipment of two extensions which the company is building. One of these extensions is from the present terminal of the Waukesha Beach line on Pewaukee Lake to Oconomowoc, and the other is an extension of the Muskego Lakes line from Muskego Center to Mukwonago and East Troy. The company has adopted single-phase electrical equipment for these outlying lines to avoid the necessity of additional power houses or sub-stations.

REPORT MADE ON THE SANITARY CONDITIONS OF THE NEW YORK SUBWAY

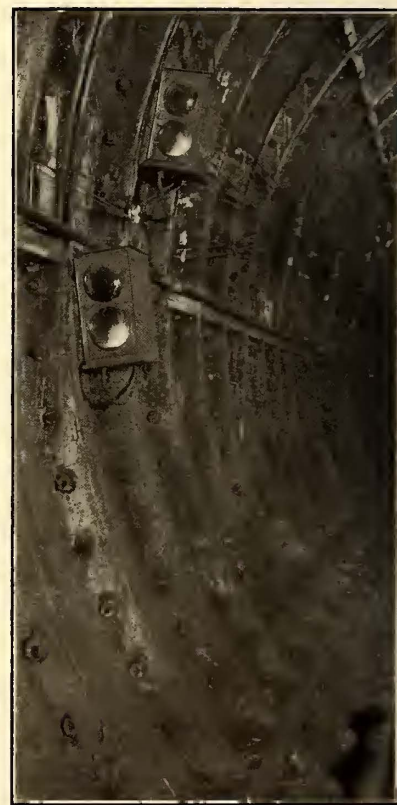
George A. Soper, Ph. D., consulting sanitary engineer of the Rapid Transit Commission, states that the average temperature in the Subway during last July and August was 5.6 degs. higher than in the streets, and that in the hottest week it was about 10 degs. higher. He does not consider this injurious to health, if the Subway is kept clean. There



SEMAPHORE AT STATION



SIGNAL LANTERN AT STATION



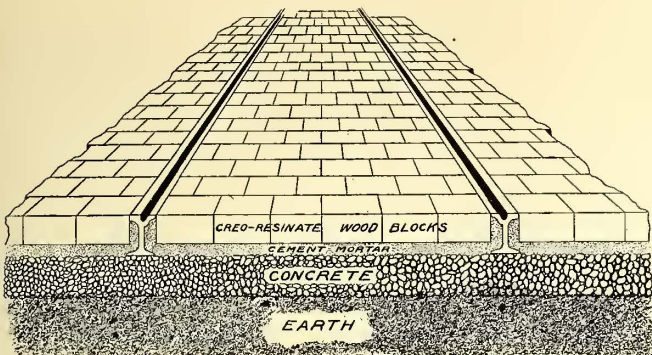
SIGNAL LANTERN IN TUNNEL

error, on account of the actual working of the signals and road levers, being governed by the track circuit and the position of the trains. The correct location of the trains enables the right apparatus to become free for operation. The signal can be put to danger at any time when desired, but

is only a slight decrease in the average amount of oxygen and a slight increase in carbon-dioxide as compared with the outside air, and of bacteria there were more than twice as many in the streets as in the Subway. Recommendations are made for improving the sanitary conditions.

CREO-RESINATE WOOD BLOCKS FOR PAVING

The recent decision of the city of New York to have over a mile of the busiest part of Broadway—from the Battery



CROSS-SECTION OF TRACK, SHOWING METHOD OF PAVING WITH WOODEN BLOCKS

to the Post Office—paved with treated wooden blocks, has resulted in one of the most important awards ever made for wood paving. The authorities of the metropolis had previously tried these blocks on a number of side streets, and as they proved satisfactory it was finally decided to give their manufacturer, the U. S. Wood Preserving Company, of New York, the Broadway contract mentioned. It is interesting to note that by this action in favor of wooden paving New York is following the example of such European cities as London and Paris, which have long recognized the merits of properly treated blocks as regards noiselessness, cleanliness and low maintenance cost. To street railway companies, this subject is of special interest as so many of them are burdened with the heavy ex-



ALONG LEXINGTON AVENUE, NEW YORK, WHICH IS PAVED WITH CREO-RESINATE WOOD BLOCKS

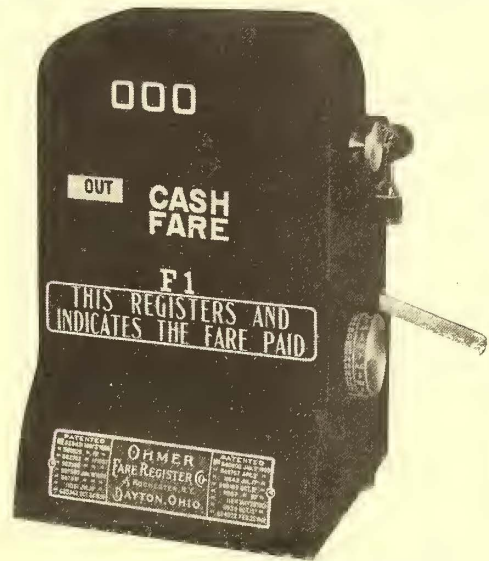
pense incident to keeping in repair the asphalt or granite pavements between their rails, and, in particular, whenever track repairs of any kind are necessary.

The paving blocks furnished by the U. S. Wood Preserving Company are made of pine treated by the creo-resinate process, which impregnates the blocks with a mixture of creosote and resin. The creosote acts as a preservative, taking the place of the sap in the wood,

while the resin hardens the block, makes it waterproof and keeps the creosote from washing out or evaporating. These blocks are quickly laid, and can be easily taken up whenever track repairs are necessary. As they are made of wood, only an axe is needed to shape them for fitting into odd corners. In fact, no other form of paving can be taken up or laid so cheaply. The accompanying drawing has been prepared to show a standard roadbed covered with these blocks, and designed to withstand the most severe traffic. The half-tone illustration is a view on Lenox Avenue, New York, on which the New York City Railway Company operates one of its most important lines.

A NEW TWO-FARE RECORDING REGISTER

The Ohmer Fare Register Company, of Dayton, Ohio, has added to its several types of registers a two-fare recording machine, provided with total passenger indicating wheels, identification key, and printing device. It is of strong and



TWO-FARE RECORDING REGISTER

durable construction, and is easily operated by rod movement from either or both sides.

As its arms are adjustable, it can be attached to rods in all sizes of cars. It is built especially for heavy city work, and is the result of ten years of careful study and experience in the building of registers for street and interurban cars. The printed records from this type of register show all details desired by railway managements. They can be easily removed, are in very convenient form, and constitute a complete check over all the operations of the conductors.

NATIVE OPERATIVES ON THE MANILA STREET RAILWAY

The experiment made by the operating department of J. G. White & Company, through its resident general manager in Manila, H. A. Belden, in depending solely on native Filipinos to man the cars of the Manila Electric Railway, is proving eminently successful. It was feared in some quarters that a certain well-known tendency toward unreliability in the native character would manifest itself almost certainly in this work, more exacting than any natives had heretofore been called upon to perform in numbers since the American occupation, but thus far such fears have proven absolutely groundless.

It must be remembered that to operate a modern electric

car in the crowded streets of an Oriental city, where the traffic and pedestrians are absolutely at variance and unaccustomed to so foreign an element, calls for the full measure of steadiness and resourcefulness to avoid accident. It is a fact that

under these trying conditions the Manila Electric Railway is being operated with what may be justifiably considered a minimum of accident. To appreciate fully the peculiar demand for steadiness, one must have had experience in trying to progress through the streets of a Far Eastern metropolis. Pedestrians use the roadway very often in common with vehicles, and may generally be persuaded to make way only when their lives are actually endangered. A narrow escape from death is uniformly treated as a good

joke, not only by the observers, but by the principal as well. Under the circumstances, the almost complete freedom from serious accident in the operation of the line is decidedly noteworthy. The conductors, too, uniformly show the ability to live up to the requirements of their work.

These facts are significant of the possibilities in the native Filipino character, when given just opportunity to display itself, and will prove especially interesting to Americans, watching the industrial development of the islands.

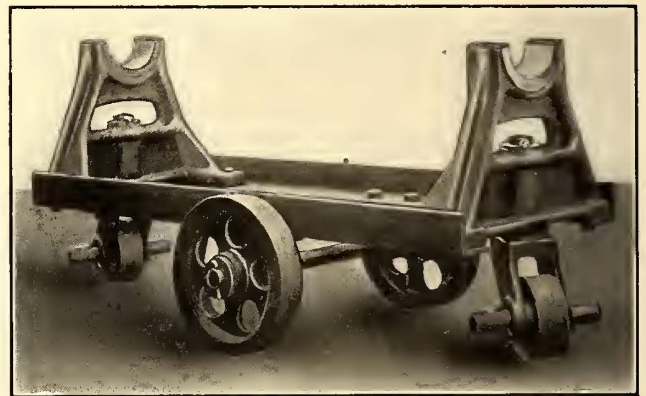
A HANDY ARMATURE BUGGY

The American General Engineering Company, of New York, has recently designed a simple but effective truck for handling armatures. It will be seen from the accompanying illustration that the truck takes up hardly any more room

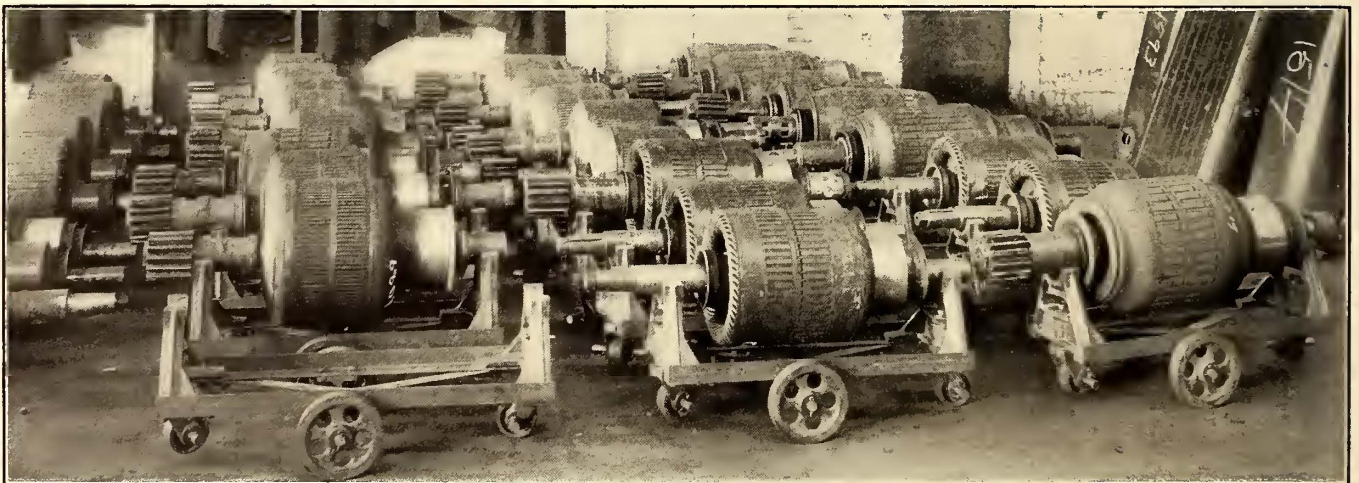
the tilting effect. These main wheels are constructed of cast iron. By bearing down on one of the malleable-iron pivot casters at the end, the truck and its load can be easily transported through the shops. Any num-



A GROUP OF NATIVE EMPLOYEES OF THE MANILA STREET RAILWAY



ARMATURE TRUCK WITH BABBITTED BEARINGS



A GROUP OF ARMATURE TRUCKS, SHOWING THE PROTECTED POSITION AND ACCESSIBILITY OF THE ARMATURES

than the armature, so that the armatures can be easily stored in accessible positions without coming into contact with nails, splinters or other odds and ends. The two side pieces are made of steel, and the gray iron end brackets which hold the armature shaft have babbitted bearings. The truck is carried on two 8-in. diameter wheels placed out of center to secure

ber of these trucks can be operated with the aid of an interchangeable handle. It is not practicable to give any exact dimensions of this truck, as these depend entirely on the size of the armature. For accommodating armatures requiring inside distances of $28\frac{1}{2}$ ins. and 33 ins. between bearings, the truck needed does not weigh more than 100 lbs.

LEGAL DEPARTMENT*

INJURIES SUSTAINED THROUGH ELECTRICAL APPLIANCES

Officers of railroad companies are familiar with the duty of extraordinary care and special liabilities on the part of common carriers to passengers. With regard to danger of injury from electricity, very much the same measure of care and responsibility is exacted in behalf of all the world. Practically all the cases on the subject hold that those who supply or use electrical power or light must take extraordinary precautions to avoid injury to others. The reason for the rule is obvious in the occult, but extremely dangerous, nature of electrical currents. It was, for instance, held by the Supreme Court of Minnesota, in *Gilbert vs. Duluth General Electric Company* (100 N. W., 653), that electric companies are bound to use reasonable care in the construction and maintenance of their lines and apparatus. This care varies with the risks to be apprehended from negligence. Where the wires carry strong and dangerous currents of electricity, and the result of negligence may be exposure to death or serious accident, a high degree of care is required. Under such circumstances "reasonable care" and a high "degree of diligence" may be deemed to be synonymous. It was definitely decided that parties installing electric light fixtures in houses are not bound to anticipate that electric light companies furnishing electricity to the public will be negligent in either the construction or maintenance of their respective systems connecting therewith, and the installation of a defective electric socket by plaintiff's intestate at his place of residence did not constitute such contributory negligence as will preclude a recovery.

That the court will, however, impose some limit upon the responsibility of those who supply electricity was exemplified by the decision of the Supreme Court of Iowa, in *Harter vs. Colfax Electric Light & Power Company* (July, 1904, 100 N. W., 509). It appeared that a guest in a hotel was injured by an electric shock, owing to an electric light wire falling on him, but it also appeared that the wiring was not done by the defendant, the company furnishing the electricity. It was held that the doctrine *res ipsa loquitur* did not apply in the absence of evidence that the accident was due to a dangerous current knowingly, or even negligently, sent into the building, and, therefore, that there was no presumption of negligence on the part of the one furnishing the electricity, which it was necessary for it to rebut. In harmony with the decision in the Minnesota case (*supra*), however, the Iowa court conceded that the defendant company owed "to the owner of the property and to any person rightfully upon the premises, the duty of not sending into the hotel a deadly or dangerous current of electricity. Handling, as it did, a dangerous element, it was held to the highest degree of care in the construction, inspection, repair and operation of its plant and machinery; but it was not an insurer against all accident."

In the recent decision of the Supreme Judicial Court of Massachusetts, in *Mahan vs. Newton Electric Railway Company* (75 N. E., 59), the duty of extraordinary care was enforced against a street railroad company in behalf of the estate of a person other than a passenger.

It was held that the defendant might be liable for the death and conscious suffering of a lineman of an electric light company caused by reason of an electric shock received while engaged in putting a cross-arm to a pole of the light company. It was expressly laid down that a violation by a lineman of a rule of the electric light company employing him that linemen should treat every light wire as a live wire is not conclusive evidence of negligence, but only a circumstance to be considered with others. As to the general duty of care, the following language from the opinion is significant:

"The negligence relied on is the failure of the defendant to

put up and maintain guard wires. There was evidence, which was objected to by the defendant, tending to show that it was customary to use such wires, and that they were in general use at the time of the accident, and that they were used to prevent other wires from coming in contact with the trolley wire, which was an uncovered wire, and thus becoming charged. The witness who testified to this admitted on cross-examination that some systems did not use such wires, and that they were not used in many important localities in this vicinity. The defendant was operating cars in the public streets by the use of a highly dangerous agency. It was bound to know that other wires were or might be strung along the streets for various purposes, and that persons would or might be employed to work upon them, and it was its duty, in the exercise of reasonable care, to adopt such precautions as were proper to prevent its own wires from coming in contact with the wires upon which such persons were or might be employed and injuring them. It was for the jury to say, taking everything into account, including the expense and practicability of guard wires and the way in which the trolley wire was put up, as to which there was evidence from the defendant, whether the defendant had performed this duty, and whether the plaintiff's intestate was injured and killed in consequence of its failure to do so. It could not be ruled as matter of law that there was no evidence of negligence on its part, or that the negligence, if any, had not resulted in harm to the plaintiff's intestate."

CHARTERS, ORDINANCES, FRANCHISES.

ALABAMA.—Injunction—Trespass—Leases—Reservations—Exercise of Power—Construction—Street Railways—Character—Statutes—Constitution—Mandatory Provisions—Introductory Clause—Compliance.

1. Where a street railway's entry into complainant's park was lawful if properly made, and became unlawful only because it was that the entry was by force at the hands of one from whom the possession was wrongfully withheld, a court of equity, in the absence of irreparable injury from the mode of entry and occupation, would not protect the possession of one wrongfully seeking to withhold it, by injunction, but would leave such complaint to redress the forcible trespass by ordinary remedies.

2. Where a lease of land for park purposes reserved to the grantor the right to grant a right of way through the park for street railway purposes, mere acquiescence by the lessors in a prior entry of a street railway company into the park at the instance of the lessees, and its use of a part of the premises as a station for receiving and delivering passengers, did not constitute an exercise of the power reserved.

3. An electric railway, operating beyond the limits of a city, and into a town incorporated for the mere maintenance of a park adjacent to the city, was a street railway, within a power reserved in the lease of the land used for the park, reserved to the lessors the right to grant a right of way through the land "for street railway purposes."

4. Const. Ala., Section 45, providing that the style of laws of the State shall be, "Be it enacted by the Legislature of Alabama," is mandatory.

5. Under Const., Ala., Section 45, providing that the style of laws of the State shall be, "Be it enacted by the Legislature of Alabama," Act March 20, 1903 (Acts 1903, p. 116), amending Code, Section 1283, the enacting clause of which stated that it was enacted by "the Legislature of Alabama," was not defective because it also declared that "the Legislature of Alabama" which enacted the statute was "the Legislature of the State of Alabama."

ARKANSAS.—Street Railway Franchise—Authority to Revoke—Presentation of Question—Appeal—Supreme Court—Injunction—Power to Grant—Provisional Relief.

1. Where, in a suit to annul a street railway franchise conferred by ordinance providing that, before the franchise should be enjoyed, the company should obtain from the County Court a confirmation of the right of way over a bridge, the complaint alleged that application to the County Court to confirm the right of way had never been made, and the answer admitted the allegation, and the only proof was the testimony of the company's manager that no application was made to the County Court, and that he had believed that permission to cross the bridge would not be granted, the question of the authority to revoke the franchise on the refusal of the County Court to grant permission was not presented.

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

2. The Supreme Court, on appeal from a decree annulling a street railway franchise, has no authority to restrain the city from interfering with the tracks constructed under the franchise before the commencement of the suit, pending further proceedings by the company to test its rights under a municipal ordinance; that being a provisional relief to be awarded by the court in which the further proceedings are instituted, subject to review on appeal.—(Little Rock Ry. & Electric Co. vs. City of North Little Rock, 88 S. W. Rep., 1026.)

INDIANA.—Eminent Domain—Condemnation for Right of Way—Measure of Damages—Instructions—Evidence—Opinions—Value of Land—Appeal—Harmless Error—Rejecting Evidence—Damages—Evidence.

1. The instruction, in proceedings to condemn land for a railroad right of way, that the damages are to be determined by finding the value of the land remaining after the company has appropriated its right of way and built its road, and determining the value of the entire lot as it now is, and, deducting one from the other, the difference being the measure of damages, sufficiently states the measure of damages, the difference in value of the real estate at the time of the appropriation, and the value of the residue after the strip is taken.

2. A witness who has testified as to his knowledge of land in question is competent to give his opinion as to its value before and after appropriation of a right of way through it, basing his opinion on the facts to which he has testified, though he shows that he is not familiar with the value of lands in the neighborhood, and knows of only one transfer.

3. Rejecting testimony of a railroad company's witness that the damages from its appropriation of land for a right of way was only \$200 is harmless; the company having introduced the testimony of many other witnesses that the damages were only from \$45 to \$150.

4. In proceedings to determine damages for condemnation of land for a railroad right of way, it is not error to admit evidence of a cut in the grade of the road along by the land in question.—(Consolidated Traction Co. vs. Jordan (No. 5489), 75 N. E. Reporter, 301.)

ILLINOIS.—Eminent Domain—Form of Verdict—Constitutional Law—Evidence.

1. In condemnation proceedings, an instruction as to the form of a verdict, leaving the amount to be allowed for compensation blank, but providing that "we, the jury, find no other property will be taken or damaged," is erroneous, where the evidence of defendant shows that it is entitled to damages for property not actually taken.

2. Local Improvement Act 1897, Sec. 23 (Starr & C. Ann. St. Supp. 1904, c. 24, par. 59), making the report of the commissioners in condemnation of a street prima facie evidence, being a mere rule of procedure, is not unconstitutional.

In condemnation proceedings by the city to extend a street across a railroad right of way, the city can show a way by user of less width than the street proposed, which fact is to be considered in connection with the evidence of defendant that the extension of the street across its railroad yards would render them less useful and greatly increase the cost of operation.—(Chicago Terminal Transfer R. Co. vs. City of Chicago, 75 Northeastern Reporter, 499.)

MASSACHUSETTS.—Municipal Corporations—Streets—Change of Grade—Damages to Abutting Owners—Street Railroads—Location—Change of Grade—Injuries to Abutting Owners—Same.

1. Where the grade of a street is altered by the grant of a location of a street railway, it is not altered "for the purpose of repairing such way," within Rev. Laws, c. 51, Sec. 15, providing that an abutter shall be entitled to compensation for damages sustained by the raising or lowering of a public way, or for the purpose of repairing such way.

2. Rev. Laws, c. 112, Sec. 44, making a street railway liable for injuries sustained during construction resulting from the carelessness of defendant's servants, if notice is given and an action begun as provided by chapter 51, Sec. 20, has no application to injuries suffered by an abutting owner by a slight raising of the grade of the surface of a street by the railroad company in the process of construction.

3. Where a street railway company was granted a location along a street, it was not liable for a slight raising of the grade from 6 to 15 inches, reasonably necessary as a matter of proper construction.—(Laroe vs. Northampton St. Ry. Co., 75 N. E. Reporter, 255.)

NEW YORK.—Carriers—Regulation—Transfers.

Railroad Law, Laws 1892, p. 1406, c. 676, Sec. 104, providing that

railroad companies within the limits of incorporated cities and villages shall forfeit \$50 to the aggrieved party for each failure to give a transfer entitling a passenger to a continuous trip to any portion of the railroad, does not require the giving of a transfer between two separate lines controlled by the same corporation, where they do not intersect, though one line approaches within 30 feet of the other.—(Ketcham vs. New York City Ry. Co., 95 N. Y. Supp., 553.)

NEW YORK.—Carriers—Transfer Tickets—Mutilation—Rejection by Carrier.

A street railway company may, pursuant to its rules, refuse a transfer ticket mutilated after coming into the possession of the passenger receiving it, but cannot refuse a ticket mutilated before given him.—(Koch vs. New York City Ry. Co., 95 N. Y. Supp., 559.)

PENNSYLVANIA.—Street Railroads—Use of Street Application to City—Second Application—Application of Second Company.

1. Act June 7, 1901, Sec. 1 (P. L. 514), relating to street railroads, requires that the consent of the local authorities for the right to occupy the street shall be promptly applied for, and shall have been obtained within two years from the date of the charter. Held, that a delay after incorporation to apply for consent is immaterial, where it does not extend beyond two years.

2. Where a street railway company has applied, under Act June 7, 1901, Sec. 1 (P. L. 514), for permission to occupy the streets of a town, the fact that its first application is denied does not prevent a subsequent application within the two years granted by statute.

3. Where a street railway company has applied within the time granted by Act June 7, 1901, Sec. 1 (P. L. 514), for leave to occupy the street of the town, and has been twice refused, and a second street railway company has started its proceedings to extend its road within the two years, but when they were nearing their close, after the right of the first company has expired by the lapse of the two years, the second company is entitled to obtain the consent of the town.—(Nanticoke Suburban St. Ry. Co. vs. People's St. Ry. Co., of Nanticoke and Newport, 61 Atlantic Reporter, 997.)

PENNSYLVANIA.—Injunction—Laches—Acquiescence.

A street railway company secured the consent of a land owner to the location of its railway in a public road. The road was constructed, and afterwards the township sued to enjoin the railway from extending its switch in front of the property of the land owner. Thereafter the township waived its right to enforce the decree in its favor. Held, that the testamentary trustees of the consenting owner could not, eight years thereafter, and thirteen years after the consent was given, maintain a bill to compel the railway company to remove the switch.—(Taylor et al. vs. Erie City Pass. Ry. Co., 61 Atlantic Reporter, 992.)

PENNSYLVANIA.—Railroads—Motive Power—Electricity.

1. Where a railroad was incorporated under Act April 4, 1868 (P. L. 62), providing that every company incorporated under it shall be entitled to exercise all the rights and privileges given by Act April 19, 1849 (P. L. 79), it was not restricted to the use of steam as a motive power, but can use electricity; nothing being stated in the act about the kind of power to be used.

2. A railroad company, where it is not limited as to the power to be used, is required to use that which is best and most convenient for its operation, having due regard to the safety of the public.—(Howley vs. Central Valley Ry. Co., 62 Atlantic Reporter, 109.)

LIABILITY FOR NEGLIGENCE.

ALABAMA.—Street Railroads—Collision at Crossing—Personal Injuries—Complaint—Allegation of Negligence—Sufficiency—Trial—Evidence—Objections—Sufficiency—Appeal—Error in Refusing Instructions Cured by Instructions Given—Negligence—Question for Jury.

1. A complaint, in an action against a street railway company for injuries sustained by a mail clerk on a railway train in a collision with a street car at a crossing, which alleges that defendant was operating a street car line which crossed the tracks of the railway; that on the day of the accident the train collided with a street car at the crossing, and as a proximate consequence thereof plaintiff, who was on the train, was injured; and that the collision occurred and plaintiff received the injury by reason of defendant's negligence—is good, as against a demurrer averring that the allegations are indefinite and fail to show any negligence on defendant's part, and fail to show any duty owing by defendant to plaintiff.

2. Since a plaintiff, in an action for injuries received in a collision between a train and a street car, may testify to what he did at the time of the collision as a part of the *res gestæ*, a motion to exclude plaintiff's evidence relating to what he did at the time of the accident, together with his uncommunicated motives, is properly refused, for failing to single out the inadmissible evidence as to his motives.

3. Where, in an action for personal injuries, the only element of damages for loss of time proved was what plaintiff was earning, and the evidence showed that he was paid his wages while he was not working, the error in refusing to charge that plaintiff was not entitled to recover for the time lost was cured by a charge that he was not entitled to recover for lost wages.

4. Where, in an action against a street railroad company for injuries received by a person on a railway train by a collision with a street car, the evidence showed that a car of defendant was sufficiently near to the crossing of the railroad tracks to be run into by the train, the question whether the car was placed there through the negligence of defendant was for the jury, though it did not offer any evidence to negative the inference that the car was placed there by its servants.—(Birmingham Ry., Light & Power Co. vs. Livingston, 38 Southern Reporter, 374.)

ALABAMA.—Carriers—Passengers—Existence of Relation—Evidence—Who are Passengers—Questions for Jury—Injuries to Passengers—Negligence—Unusual Jerks.

1. On the issue of whether a small child, riding on a street car in company with his parent, but for whom no fare was paid, was a passenger, evidence of a general custom on the part of the street railway not to charge fare for the carriage of small children is competent.

2. A small child, riding on a street car in company with his mother, who pays a fare for herself, is a passenger, although no fare is paid for such child, where there is a general custom on the part of the street railway not to charge fare for the carriage of small children.

3. Testimony that "there were about seven or eight passengers on the car, and (plaintiff) was one of the passengers," raises a question for the jury on the issue of whether plaintiff was a passenger or not.

4. Evidence that a street car was stopped with unusual suddenness and a jerk, and that by the sudden stopping of the car plaintiff was thrown from his seat and injured, raises a question for the jury on the issue of negligence in the manner of stopping the car.—(Ball vs. Mobile Light & Ry. Co., 39 Southern Reporter, 584.)

ALABAMA.—Witness—Cross-Examination—Scope of Inquiry—Impeachment—Predicate for Proof of Inconsistent Statement—Appeal—Harmless Error—Ruling on Question to Witness—Carriers—Assault and Battery by Conductor—Instructions—Trial—Undue Prominence to Particular Evidence—New Trial—Papers Improperly Sent to Jury Room—Proceedings to Produce—Affidavits of Jurors—Grounds—Conduct of Counsel—Appeal—Questions of Fact—Decision on Motion for New Trial.

1. The scope of inquiry on cross-examination is limited only by the sound discretion of the court, with a view to test the memory, skill, accuracy, and judgment of the witness and the consistency of his answers with each other and with his present testimony.

2. A question propounded to a witness with reference to what he said to a third person was proper, where it laid the predicate for proof of a statement which, if made by the witness, was contradictory to his evidence.

3. Any error in allowing a question to be propounded to a witness as to contradictory statements made to a third person would be cured by the evidence of such third person, when called to prove the contradictory statement that no such statement was made.

4. In an action against a carrier for damages for assault and battery committed by its conductor upon a passenger, the court charged that, "even though it be the duty of the conductor to keep (plaintiff) out of that part of the car for white people, yet it was the duty of the conductor not to use any more force than was necessary for that purpose, and, if no force was necessary, then it was the duty of the conductor not to use any force to injure plaintiff." Held, that the giving of such charge was not reversible error, even if it be conceded that it is argumentative and abstract.

5. A requested instruction, giving undue prominence to the evidence of a witness named, is properly refused.

6. That the bill of exceptions which was reserved on a former trial of the case was inadvertently handed to the jury on their retirement was not ground for new trial, where the proof offered by defendant to support this ground of the motion did not show who handed the papers to the jury, and there was no claim that the

possession by the jury of such bill was the result of misconduct on the part of anyone, and it was further shown that the bill was not read by the jury.

7. Where a motion for a new trial is asked on the ground that the bill of exceptions which was reserved on a former trial of the case was improperly sent to the jury room, affidavits of the jurors are admissible to show that the bill was not read in the jury room.

8. The persistence of counsel for plaintiff in their effort to prove the general reputation of plaintiff is not ground for a new trial, where no witness gave evidence of such reputation.

9. The Supreme Court will allow all reasonable presumptions of the correctness of the judgment denying a motion for a new trial, and will not reverse on the ground that the preponderance of the evidence is against the verdict, although the verdict for plaintiff is supported only by his own evidence and that of one other witness, while the defense is supported by the evidence of four witnesses.—(Birmingham Ry. & Electric Co., vs. Mason, 39 Southern Reporter, 590.)

CALIFORNIA.—Carriers—Injury to Passenger—Instructions.

1. In an action against a street railroad for injuries sustained by a passenger while alighting from a car, a charge that the burden is on plaintiff to show that the injury was caused by the act of defendant in operating the instrumentalities employed in its business, and that, if this be shown, there is a presumption of negligence, which throws upon defendant the burden of showing that the injury was sustained without negligence, was not subject to the objection of withdrawing from the jury the issue whether the car started while plaintiff was alighting therefrom, or whether he voluntarily left the car while it was in motion, or to any other objection, when considered with other instructions that a passenger who voluntarily alights from a moving car assumes the risks thereof, and cannot recover for injuries sustained, and that, if plaintiff alighted from the car while it was in motion, and was thereby injured, he was guilty of such negligence as to preclude a recovery.

2. Nor, in view of the above instructions, and the fact that the only issue was whether the car started while plaintiff was alighting therefrom, or whether he voluntarily left the car while it was in motion, was it error to refuse a charge that "in a case of this character the burden of proving negligence rests on plaintiff, and he must prove the negligence alleged in the complaint by a preponderance of evidence."—(French vs. Pacific Electric Ry. Co., 82 Pacific Reporter, 395.)

CALIFORNIA.—Carriers—Injuries to Passengers—Street Railroads—Instructions—Time to Alight—Premature Start—Negligence—Presumption—Trial—Issues—Instructions—Carriers—Injuries to Passengers—Actions—Instructions—Appeal—Review—Harmless Error.

1. An instruction, in an action for injuries to a passenger, that the carrier is required to exercise the highest degree of care in transportation of passengers, and that a showing that the injury was caused by the carrier's act in operating the instrumentalities employed in its business raises a presumption of negligence, which throws on the carrier the burden of showing that the injury was sustained without its negligence, was not erroneous, as requiring defendant to overcome plaintiff's showing by a preponderance of the evidence; the court having also charged that plaintiff was required to prove her case by a preponderance of the evidence.

2. Where a passenger alleged injuries by the premature starting of a street car as she was attempting to alight, the case was one in which the presumption of negligence arose from injuries resulting from the carrier's act in operating the instrumentalities used in its business.

3. Where the issues made by the pleadings were simple, were apparently not in dispute, and had probably been correctly stated to the jury by counsel, as provided by Code Civ. Proc. Sec. 607, the refusal of a requested instruction stating the issues to the jury was not error.

4. The court may properly refuse a request to charge fully covered by other instructions given.

5. Where, in an action for injuries to a passenger on a street car by an alleged premature start, the only negligence submitted to the jury related to the management of the car at the very moment of the accident, it was not error to refuse to charge that the carrier's failure to stop the car at the street where plaintiff intended to alight was not the proximate cause of her injury and did not entitle her to recover.

6. Where, in an action for injuries to a passenger, the court charged the proper measure of damages, and there was no evidence of any injuries other than those specifically alleged in the

complaint, defendant was not prejudiced by the refusal of an instruction limiting plaintiff's recovery to such specified injuries.—(Cody vs. Market St. Ry. Co. (S. F. 3489,) 82 Pacific Reporter, 666.)

CALIFORNIA.—Damages — Personal Injuries—Excessiveness — Trial—Expert Testimony—Cautionary Instructions—Reversible Error—Evidence—Presumptions—Failure to Call Witness.

1. In an action for injuries to a passenger, evidence held insufficient to show that a verdict for \$2,000 was excessive, or that the jury were influenced by anything outside of the evidence.

2. In an action for injuries to a passenger, refusal to give a cautionary instruction as to the weight to be given expert medical evidence was not reversible error.

3. Where, in an action for injuries to a passenger, it appeared that she had been visited by four different physicians, one of whom, at least, was in defendant's employ, and two of them were merely called in consultation with the physician who had charge of the case, who was called as a witness, defendant having failed to call the others, it was not error for the court to refuse to charge that, where a party offers weaker or less satisfactory evidence, when it appears that stronger and more satisfactory evidence was within his power, the evidence offered should be viewed distrust.

4. Where the court charged that each item of damage claimed by plaintiff must be shown to a reasonable degree of certainty by a preponderance of the evidence, and that the law authorizes such reasonable damages as the jury deem plaintiff entitled to under the evidence, an instruction that in reaching a verdict the jury should not only consider all the evidence, but also all surrounding circumstances and draw all inferences from such circumstances and from the testimony as may be reasonably drawn, was objectionable, as authorizing the consideration of facts in addition to the evidence.—(Wood et ux. vs. Los Angeles Traction Co., 82 Pacific Reporter, 547.)

ILLINOIS.—Appeal—Review—Carriers—Injury to Passengers—Negligence—Contributory Negligence—Instructions—Trial—Instructions.

1. Where, on appeal to the Supreme Court from the Appellate Court, appellant obtains leave to file the briefs and arguments used in the Appellate Court, only those points urged in the Appellate Court will be reviewed, and not those made in a petition for rehearing in the Appellate Court; permission for leave to file having been denied.

2. Running an extra car so close to a preceding car that it could not be stopped on the slippery rails when the preceding car had stopped at a street crossing shows negligence in managing the car.

3. Where a car had stopped to allow passengers to get off, at a crossing, that a passenger stood on the rear bumper of the car, not knowing that another car was approaching from the rear, is not negligence per se.

4. In an action to recover for injuries received in a rear-end collision between street cars, an instruction directing a verdict for defendant, if the collision was caused by the unavoidable slipping of the rear car on the wet rails, or if the usual means were taken to stop it, is properly refused for failing to consider the question as to whether the motorman attempted to stop the rear car in due time.

5. The refusal of instructions already covered by those given is not reversible error.—(Chicago City Railway Co. vs. Schmidt, 75 N. E. Reporter, 383.)

ILLINOIS.—Trial—Directing Verdict—Damages—Personal Injuries—Expenses—Evidence—Trial—Objections to Evidence—Evidence—Declarations Against Interest.

1. Where plaintiff's testimony as to the manner in which he was injured while attempting to board a street car is improbable, and defendant's evidence tends to show that he was injured on a different day, and in an entirely different manner, it is error to take the case from the jury.

2. A passenger, injured on a street car by the negligence of the railroad company, may recover all reasonable doctor's and surgeon's fees, and may show that a further surgical operation may be necessary.

3. Where, in an action for personal injuries, there is no evidence that a surgical operation has been performed or is necessary, evidence that a man in plaintiff's station of life would have to have \$200 to be operated upon is incompetent.

4. Defendant objected to a question asked of a witness, and the court allowed the witness to answer after the question was put in a different form. Held in effect an overruling of the objection,

and on defendant's exception the ruling is preserved for review.

5. In an action for personal injuries, evidence of statements of plaintiff made out of court to a doctor as to the cause of certain physical disorders prior to the accident in which the injuries were received, being in the nature of admissions against interest, was erroneously excluded.—(Chicago City Ry. Co. vs. Henry, 75 N. E. Reporter, 758.)

ILLINOIS.—Master and Servant—Injury to Servant—Defective Appliances—Fellow Servant—Vice Principal—Trial—Instructions.

1. A street railway company is liable for an injury to a servant because of the negligence of another servant in delivering a car without a motor handle, or with a handle which does not fit the car, and with which the car cannot be reversed.

2. If an injury to a servant is caused in part by the negligence of a fellow servant, yet the negligence of a vice principal contributed to the injury, the master is liable.

3. Where instructions given for defendant sufficiently cover an instruction asked by it and refused, the refusal is not cause for reversal.—(Chicago Union Traction Co. vs. Sawusch, 75 N. E. Reporter, 797.)

ILLINOIS.—Carrier's—Injury to Passenger—Presumptions—Burden of Proof.

1. There is no presumption of negligence on the part of a street car company, on proof that a passenger using due care was injured as the result of a collision between the car and a passing wagon.

2. In an action for injuries to a passenger on a street car by collision with a wagon, where the evidence is conflicting as to whether the car ran into the wagon or the wagon backed into the car, it is error to refuse an instruction that the burden of proof is on plaintiff to show by a preponderance of evidence that defendant was guilty of negligence.—(Chicago Union Traction Co. et al. vs. Mee, 75 N. E. Reporter, 800.)

ILLINOIS.—Carriers—Injuries to Passengers—Evidence—Rules of Carrier—Evidence—Opinions of Witnesses—Expert Testimony—Injuries to Passengers—Actions—Instructions.

1. In an action for injuries sustained by a passenger on a street car by being thrown to the ground by the sudden starting of a car as he was alighting therefrom, testimony of a common practice among passengers to get off cars at that place was competent.

2. In an action against a street railroad for injuries to a passenger sustained while alighting from the car during a stop at a railroad crossing, rules of defendant requiring cars to be stopped at a certain distance from railroad crossings, giving the motorman charge of the car while the conductor goes ahead to the crossing, and forbidding the motorman to start the car without seeing that no person is getting on or off, are admissible on the issue of defendant's negligence in starting the car.

3. In an action against a street railroad for injuries to a passenger caused by a sudden start of the car while he was alighting, a question asking witness whether it was physically possible for the motorman to see anybody getting off the rear platform in the nighttime was subject to the objection of calling for an opinion.

4. Testimony of a physician that in an examination of plaintiff he found "an apparent inability" to use the hip was properly allowed to stand, where witness subsequently stated that he could only form an opinion on the subject.

5. In an action against a street railroad for injuries to a passenger, where a rule of defendant relating to the conduct of employees at railway crossings was read in evidence, a charge that the rule was not admitted, and should not be considered as furnishing a substantive ground of complaint and base of recovery, was properly refused.—(Chicago City Ry. Co. vs. Lowitz, 75 N. E. Reporter, 755.)

ILLINOIS.—Carriers—Street Railways—Speed of Car—Contributory Negligence—Trial—Directing Verdict.

1. Where the seats, aisles, and platform of a street car are crowded, the railway company should so regulate the speed as to use the highest degree of care for the safety of passengers consistent with the practical operation of the car.

2. Whether it was negligence to board a car in its crowded condition, when urged by the conductor to "Crowd on! This is the last car for the city"—is a question of fact for the jury.

3. An instruction directing a verdict for defendant, if plaintiff had failed to prove certain allegations by a preponderance of the evidence, is properly refused, where a material allegation of negligence charged, and which the evidence tended to prove, has been omitted.—(Alton Light & Traction Co. vs. Oliver, 75 N. E. Reporter, 419.)

ILLINOIS.—Street Railroads—Collision with Wagon—Contributory Negligence—Trial Instructions.

1. In an action against a street railroad company for collision with plaintiff's wagon, whether plaintiff was in the exercise of due care held a question for the jury under the evidence.

2. Where a teamster deliberately drives on the tracks of a street car company, knowing that a car is approaching at a high rate of speed and must strike his wagon unless the car is stopped, and with intent to compel the car to stop, he is guilty of negligence per se.

3. Where an instruction given was identical in principle with one which was refused, the refusal was not error.—(Chicago Union Traction Co. vs. Jacobson, 75, N. E. Reporter, 508.)

ILLINOIS.—Negligence—Trial—Directing Verdict—Instructions—Street Railroads—Collision with Wagon—Care Required.

1. In an action for personal injuries, where the evidence is conflicting as to how the injury occurred, it is error to direct a verdict.

2. If an instruction is correct so far as it goes, and does not assume to point out all the elements necessary to a recovery, it may be supplemented by other instructions.

3. In an action for injuries caused by collision with defendant's street car, an instruction that a street railway company is chargeable with notice that the public may lawfully use the entire street, and that it must employ due care to avoid injury to persons using that part of the street occupied by its tracks, is not misleading in failing to charge that such persons must exercise due care for their own safety, where other instructions fully covered that phase of the case.—(West Chicago St. Ry. Co. vs. Schulz, 75 N. E. Reporter, 495.)

ILLINOIS.—Carriers—Diligence Required—Trial—Instructions—Evidence—Weight.

1. A street railway company must use all that care and vigilance for the protection of its passengers consistent with the practical operation of its road.

2. An instruction as to the care required of a carrier is erroneous which does not require it to be "consistent with the practical operation of the road."

3. An instruction that the testimony of one credible witness may be entitled to more weight than the testimony of many others, if the jury has reason to believe that such other witnesses were mistaken in their testimony, or knowingly testified untruthfully and are not corroborated, is erroneous.—(Tri-City Ry. Co. vs. Gould, 75 N. E. Reporter, 493.)

ILLINOIS.—Carriers—Collision—Injury to Passenger—Negligence—Tort of Third Person—Evidence—Damages—Pleading—Variance—Evidence—Opinion of Expert—Fright—Trial—Argument of Counsel—Taking Pleadings to Jury Room—Appeal—Estoppel to Allege Error.

1. In an action against a carrier for injuries to a passenger, evidence of collision between trains, without any contributory negligence on the part of the passenger, authorizes recovery.

2. Where the evidence showed that a passenger was injured by the failure of a railroad company to keep a main-track switch locked or guarded, so as to prevent it from being improperly thrown, whether this was actionable negligence is a question for the jury.

3. That a passenger was injured by the tort of a third person does not relieve the carrier from liability for its failure to use due care which gave an opportunity to such person to commit the act.

4. In an action for injuries to a passenger, where it is alleged that the train was running at a dangerous speed, the condition of the cars after the collision may be shown.

5. Proof that one of plaintiff's legs was broken and an elbow injured is no variance from an allegation that divers bones of her body were broken.

6. It is not proper to permit a medical expert to give an opinion based on the testimony as he has construed it from having heard it.

7. Where plaintiff claims that neurasthenia was brought about by injuries received in a collision, and defendant's witnesses testified that it might have been occasioned by other causes, plaintiff, on cross-examination, may show that it might have been caused by sudden fright and terror, where she was physically injured at the time of such fright.

8. Where, in an action for a collision caused by an unguarded switch, there was evidence that the switchman was watching a ball game, and the boy who threw the switch testified that it was not locked, an argument by plaintiff's counsel, based on the alleged negligence of the defendant, was proper.

9. It is not reversible error to allow the jury to take the pleadings to the jury room.

10. Any error in allowing the jury to take the declaration, containing counts to which demurrers had been sustained, to the jury room, is not ground for reversal, where appellant's counsel declined appellee's offer to remove the objectionable count.—(Elgin, A. & S. Traction Co. vs. Wilson, 75 N. E. Reporter, 436.)

ILLINOIS.—Carriers—Who are Passengers—Question for Jury—Appeal—Review—Affirmance.

1. In an action to recover for injuries, where there was testimony that when the car on which plaintiff was riding stopped he put one foot on the ground and with the other on the footboard attempted to lift his little girl off the car, when it started suddenly, injuring him, the question as to whether he was a passenger was for the jury.

2. Where the refusal of the trial court to direct a verdict was affirmed by the Appellate Court, its judgment will be sustained, if there is any evidence tending to establish the case made by the declaration.—(Chicago Union Traction Co. vs. Rosenthal, 75 N. E. Reporter, 578.)

INDIANA.—Evidence—Judicial Notice—Carriers—Ejection of Passenger—Excessive Damages.

1. A court will take judicial notice that a time between 4 and 6 o'clock in the afternoon of Sept. 16 was before sunset.

2. Where a passenger was required, without physical force, to leave a car in the afternoon before sunset, on account of a dispute as to the amount of her fare, the conductor explaining that his duty required him to act as he did, and she thereby missed an engagement with pupils in music, and was obliged to walk home, a distance of nine blocks, but she suffered no bodily injury or illness as a result of her ejection, an award of \$400 as damages was excessive.—(Dayton & W. Traction Co. vs. Marshall (No. 5453), 75 N. E. Reporter, 824.)

KENTUCKY.—Street Railroads—Liability for Torts—Negligence—Instructions—Street Railroads—Questions for Jury—Right of Way Over Tracks.

1. In an action against a corporation and its successor for negligence in the operation of a street railroad, a verdict was properly directed in favor of the successor on its appearing that it was not in existence at the time of the accident.

2. In an action against a street railway company for injuries to a vehicle, an instruction authorizing recovery if the driver of the vehicle was "free" from negligence was improper, and was inconsistent with an instruction defining what contributory negligence would defeat recovery, as stating that any negligence, however slight, would defeat recovery.

3. Where the evidence was conflicting as to whether a collision between defendant's street car and plaintiff's vehicle was caused by the fault of the driver of the vehicle or of the motorman, the question was for the jury.

4. In an action for injury to plaintiff's vehicle from a collision with defendant's street car, it was error to instruct that the car had exclusive right to the track; but the court should have instructed "that the plaintiff was lawfully upon the street and had the right to use any part of it, that the defendant was entitled to the use of its tracks for the free passage of its cars, that it was the duty of those in charge of defendant's car to keep a lookout for persons and vehicles upon the track and to exercise ordinary care to discover and avoid injuring them, and that it was the duty of plaintiff in using the street to use ordinary care for his own safety and the safety of others."—(Palmer Transfer Co. vs. Paducah Ry. & Light Co. et al., 895 S. W. Reporter, 515.)

KENTUCKY.—Damages—Personal Injuries—Evidence—Sufficiency—Instructions—Proper Instruction—Negligence—Contributory Negligence—Instructions—Definition of Negligence.

1. Evidence in a personal injury case held sufficient to sustain the verdict, without attributing it to passion or prejudice.

2. An instruction that, if the jury find for plaintiff, they may, in estimating his damages, consider the physical pain and mental anguish caused by his injuries, if any, his loss of time, if any, his nervous and physical shock, if any, his loss of memory, if any, his impairment of eyesight, if any, his headaches, if any, and his permanent disability, if any, not to exceed the amount claimed, is erroneous and misleading in directing the jury, in estimating plaintiff's damages, to segregate such of his injuries as ought to be considered and estimated under the heads of physical and mental suffering and the permanent impairment of his ability to earn money, into special items of damage, and allowing them to estimate the damage for each item as distinguished from the others, and from the damages on account of physical and mental suffering or permanent disability.

3. A proper instruction on the measure of damages in a personal

injury case is that, if the jury find for plaintiff, they should allow him such a sum in damages as they believe from the evidence will fairly and reasonably compensate him for his physical and mental sufferings, if any of either, for his loss of time; if any, the reasonable expense, if any, in the matter of physicians' bills incurred by him, and for a permanent impairment, if any, of his ability to earn money, that may have directly resulted to him from his injuries, if they were caused by defendant's negligence, the damages altogether not to exceed the amount claimed in the petition.

4. It is error to instruct that plaintiff cannot recover if there was any negligence on his part, which in any way contributed to his injuries. His negligence, to defeat recovery, must have contributed to his injuries to such an extent that, but for it, he would not have received them.

5. In the absence of any evidence of contributory negligence, an instruction thereon should not be given.

6. In a negligence case, the court should give an instruction defining negligence and ordinary care as used in the instructions.—(South Covington & C. St. Ry. Co. vs. Nelson, 89 S. W. Reporter, 200.)

KENTUCKY.—Carriers—Collision—Injury to Passenger—Joint Liability—Damages—Personal Injuries—Instructions—Appeal—Failure to Request.

1. Where a collision occurs between the carriage of one common carrier and the car of another, both being negligent, injuring the passenger of one, both are liable; the negligence of one not excusing the other.

2. An instruction in a personal injury case that, if the jury find for plaintiff, they will fix his general damages at such sum as will reasonably and fairly compensate him for his bodily injuries, if any, not exceeding the sum claimed in the petition, and will also find special damages in such sum as will reasonably and fairly compensate him for his expense in getting cured, for his loss of time, and for injury to his clothes, if any, not exceeding the amount claimed, is substantially correct.

3. Where formal objection was made to all instructions given, and several instructions were offered as to certain matters, but none were offered or asked on the measure of damages, a party may not complain that such an instruction as he claims should have been given on that subject was not given.—(Louisville Ry. Co. et al. vs. Blum. Same vs. Goodman, 89 S. W. Reporter, 186.)

KENTUCKY.—Continuance—Surprise at Trial—Testimony of Witnesses—Evidence—Res Gestæ—Statements After Act Causing Injury to Another—Street Railroads—Injuries to Traveler—Instructions—Contributory Negligence.

1. On the trial of an action against a street railroad for injuries to a traveler in a collision with a car, plaintiff and witnesses testified that immediately after the accident the motorman came from the car to where plaintiff had fallen and stated that the reason he had not sounded his gong or stopped the car was because the gong and brake were out of repair. The motorman had left the service of the company and resided in another State, where his deposition was taken, without plaintiff asking any question on cross-examination indicating that he would rely on the testimony as to the motorman's alleged statement. The company's president filed an affidavit to the effect that it was surprised at plaintiff's evidence, and could show by the motorman that he did not make the statement testified to. Held, that the court, on the company's motion, should have discharged the jury and continued the case, to give it opportunity to rebut plaintiff's evidence.

2. The statement of the motorman of a car which had collided with a traveler that the reason he did not sound the gong or stop the car was because the gong and brake were out of repair, made immediately after the accident and before he had time to manufacture a false statement with regard to the cause of the accident, was a part of the res gestæ.

3. A street railway company, when sued for injuries received by a traveler in a collision with a car, is entitled to an instruction that, though it was negligent, yet, if the traveler was also negligent and his negligence contributed to the accident, so that but for it he would not have been injured, there can be no recovery.—(Lexington St. Ry. vs. Strader. Same vs. McKenna, 89 S. W. Reporter, 158.)

MAINE.—Street Railways—Personal Injuries—Child Injured on Track—Contributory Negligence—Due Care—Care Required of Infant.

1. In a case where a child 10 years and 7 months old, while attempting to cross an electric railway track in a street, was run over by a car, and where it appears that the car, at the time she attempted to cross, was in plain sight of her and could not have been much more than its own length from her, and where it is

manifest either that she did not look to see if the car was approaching or that, if she looked, she must have seen the car, held, that her contributory negligence is a bar to her recovery against the railway company. Her act can hardly be regarded otherwise than a result of a sudden, unthinking impulse, or of reckless daring.

2. Though children are not by the law holden to the exercise of the same extent of care that adults are, and though the age and intelligence of a party are important factors in determining whether due care has been used, yet the plaintiff in this case was bound to use that degree or extent of care which ordinarily prudent children of her age and intelligence are accustomed to use under like circumstances.

Held, that the plaintiff clearly failed to use that care which a child of her intelligence should use.—(Colomb vs. Portland & B. St. Ry., 61 Atlantic Reporter, 898.)

MARYLAND.—Street Railroads—Right of Company and Individuals to Use Streets—Injury to Traveler—Contributory Negligence—Negligence of Company—Question for Jury—Necessity.

1. The rights of a street railway company and of an individual to use the streets are equal, and each owes to the other the same duty to avoid injury.

2. While a street railway company and an individual have an equal right to the use of a highway, an individual who, in disregard of his own safety, undertakes to cross the company's track when no prudent person would do so, cannot recover for the injuries sustained in a collision with a car.

3. It is not negligence as a matter of law for a traveler driving a four-horse wagon to attempt to cross a street car track when a car approaching is a block distant, but the question is for the jury.

4. Whether a street railway company was guilty of actionable negligence, and liable for injuries received in a collision by a traveler when attempting to cross the tracks, held, under the evidence, for the jury.

5. Where the nature of an act relied on to show negligence contributing to a personal injury can only be determined by considering all the circumstances, it is the province of the jury to pass on and characterize it.—(United Railways & Electric Co., of Baltimore, vs. Watkins, 62 Atlantic Reporter, 234.)

MASSACHUSETTS.—Street Railroads—Injury to Bicyclist—Contributory Negligence.

A person riding a bicycle at about noon in a crowded city street, who, when about to cross a street car track, looked to ascertain whether a car was coming, and, his view of an approaching car being obstructed, took his chances, and while crossing the track was struck by the car, was guilty of contributory negligence.—(Bartlett vs. Worcester Consol. St. Ry. Co., 75 N. E. Reporter, 706.)

MASSACHUSETTS.—Carriers—Passengers—Boarding Street Car—Contributory Negligence.

Plaintiff, intending to board an approaching street car, the side of which projected over the rail about 8 inches, stood in a space about 2 ft. from the south rail of the track at a stopping place, and as the car approached, plaintiff leaned his head forward and signaled the car, when he was struck on the head by some part of the car, but his body was not injured. Held, that plaintiff was guilty of contributory negligence in not taking a position outside the reach of the car, and was not entitled to recover.—(Neale vs. Springfield St. Ry. Co., 75 N. E. Reporter, 702.)

MASSACHUSETTS.—Carriers—Street Railroads—Injuries to Passengers—Rules—Negligence—Request to Charge—Negligence—Gross Negligence—Carriers—Degrees of Negligence.

1. Where plaintiff's intestate, while sitting in an open electric car, was thrown therefrom as it was being driven around a curve at a high rate of speed, and while a wooden rail intended for the protection of passengers, running along outside of the stanchions was up, and the company had provided by rule for a speed not exceeding 3 miles an hour on curves, the company was not guilty of negligence in failing to adopt a rule requiring the rail on the outer side of curves to be down when its cars are rounding such curves; the rails being intended only to prevent passengers from leaving the car on the inner side, where there are double tracks.

2. In an action for injuries to a passenger, a request to charge that the duty of exercising the highest degree of care is incumbent on the defendant, and any failure on the part of its servants to exercise that degree of care is "gross negligence," was properly refused, as a failure to exercise the highest degree of care constitutes slight negligence only.

3. A request to charge that the term "gross," in the term "gross

negligence," when used with reference to the degree of care required and not fulfilled, is merely an expletive, when the degree of care required is the very highest, was properly refused, since under such circumstances the term implies a gross failure to exercise that degree of care.

4. There are degrees of negligence in an action against a carrier for the death of a passenger, under Rev. Laws, c. 111, Sec. 267, providing that if a corporation operating a railroad, by reason of its negligence or by reason of the unfitness or gross negligence of its agents or servants while engaged in its business, causes the death of a passenger, etc., it shall be punished by a fine not less than \$500 nor more than \$5,000, which shall be paid to the executor or administrator, etc.—(Dolphin vs. Worcester Consol. St. Ry. Co., 75 N. E. Reporter, 635.)

MASSACHUSETTS.—Street Railroads—Injuries to Children—Negligence—Warning—Signal.

Plaintiff, a child less than 3 years old, in attempting to cross a street, darted from a sidewalk behind a wagon standing in front of plaintiff's home, and struck the running board of defendant's street car. The car was going at a moderate speed, and as it approached there was nothing in sight, and no children in the street for a distance of 200 yards. Held, that defendant was not guilty of negligence in failing to sound the gong on the car as it approached the place of the accident.—(Bouthillier vs. Old Colony St. Ry. Co., 75 N. E. Reporter, 960.)

MICHIGAN.—Electricity—Injuries — Inspection—Reasonableness—Evidence—Judicial Notice—Electricity—Care Required—Instructions—Prejudice—Time for Repairs—Question for Jury—Proximate Cause—Evidence—Expert Testimony—Competency of Witness—Demonstrative Evidence—Appeal—Review—Harmless Error—Electricity—Personal Injuries—Actions—Evidence.

1. In an action for injuries caused by a live electric wire, the reasonableness of the inspection depends, not only on the condition of the line, but also on the nature of the danger to be feared.

2. Judicial notice will be taken of the fact that electricity is dangerous and so generally recognized.

3. In an action for injuries caused by a live electric wire, an instruction requiring of defendant the exercise of such care as ordinarily careful and prudent persons would exercise in dealing with electricity under similar circumstances was not prejudicial to it.

4. Plaintiff's child was injured by coming in contact with a live telephone wire, which received its dangerous current from a trolley span wire belonging to defendant, through being pressed against the span wire by the limb of a tree, which was broken by a storm the previous evening at a considerable distance from the point where the wire parted and fell and where plaintiff was injured. There was evidence that the span wires were not properly insulated and were not protected from impact with other wires. Held, that whether defendant was guilty of negligence in these respects was for the jury, notwithstanding the short time that elapsed between the breaking of the wire and the accident in which to discover and make repairs.

5. Where plaintiff was injured by coming in contact with a live telephone wire, which had been pressed down against an improperly insulated trolley span wire by the limb of a tree, which was broken by a severe storm the previous evening, the failure to guard the span wire and the want of insulation were concurring causes establishing a liability, and the breaking of the tree was not the sole proximate cause of the injury.

6. In an action for injuries caused by a live electric wire, witnesses who were experienced in the use of certain alleged defective insulators used were entitled to testify as to their experience in their use, and to give their opinion as to their effectiveness, as well as their tendency to fall into disuse in places where formerly used.

7. In an action for injuries caused by a live electric wire, it was proper to introduce an insulator or hanger in evidence which was alleged to be defective and insufficient.

8. In an action for injuries by a live electric wire, defendant was not prejudiced by a question, asked of its foreman on cross-examination, as to whether it was not common knowledge among defendant's employees that defendant's span wires were charged, where it did not appear that the witness admitted such fact.

9. In an action for injuries by a live electric wire, which had become hot by contact with defendant's trolley span wire, it was proper to ask defendant's foreman on cross-examination whether he had not warned lineman against hot span wires.—(Warren vs. City Electric Ry. Co. et al., 104 N. W. Rep., 613.)

MISSOURI.—Appeal—Harmless Error—Variance—Carriers—Measure of Carrier's Duty—Continuance of Relation—Alight-

ing from Street Car—Duty of Conductor—Instructions—Damages—Personal Injuries—Future Suffering.

1. Where, in an action against a street railroad company for injuries to a passenger, plaintiff alleged that while she was dismounting, and before she had sufficient time to do so safely, the car was negligently started with a sudden jerk and at a rapid rate of speed. Held, that the allegations as to the manner of starting the car were not essential to the cause of action, so that failure to prove them was not cause for reversal, under Rev. St. 1899, secs. 655, 798, providing that no variance shall be deemed material, unless it has actually misled the adverse party, and that, where the cause of action is unproved in its entire scope and meaning, it shall not be deemed a case of variance, but a failure of proof.

2. Street railways are common carriers, and must employ the highest degree of care to avoid injury to their passengers.

3. The relation of carrier and passenger continues until the time the latter leaves the train, so that it is the duty of the carrier, not only to safely carry the passenger, but, when his destination is reached, to keep the train stationary while he is alighting.

4. A street car conductor is required, in the exercise of due care, to look to see if passengers are in the act of alighting before he starts his car, though the car has been stationary for a reasonable length of time to permit passengers to alight.

5. In an action against a street railway company for injuries alleged to have been caused by the sudden starting of the car as plaintiff was dismounting therefrom, an instruction predicating plaintiff's right to recover upon proof that, while the car was standing, plaintiff took a position upon the back platform for the purpose of stepping off, and that, while in that position and before she had sufficient time to get off, the defendant's servants suddenly caused the car to be started, did not, when considered with another instruction forbidding a recovery if plaintiff stepped from the car after it started, authorize a finding for plaintiff, notwithstanding the jury might believe that she did not attempt to step from the car until after it had started.

6. In an action for personal injuries, plaintiff may recover damages for pain which will be suffered in the future as a result of the injury.—(Nelson vs. Metropolitan St. Ry. Co., 88 S. W. Rep., 1119.)

NEW JERSEY.—Street Railroads—Injury of Child at Crossing—Negligence of Motorman.

A motorman operating a street car on approaching a crossing where a number of children are congregated or passing across the tracks is bound to know that they may not exercise the care of older persons, and to take special precautions accordingly to avoid their injury; and where in such case a child was run over and injured, and there was evidence of a substantial character tending to show that the car approached the crossing at a speed of 10 m.p.h. or 15 m.p.h., without giving any warning of its approach, although such evidence was contradicted, a verdict finding that the company was chargeable with negligence will not be disturbed.—(Camden Interstate Ry. Co. vs. Broom, 139 Fed. Rep., 595.)

NEW YORK.—Trial—Directing Verdict—Conflicting Testimony.

Where, in an action for injury to a passenger in a street car, from the sudden stopping of it by the motorman on the blowing out of the motor box, plaintiff's testimony tends to show the explosion was due to a short-circuit, caused by rapid motion of the car through the water, which was high enough on the street from a recent rainfall to splash up on the sides, in which case, if the motorman was careless in running at too high a speed, the company would be liable for his negligence, though the sudden stopping of the car might not alone have been more than an error of judgment, and defendant's testimony tended to show the explosion was due to lightning, in which the company would not be liable for the mere error of judgment of the motorman in making a sudden stop, the trial court, disbelieving plaintiff's testimony, may grant a new trial, on verdict being rendered for plaintiff; but it may not direct a verdict for defendant.—(Dowling vs. Brooklyn Heights R. Co., 95 N. Y. Sup., 105.)

PENNSYLVANIA.—Street Railroads—Collision—Evidence—Negligence—Evidence.

1. In an action against a street railway company to recover for injuries received by collision between a wagon in which plaintiffs were riding and an electric car, evidence held insufficient to show negligence on the part of defendant.

2. In an action against a street railway company for injuries received by a collision between an electric car and the wagon in which plaintiffs were riding while crossing a bridge, where the accident was shown to be caused by a defect in the bridge, plaintiffs, to recover, must show that defendant, and not the town, was re-

sponsible for the repairs of the bridge.—(Wagner et al. vs. Lehigh Traction Co., 61 Atl. Rep., 814.)

NEW YORK.—Appeal—Contentions Available—Questions Not Urged Below—Carriers—Injuries to Passengers—Negligence—Questions for Jury—Discretion of Trial Court—Setting Aside Verdict—New Trial.

1. Where plaintiff declined to join in defendant's motion for a directed verdict, and expressly requested to go to the jury, he could not contend on appeal that the case should have been disposed of as one of law.

2. In an action against a street railroad for injuries to a passenger, sustained by being kicked in the face by another passenger who was entering the car through the window, where there was evidence that at the station where the accident occurred people had frequently gained ingress to cars during rush hours by climbing through the windows, without the railroad having taken any measure to prevent the practice, but defendant's employees testified that they had never heard of an accident from that cause previous to the injury to plaintiff, the questions whether the practice was so common that defendant knew or should have known of it, and, if so, whether it should have foreseen the likelihood of injury to passengers, were for the jury.

3. Appellate courts exercise great caution in interfering with orders of trial courts setting aside verdicts as against the weight of the evidence.

4. Where a question involving inferences from undisputed evidence is submitted to the jury, and the inference adopted by the jury is fairly warranted by the evidence, the fact that the trial justice thinks that the jury drew the wrong inference does not waive evidence.—(Grogan vs. Brooklyn Heights R. Co., 95 N. Y. Sup., 23.)

SOUTH CAROLINA.—Street Railroads—Injuries to Person on Track—Intoxication—Instructions—Trial—Examination of Witness—Exclusion of Witness—Necessity of Exceptions—Appeal—Instructions—Harmless Error—Trial—Instructions—Exceptions—Street Railroad—Care Required.

1. In an action for injuries to plaintiff by being struck by a street car, where defendant pleaded contributory negligence, in that plaintiff went on defendant's right of way, defendant may show, by questions to plaintiff and by his declarations, that he was intoxicated at the time of the accident.

2. In actions for injuries to plaintiff on street car track, under the plea of a general denial, defendant may show plaintiff's intoxication, as tending to show contributory negligence, and to impair his credibility.

3. An instruction, in an action for injuries to a person on a street car track, that voluntary intoxication will not excuse a traveler for failure to exercise ordinary care at a railroad crossing, is properly refused as inapplicable to the case.

4. Where a witness testified that he did not write a letter, nor procure anyone to write it for him, it cannot be read to him, in order to ask him if he did not write it.

5. Where witnesses have been excluded by order of the court, it is discretionary with the trial judge to allow a witness who has been in the court room a part of the time to be examined on matters not testified to by the other witnesses.

6. It is incumbent on one desiring to base exceptions on error of judge in stating issues raised by the pleadings to call the court's attention to it.

7. An instruction charging a proposition of law inapplicable to the facts is not ground for reversal, where the jury could not have been misled thereby.

8. Where the court charges a proper request, but commits error in remarks in connection therewith, an exception to such remarks must be taken to procure consideration on appeal.

9. The motoneer on an electric car must keep an ordinary lookout for persons on the track.—(Sharpton vs. Augusta & A. Ry. Co., 51 S. E. Rep., 553.)

TEXAS.—Carriers—Injuries to Passengers—Negligence—Excessive Speed—Contributory Negligence—Alighting from Moving Car—Damages—Medical Expenses—Interference with Duties—Pleading.

1. In an action against a street railroad for injuries to a passenger, where defendant pleaded contributory negligence in attempting to alight from a car while in motion, and the evidence raised the issue, a requested charge that, if the passenger attempted to alight from the car while in motion, and before it had stopped for passengers to alight therefrom, and a person of ordinary care would not have so acted under similar circumstances, the verdict should be for defendant, should have been given, although the court had given a general charge on contributory negligence.

2. In an action against a street railroad for injuries to a passenger, a charge on the speed of the car as in violation of a city ordinance should not have been given where the ordinance was not introduced in evidence.

3. The running of cars in a city at a speed greater than that allowed by ordinance is negligence per se, and the court may so instruct, if the ordinance is in evidence, whenever it is proper to charge on the rate of speed.

4. In order that a street railroad may be held responsible for injuries to a passenger on the ground that it was running its cars at a greater speed than allowed by a city ordinance, the speed must have caused or contributed to cause the accident.

5. In an action for injuries, a petition alleging that the person injured was seriously and permanently injured in her head, hips, limbs and ankles should have also stated the nature and character of the injuries to such parts, and if, for any reason, such nature and character could not be stated, the petition should so allege.

6. In an action for injuries there could be no recovery for expenses for a drug account, domestic help, and attendance of nurses, in the absence of evidence that those expenses were reasonable, and rendered necessary by the accident.

7. In an action for injuries, a charge to allow such reasonable expenses as plaintiff was compelled to incur for medical attention was erroneous where the evidence showed the amount and reasonableness of the bill of one physician, and also showed services by other physicians, the amount or reasonable value of whose services was not shown.

8. A minister cannot recover damages for hindrance in ministerial duties and loss of time from study and preparation for his work, resulting from an injury to his wife, where no pecuniary loss is shown, but he may recover the value of time necessarily lost in attendance upon his wife.—(Dallas Consol. Electric St. Ry. Co. vs. Ison, 84 S. W. Rep., 408.)

TEXAS.—Carriers—Injuries to Passengers—Negligence—Construction of Cars—Contributory Negligence—Vicarious Negligence.

1. Whether a street railroad was negligent in using, for the transportation of small children, an open car, the seats of which projected beyond the floor, so as to leave an opening or pitfall through which a child might fall to the street, is a question of fact.

2. A finding that a street railway was negligent in using for the carriage of a small child an open car, the seats of which projected along the floor, so as to leave an opening or pitfall through which the child fell to the street, was justified.

3. Contributory negligence of parents who carry their child on a street car of defective construction is not imputable to the child, in such manner as to preclude him from recovering from the street railway for personal injuries occasioned through its negligence.—(Northern Texas Traction Co. vs. Roye, 86 S. W. Rep., 621.)

WASHINGTON.—Appeal—Stare Decisis—Application of Doctrine—Death—Actions—Beneficiaries—Surviving Husband—Actions—Misjoinder of Causes of Action—Refusal to Amend—Effect.

1. Ballinger's Ann. Codes and St. Section 4828, provides that "the widow, or widow and her children, or child or children if no widow," of a man killed in a duel shall have a right of action against the person killing him, etc., and further provides that, "when the death of a person is caused by the wrongful act or neglect of another, his heirs or personal representatives" may maintain an action for damages. The Supreme Court, in construing the word "heirs" so as not to include "parents," did so upon the theory that it was limited in its scope to the persons therefore specifically mentioned in the statute. Held, that the decision was conclusive under the rule of stare decisis against the right of a surviving husband to maintain an action for the death of his wife.

2. Ballinger's Ann. Codes and St. Section 4828, relative to the right of action for wrongful death, gives the surviving husband no right of action for the death of his wife.

3. The husband's right of action for funeral expenses paid by him on the wrongful death of his wife cannot be joined with an action on behalf of the minor child of the husband and wife for the death of his mother.

4. Where a cause of action in favor of a minor son for the death of his mother was improperly joined with a cause of action by the son's father for funeral expenses incurred on account of such death, and a demurrer to the complaint was sustained on that ground, but with leave to amend so that the son might state his cause of action separately, a judgment for defendant was properly rendered on the son's declining to amend.—(Johnson et al. vs. Seattle Electric Co., 81 Pac. Rep., 705.)

LONDON LETTER

(From Our Regular Correspondent.)

At the invitation of the Romapac Tramway Construction Company, Ltd., of Leeds, a party of journalists were given a practical demonstration of this company's system of laying down its compound rails for tramway purposes. The company has hitherto preserved a complete silence regarding the system, as it desired to be able to point to certain portions of tramway work equipped with its system before having it described in the technical press and before appealing to any of the municipalities or companies operating tramways for a share of their patronage. The system is described in full in another part of this issue, but it might be described briefly as composed of a permanent T-rail, to which is fastened another section of rail which forms the head of the rail. The demonstration consisted in showing the engine which is designed for this purpose, and which successfully rolled down the top section of a rail about 40 ft. long on to the company's standard T section in a very few minutes. The process is the invention of Mr. Rhodes, and seems to be a very successful one. Seven or eight passes up and down the rail were quite sufficient to bend the flanges by means of the powerful side rollers attached to the steam engine in such a way that the top section became firmly attached to the T section. For such a system to be complete, it is necessary also to be able to cut off the top section when it becomes worn out, and the journalists were also shown a practical demonstration of how easily this is accomplished. The same machine was used, but in place of the rollers for rolling down the flanges of the top section, cutting wheels were inserted, and after a few passes up and down the rail the flange was completely cut off. Then, by means of a special device, the top section was easily lifted off. The whole demonstration was a practical success, and it would appear that this system is bound to receive in the near future the attention which it merits from tramway engineers, as it will undoubtedly save a considerable portion of the expense of new rails.

The Hastings Tramways Company has not been able to overcome the prejudice of the Hastings Corporation against the overhead wiring system on the sea front, and has offered to equip the front on the G. B. surface contact system, of which a full description as installed at Lincoln was given in the last international issue of this paper. The Corporation has not yet had time to give the matter proper consideration, but it is thought that it will probably be only too glad to accept the proposition.

The members of the London County Council have evidently had a most enjoyable trip to Paris, where for about a week recently they were entertained by the Paris municipality and saw everything that was worth seeing in that metropolis. Since returning, J. Allen Baker, chairman of the tramways committee of the London County Council, said that one of the greatest object lessons which he had observed in Paris, so far as tramway work was concerned, was the fact that tramways were carried across nearly all the bridges of the Seine. As is, of course, well known, there are no tramways across any of the bridges of the Thames in London, and repeated endeavors of the London County Council to secure a bill in Parliament for this purpose have been defeated. He also stated that the decision of the London County Council to use the conduit system instead of the overhead system was amply justified by the experience of Paris. He also stated that the tramway companies were compelled to pay a small tax on each fare toward the maintenance of the streets.

It is interesting to note how many references to electricity appear in the half-yearly reports of the various steam railroad companies. The North Eastern Railway reports states that further experience in electric traction of the suburban lines in the Newcastle district has been entirely favorable from a practical and from a financial point of view. Lord Allerton, speaking at the half-yearly meeting of the Great Northern Railway Company, stated that that company was feeling to a considerable degree the competition of the tramways, particularly in Yorkshire, but that its suburban traffic in London had been maintained. Six new railway motor cars have been added to the rolling stock during the past half year, and in the Lincolnshire district these are working very successfully, the Board of Trade having given them permission to erect rough platforms at convenient points and to pick up passengers without fixing any particular time. With regard to the London, Brighton & South Coast Railway, Lord Cottesloe made the interesting statement that the directors were now so impressed with the fact that they had chosen the right system in the single-phase system, that they now intended to equip the suburban line right into the two main stations of

Victoria and London Bridge. It will be remembered that the company's first idea was to equip a portion which commenced some distance away from each of these two termini. Reference has already been made to the contracts given out for this installation, and it would appear that after further investigation, the directors are thoroughly satisfied that they are moving in the direction of progress. Sir George Armytage, at the half-yearly meeting of the Lancashire & Yorkshire Railway, which, as is well known, has installed the electric railway between Liverpool and Southport, stated that a full year's experience had shown that the cost of working the trains, with proper allowance for depreciation and the more costly plant, were slightly higher per train-mile run than the steam trains. They were, however, quite satisfied, as they had been able to do a greater amount of work and had given a better service to the public, which would have been absolutely impossible under the old conditions. He also stated that they were now contemplating further additions, as the traffic was rapidly growing, and during the past year a very largely increased number of passengers had been carried by the electric trains. He made the entirely satisfactory statement also that the whole system was working smoothly and well.

The city of Blackburn for the past year or two has been rather disturbed about its tramway system, as when the proper amounts were allocated to interest on the investment, depreciation, etc., the whole system showed a distinct loss. It is more satisfactory, therefore, that during the nine months ended Dec. 31 last, after paying interest, allowing for depreciation, maintenance, etc., there remains a substantial profit of over £1,000. We do not often refer to the financial statement of the various systems in this column, but we do so in this particular case, as the result is not attributable to any great increase in the number of passengers carried, but to economies which have been effected by reducing the mileage of suburban lines, and also very largely to the offer which the municipality made in the shape of a bonus to the motormen for saving electric current.

Oxford has at last decided absolutely and unmistakably against electric trams. The university town will have none of them. We referred some time ago to this particular case, electric tramways having been advocated by one section, while another section was strongly in favor of motor omnibuses. A plebiscite of the ratepayers recently taken shows 5992 against electric tramways, whereas there are only 1117 in favor of them. It is not likely that motor omnibuses will be permitted, as they would pay no portion of the maintenance of the streets, so that it would appear that Oxford for at least some time has decided to get along as best it can with the old antiquated horse tramway system which it has at present.

The London County Council has opened its new route from Westminster to the Obelisk at Lewisham. The cars run via Walworth Road, Peckham and New Cross to the Marquis of Granby, where the new lines diverge, running along the Lewisham High Road to the Obelisk, where they will shortly be continued to Catford Bridge.

The London County Council electric supply bill passed the preliminary stage in the House of Commons. In this bill the London County Council has applied for authority to supply electricity in bulk for power and traction, not only in London, but throughout a wide area beyond the administrative county. No opposition was raised to the bill in the preliminary stage, and as the standing orders have been complied with, the bill was ordered to be reported for first reading.

The London United Tramway Company has opened up a new section of its extensive system of tramways which has been in course of construction for the past year in the vicinity of Kingston. The completion of these lines forms an important link in the tramway system in the west end of London, as it will enable passengers to travel along both sides of the Thames Valley and will bring all of the towns in this vicinity into direct communication with each other.

The Bath Electric Tramways Company has put motor omnibuses on the roads as feeders to its trams. Three services have been started, to Bradford-on-Avon and Trowbridge (9 miles), to Corsham and Chippenham (11 miles), and to Box and Melksham (9 miles). The next services to be started will be from Coombe Down to Frome (11 miles), and up Lansdown, a hill which has hitherto baffled every form of mechanical traction. The vehicles used are 30-horse Milnes-Daimlers, double-decked.

The Folkestone Town Council has sanctioned the bill which is being promoted by the National Electric Construction Company for powers to make lines connecting Folkestone with Cheriton, Sandgate and Hythe. Residents and frontagers are raising a fund to oppose the bill, but efforts are being made to meet their

objections. The Dolter stud system is proposed, but the promoters agree to a clause providing that the system shall be in working elsewhere in the United Kingdom for six months before it is adopted at Folkestone. It is being installed at Torquay and Mexborough at present, and as both systems are nearly completed, this condition should not be a difficult one to fulfill.

The Croydon Council has finally refused the offer by the British Electric Traction Company for the purchase of the tramways which belong to the corporation and have been leased to the company. The Corporation having given notice to terminate the lease, the company submitted fresh offers, which were rejected. It then offered to buy the whole undertaking and pay over one-half of the net profits, with the right of repurchase in twenty-five years. The Council rejected the offer, as well as fresh proposals for re-leasing the system. The present lease of the company expires on June 1 next, and this decision of the Corporation practically means that the city will work the trams.

Considerable progress has been made with the tramways at Torquay. The whole of the special work in connection with the two triangular lay-outs on the Strand has been practically completed, and it is now intended to continue the excavation of the track along Victoria Parade to Beacon Quay, which will be the terminus in this direction. The linking-up of the track in front of the Town Hall is in progress, and as soon as this is finished the final linking-up of the track at Market Street corner will be proceeded with. When this is done, the whole of the route from Torre Railway Station to Beacon Quay will be complete. The second track is being laid along Upton Road in the direction of St. Mary-Church, and the rails have been carried to a point within a few yards of the junction of Studley and Forest Roads. A site has been definitely fixed upon in Forest Road for the car sheds, and it is expected that building operations will soon be in progress. As is well known, the National Electric Construction Company is doing the work, and is laying down the Dolter system of surface contact.

Another important extension of the electric tramways system of the Middlesex County Council, from the Wood Green terminus to Enfield, has been opened for public service. The section, which will be some 4 miles in extent, will traverse the whole length of the historic Green Lanes, passing through the populous districts of Bowes Park and Palmer's Green. With its completion the rapidly growing center of Bush Hill Park will be brought into closer touch with the city and Alexandra Palace.

The Bristol Tramways Company has extended its excellent car service into the country by means of motor buses from the end of the tramway lines from Brislington to Saltford, from Hanham to Kelston, and from Horfield to Thornbury, and the patronage extended to the new system shows how much it is appreciated by the public.

In the Chancery Division last week, Justice Farwell delivered judgment in an important action brought by Messrs. Sutton & Company, carriers, for a declaration that the Corporation of Manchester was not entitled "to carry, collect, or deliver for reward any goods or parcels otherwise than by their tramways, and that it was unlawful for them to expend any part of the city fund or the receipts of the tramway undertaking for any such purpose." His Lordship held that the Corporation had no statutory power to carry goods apart from its tramway system, and that while as a chartered corporation it had such power it was not entitled to expend any part of the funds referred to for the purpose of establishing, maintaining, or carrying on the business of carriers except as part of and in connection with its tramway undertaking. An injunction was granted against the Corporation in these terms, its operation being suspended for fourteen days. The intention of the Manchester Corporation was to put into operation a large and comprehensive scheme of parcel collection and delivery, including an express delivery and railway agency service outside the bounds of the tramway area. Several thousand pounds have been spent on depots, horses and vans, and numerous agents and servants have been engaged. A. C. S.

PARIS LETTER

(From Our Regular Correspondent.)

It is reported here that the Ouest Railway Company is now about to commence the electrification of its Paris-St. Germain line. The scheme has been proposed several times, but it seems that it will at last be taken in hand. The line is now operated by steam locomotives, which do not easily handle the large traffic, and reaches St. Germain on a steep grade. On this account the trains have to be divided to permit the locomotive to mount the

grade. The length of the line is some 12 miles, and the tracks to be equipped with third rail are the middle two tracks out of six which will soon be constructed for a short distance out of Paris. There are now four tracks.

The Paris Metropolitan Railway maintains its traffic receipts well over those of a year ago, since which time no new lines have been opened. It is curious to remark that the receipts of the Paris General Omnibus Company, which operates various omnibus and tramway routes within Paris, have also considerably increased over corresponding figures of 1905. The new circular line (south) of the Paris Metropolitan Railway, which will be opened for service on March 1, will encroach considerably upon the receipts of the Tramway Sud, which have hitherto been constantly increasing month by month.

The third rail of the Paris Metropolitan line has been considerably modified in the new lines about to be placed in service. The new steel conductor contains but a small percentage of carbon and is of exceedingly low resistance. Its form is that of a "T," of which the head or horizontal branch is broad and thick and the vertical part is short. The rail rests on rectangular blocks of porcelain or vitrified clay, which are grooved to hold the vertical part of the rail. The horizontal part of the rail rests on the top of the insulator. The rail is relatively light for the amount of surface exposed to the contact of the shoes.

There has been a deal of discussion here of late regarding bad workmanship in connection with the construction of tunnels and superstructure of the new lines of the Paris Metropolitan Railway. This work is carried out by the municipal authorities' sub-contractors, and when completed the railway company takes over the operation of the lines. Several well-known names have been brought into prominence in the daily press in connection with the matter, which at one time threatened to amount to a scandal.

Monsieur Gauthier, the French minister of public works, has been studying the question of transport on branch lines of steam railways, including lines of local interest, in view of complaints which are continually made regarding the slowness of transport on such lines, owing to the few number of passengers and tendency to make up mixed trains for the carriage of both passengers and goods. M. Gauthier has very strongly advised the employment of motor cars on these secondary lines, to be, of course, run at more frequent intervals and to supplant the more cumbersome trains now in use. In view of the high standing of the minister in such matters a move is sure to be made towards extending the use of this form of transport, which is even now in use on several of the main railway systems of France.

Public opinion has been moved of late regarding the means of access to the Simplon tunnel from the various French centers of population. The matter has been left too long and there are a number of opinions to be taken and details to settle. The contract for the electrical equipment of this line contains a clause for the eventual equipment of the line with single-phase apparatus, and three-phase was adopted temporarily, only because the material could be delivered promptly and in time for the opening in June.

It cannot be said that municipalization is making any striking progress in France in respect to matters of public transport, notwithstanding the examples set by our near neighbors in this respect. The towns which wish to obtain electric traction are not averse to obtaining the concession, but they are rather keen in making a bargain with a contracting company for the equipment of the lines and operation. This is the case recently with the town of Valenciennes, which has made application for a concession for a tramway system for the town, with the avowed intention of later turning the same over to a contracting company, probably to be chosen by public tender. It is true that the town leases the concession for a certain term of years, and unless the leases are then extended the material falls into the hands of the town. As the leases range about sixty years in length it will be many years before the municipal question is an acute one in France.

The Compagnie Générale de Distribution d'Énergie Électrique recently increased its capital from six to twelve millions of francs, with the object of constructing an electrical power station in the environs of Paris of a capacity of 70,000 kw, part of which will be immediately installed for the purpose of supplying current to the Nogentais tramways and the Tramway Sud, two of the principal Paris tramway systems. It is expected that the station will supply the needs of several other traction companies in and around Paris. The work on the new station will be pushed with the greatest speed, and it is expected to be in operation in eighteen months or less. Curtis steam turbine groups will probably be installed.

FRANCHISES IN NEW JERSEY

The special commission appointed by the Governor of New Jersey to investigate the subject of franchises granted by municipalities to public utility corporations, and to advise the Legislature in connection therewith, has just rendered its report. The commission was a very representative one, and consisted of Foster M. Voorhees, Franklin Murphy, Frank T. Lloyd, John C. Payne and Eckard P. Budd.

The commission reviews the relative advantages of the three principal methods of conducting public utility services, viz.: private ownership and operation, municipal ownership and operation and municipal ownership and private operation, and after describing the methods of making grants in other States express themselves as opposed to municipal operation. Their recommendations follow:

RECOMMENDATIONS

"As a result of their consideration and investigation of the matters to them referred, the commissioners would make the following recommendations, briefly stating their reasons for so doing:

"(1.) They would advise against municipal operation of street railways. The practical difficulties in the way of both municipal ownership and management of street railways, aside from considerations of public policy, are such that the commissioners cannot recommend a system which involves both ownership and management, with all that it implies and involves. So far as street railways are concerned, municipal ownership of tracks is a comparatively simple matter. Terms could easily be made whereby tracks could be used by companies which operated either in one municipality exclusively or in more than one political division. But it would not be such a simple matter in cases of municipal operation. In this State, one of the companies controlling street railways operates in twenty-five different municipalities. Complete municipalization would present many difficult problems. A conflict in system would undoubtedly arise. The local feeling of one political division would prevent or make difficult the extension of the system of another within its borders. The problem is being worked out with more or less success in Great Britain and Germany. It has not been free from mistakes, and, consequently, expense and loss to the public. But we do not think it wise to recommend and experiment with new plans not yet thoroughly tested until the experience of others has shown that the system in vogue, with some possible modifications, is inferior. It should be remembered that all that goes to make for the development of new territory, for improvement of apparatus, scientific and mechanical, for comparatively low rates of fare for distance carried, for cheapness of commodities and service furnished, our own method of service to the public, under the system of grants now in vogue, faulty though it may be, in many respects surpasses that of other countries.

"The commissioners venture to say, notwithstanding assertions to the contrary, that there has been found in no community the ideal condition of affairs, so far as relates to management of its public utilities, no matter what the system adopted. Perfect satisfaction exists nowhere, and probably never will be found. In all fairness it should be said that many of the defects of service, resulting from private management of these corporations, are such as can be reasonably attributed in large measure to the demands for the development of new and unprofitable fields, the carriage for longer distances, and at more frequent intervals, the extension and cheapening of service, and the replacement of old with new equipment, and the consequent increased expense. Such inconveniences as the public experience from defective and unsatisfactory service cannot be wholly attributed, or even chiefly, to the method which it has followed in its grants to these companies, nor do we believe that a perfect service would come with municipalization.

"(2.) The present power to make grants and give consents should remain where it is. The Legislature has in all cases left to each locality the determination of this matter, adhering to the principle of local self-government, and believing that in the long run and in the great majority of cases, the local authorities are unquestionably better judges of the requirements of those dwelling in a given locality than outside tribunals. This practice should not be lightly disregarded or hastily abandoned except for reasons which commend themselves to all right thinking and careful-minded people. Without controlling reasons, there should be no radical departure from this well settled and long established policy. Neither should new limitations be prescribed, except such as will equally apply to all communities. Local authorities

should not be unduly hampered in the use of powers long possessed. The power to make such contracts as particular conditions and the attendant circumstances in each individual case may warrant, should be left with the municipalities. They are the best judges of what may be required under such circumstances.

"(3.) All privileges hereafter given should be limited, and not exceed thirty-three years, unless a majority vote of the legal voters should authorize longer grants, not to exceed sixty-six years. Recent experience, not only in our own State, but in many others, has shown that the rapid growth of population and improvement in motive power and equipment, improved and cheaper facilities of production and the attendant increase of public patronage, has been followed by returns beyond the expectation of those who first applied for, and those who granted the privileges. This return to new companies will, in most cases, if we are to judge from the experience of the past, so increase as the years pass that it will be folly to permit parting with new privileges in perpetuity. Adjustment of terms, from time to time, to make them accord with changed conditions should be made obligatory. The power to adjust may be lost unless the grant be limited. In grants so restricted there will be found a chance to exact new terms in place of those which had been unduly liberal or hastily considered. Such seems to be the consensus of best opinion, as evidenced by recent legislation in other States and countries. In exceptional cases, where the limitation to thirty-three years might prevent capital from embarking in enterprises of doubtful or slow return, it will be perfectly safe to permit the people themselves, within some prescribed limit, to extend the length of time; hence, the recommendation for a submission to popular vote. In fixing the time for the limitation of grants by municipalities, the commissioners recognize that the determination is purely an arbitrary one, and is subject to honest differences of opinion. The length of a generation is commonly accepted as thirty-three years. In principle, each generation should, so far as possible, have the opportunity to express its wishes in matters peculiarly affecting its welfare; hence, the recommendation that this number of years should mark the length of the franchise. The limitation is recommended for grants by the constituted authorities. Extensions beyond that time can be granted only by a vote of the people themselves.

"(4.) At the expiration of any grant the municipalities should have power to again fix the period and terms of further grant, not exceeding thirty-three years, and the company whose franchise expires should have the first privilege to accept the same. In default of such acceptance the municipality should be authorized to grant the same to another company upon its making proper compensation for the fair value of the assets of the refusing company. Capital will not embark in new ventures unless opportunity be given it to secure a return for its risks. So well is the field in the State now occupied by grants already given that for years to come more than the mere right to possess and enjoy a franchise for a limited term must be given if the interests of the public are to be served and facilities offered to localities sparsely settled. Everyone knows that in early years the outlay is large and the return small. In order to properly develop a franchise in such localities, the earning must of necessity be invested in the improvement or extension of the plant. This is especially true of water and gas companies. Unless there be an assurance that the opportunity for reimbursement will come, there will be no inducement to capital to venture in places where it is most needed. A term franchise, strictly limited, may be accepted in thickly settled communities, but these are already largely occupied. In new localities and unoccupied fields, such a limitation would serve only as a bar against the investment of capital.

"(5.) The restriction limiting the construction of railroads within 1000 ft. of another railway in the same street and preventing the building of a new road parallel to an existing line within less than two blocks should be repealed. This prohibition, if continued in force, can only operate to create a monopoly in favor of existing companies, especially favored by liberal grants, and franchises in effect perpetual. If not removed, it will serve to check the construction or development of new lines which will afford increased public accommodations. Viewed in the light of present demands, the existing facilities for travel may be regarded as sufficient. But that rapid growth which all signs seem to indicate may be reasonably expected in urban population, at least in certain parts of the State, will surely make necessary the building of new roads and extension of old, if the accommodations are to keep pace with the needs of the public. Every obstacle in the way of extension and the building of new should be at once removed.

"(6.) The practice that has prevailed of an excessive issue of stock and bonds under guise of law should be rendered impossible in the future. This should apply to all issues hereafter made. They who hazard their investment in enterprises, the success of which is not assured or to which it may come only after the lapse of years and large expenditures of money, may rightly claim a higher reward for their faith and their courage than those whose investments are attended with no risks of loss and are immediately profitable. But the franchise—granted upon easy terms—should not afford to the few adventurous ones the means and the opportunity to suddenly amass excessive wealth by withholding from the public, by whom the grant is made, its share or allowing it one which only serves to shock the sense of fairness. Massachusetts for some years has provided against excessive issues of bonds and stock by forbidding their issue until approved by some board appointed for that purpose. Some such approving authority should be created in this State. The appointment would be in the interest of the investing public as well as the non-investing. The practice in the State mentioned has not thwarted enterprise. We find therein an efficient public service which has increased from time to time so as to meet public needs and which has well met all reasonable requirements. The courts of our State have recently and in no uncertain way expressed their opinion as to the validity of 'watered' stock and excessive bond issues. But by the adoption of the recommendation that all issues of securities shall first be approved by some supervisory authority, all doubts as to the validity and necessity of issues will disappear, and the additional advantage of safety of investment be gained."

Recommendations Nos. 7 and 8 refer to gas and water companies. Recommendation No. 9 is that there should be no change in the present method of imposing a franchise tax or fee, which is 2 per cent of the gross receipts. In referring to this tax, the commissioners say that they prefer to understand and consider it as a license fee for exercising a privilege granted by the State rather than a tax on some species of property owned by the companies. They also do not consider themselves as limiting the fee to the present amount, but that a gradually increasing rate, graduated according to the average annual mileage receipts, could be imposed in some cases.

AFFAIRS IN CHICAGO

W. W. Gurley, general counsel of the Union Traction Company, called on Mayor Dunne, last week, in company with Ex-Corporation Counsel Tolman, representing the River Improvement Association, and talked for 2 hours over a possible solution of the tunnel problem. What the Union Traction Company wants to do is not only to blow the tops off the tunnels so the order of the War Department will be complied with, but to rebuild them at the required depth so they can be used for street car purposes. General Manager Roach has told his company it will be physically impossible to move the street car traffic of the North and West Sides over the bridges alone. At the same time the company wants the right to equip with the trolley its cable lines throughout, claiming it would be impossible to change its motive power at the rivers without hopelessly blocking its cars during the rush hours. This is the thing the Mayor thus far has refused to concede. The other interesting development of the week was Secretary Taft's presence in town. He said his plan of action regarding the lowering of the tunnels, as set forth in his letter to Congressman Mann a year ago, has not changed, although he did not care to go further in the discussion. "The tunnels must be lowered," he said. "It is my duty to see that they are lowered. The date set as the limit of grace to be allowed the city I believe was April 15, 1906, decided upon by my predecessor, Mr. Root. I have not been approached by anybody representing the city of Chicago with a view to securing more time, and I can't say what I should do until the matter comes before me in my official capacity." The plan which Mr. Gurley proposed to the Mayor was:

Bulkheads to be built at the ends of the tunnels and then the tops knocked off so as to comply with the order of the Federal Government that the obstructions be out of the way by April 15.

At the close of navigation in the fall the tunnels to be reconstructed for street car travel, so as to give 26 ft. of water over their tops. The Union Traction Company agrees to pay the cost of this if given the use of the tunnels after reconstruction.

In order to bring its cars downtown during the reconstruction period the company to be given the right to substitute trolleys for cables wherever cables now exist, not only in the business district but on the North and West Sides.

THE LIMIT AS REGARDS SUITS

B. B. Davis, secretary-treasurer of the American Association of Street Railway Claim Agents, has sent to the STREET RAILWAY JOURNAL the appended newspaper item taken from among the clippings received daily by the Columbus Railway & Light Company, which is self explanatory.

LOUISVILLE, KY., February 12, 1906.

Mrs. Josephine King told an unusual story in Judge O'Doherty's court to-day, in the trial of her \$5,000 damage case against the Louisville Railway Company, which was decided against her. Mrs. King asked judgment on the representation that she pursued her daughter, Lillian King, to prevent her getting on a street car to meet the conductor, W. T. Wiley.

"My girl got on the car all right, but it was because her skirt ripped," said Mrs. King, gazing steadily at the jurors. "Bill Wiley telephoned Lill from the car barn to meet him on his run, and when she asked me if she might, I just stamped my foot and said 'No, sir.' Well, directly I sees Lill gliding out of the house. When she hit the street she ran fast. I took after her. It was a race, I tell you, 'tween me and that car. I could see it comin'. I knew it was Bill Wiley's too. Just as my girl was about to get on I grabbed her. Then her skirt ripped and Bill pulled the bell, and everybody laughed. I broke my leg eight years ago. When I ran after Lill I wrenched my leg, and besides my feelings were hurt. I think the company ought to pay me."

The jury was only out a few minutes considering a verdict.

REPORT OF NASHVILLE RAILWAY & LIGHT COMPANY

At the annual meeting of the stockholders of the Nashville Railway & Light Company, held in Nashville a few days ago, the following directors were elected: Percy Warner, J. H. Fall, F. O. Watts, Joseph H. Thompson, A. M. Shook, of Nashville, and A. H. Ford, J. K. Newman, S. H. March and George H. Davis, of New York. Immediately after the adjournment of the stockholders' meeting the directors met and elected the following officers: Percy Warner, president and general manager; J. H. Fall, vice-president, and N. P. Yeatman, secretary and treasurer. The report of President Warner on the business of the past year was received and read. The matter of extensions, improvements and betterments was left to President Warner and the directors. Secretary and Treasurer N. P. Yeatman made the following report to the directors and stockholders, which was considered the most satisfactory statement yet made by the company. The report is a comparative statement of the operations in 1904 and 1905, and is as follows:

	1904	1905
Earnings railway department.....	\$750,410.25	\$832,742.02
Earnings light department.....	248,561.16	324,907.73
Total gross earnings	\$998,771.41	\$1,157,649.75
Operating expenses railway department	420,175.60	453,819.52
Operating expenses light department.....	121,871.53	136,772.37
Total operating expenses	\$542,047.13	\$590,591.89
Net earnings	\$456,924.28	\$567,057.86
Income from other sources, rent, advertisements, etc.....	11,109.66	16,727.13
Gross income, less operating expenses	\$468,033.97	\$583,784.99
Deductions from income—		
Interest on funded debt.....	264,008.00	291,045.45
Interest on current liabilities.....	3,225.15	7,696.09
Taxes, real, personal and privilege...	91,704.22	99,969.83
Bond premium	5,138.75	12,048.23
Reserve and emergency fund.....	.....	13,500.00
Total deductions from income.....	\$364,076.10	\$424,259.60
Surplus	\$103,957.87	\$159,525.39

The Senate cities committee of the New York Legislature, on Tuesday, Feb. 20, reported out the Elsberg Rapid Transit Bill. This provides for the separation of construction and operation contracts for future subways in New York. It will probably be discussed by the Senate during the present week.

SECOND QUARTERLY MEETING OF THE NEW YORK STATE ASSOCIATION

President Danforth, of the Street Railway Association of the State of New York, has called a special meeting of the association, to be held at Elmira, N. Y., on March 29, to discuss transportation matters. The success of the quarterly meeting, held at Schenectady last January, was so pronounced that the executive committee has decided to make these quarterly meetings a regular feature of the association's work.

At the Elmira conference the entire day will be devoted to the reading of papers and discussion on topics pertaining to operation and management. The following subjects have been assigned:

"Interchangeable Mileage Books."

"Collection and Registration of Interurban Fares."

"City Schedules."

"Advertising."

"Methods of Discipline."

"Station Rules."

The invitation is extended to all member companies and non-member companies in New York State and electric railway companies outside of the State to have a responsible representative from their operating departments at the Elmira conference.

THE IOWA CONVENTION PROCEEDINGS

L. D. Mathes, of Dubuque, Ia., has just issued the proceedings of the second annual convention of the Iowa Street & Interurban Railway Association, held at Dubuque, Ia., April 20 and 21, 1905. The proceedings are neatly bound in board cover and contain the papers and discussions at the Dubuque meeting as well as a copy of the constitution and by-laws. The next convention will be held at the Kirkwood Hotel, Des Moines, Ia., on April 19 and 20, 1906. Applications for copies of the proceedings should be made to Secretary Mathes.

THE ROCHESTER & ELMIRA ELECTRIC RAILWAY—HEINZ & COMPANY INTERESTED

After the sale by the Heinz interests of their holdings in the Montana copper fields, the announcement was made that one of their first deals in financing, under the firm name of Otto Heinz & Company, would be to arrange for the building of the Rochester & Elmira Electric Railway Company, projected between Rochester and Elmira, N. Y. The new company will be capitalized at \$4,000,000, divided into 40,000 shares. Franchises have already been procured in all the townships through which the road will run, and for a goodly part of its length private right of way across country has been contracted for. No construction or grading has been attempted, but surveys have been made of the entire route. The enterprise is in such shape that work may be started as soon as the formal approval of the State Railroad Commissioners has been obtained. The route runs through Brighton, Avon, Livonia, Lakeville, Dansville, Cohocton, Bath, Painted Post, Corning and Horseheads to Elmira, paralleling the Erie tracks from Corning westward. The line will be single-track, and as surveyed will be 120 miles long. The incorporators are Max H. Schultze, Horace G. Abel, Stanley Gifford, Henry Brunssen, Frederick Eckstein, Henry Velthusen, C. B. Geer, Tracy S. Buckingham and Ralph Wolf.

APPLEYARD SYSTEM SOLD TO WIDENER-ELKINS—PLANS FOR EXTENDING OPERATIONS

Last week all of the Appleyard properties in Ohio passed into the control of the so-called Widener-Elkins syndicate. The purchase gives the syndicate unbroken lines from Zanesville, Ohio, to Cincinnati. Except for the Dayton & Western, the Dayton & Troy and the Western Ohio lines, the syndicate now controls all of the through lines between the most important centers of Ohio and Michigan, in all about 1800 miles. The properties will be transferred by Theodore Stebbins, "general manager for the receivers," to Theodore Stebbins, "general manager for W. K. Schoepf, agent."

On Feb. 19, A. E. Loche, acting for the Philadelphia syndicate, bought in the Dayton, Springfield & Urbana Railway for \$600,-

000. The bonded indebtedness of the road is \$750,000 and the floating debt about \$65,000. On Feb. 20 Mr. Loche bought in the Columbus, London & Springfield Railway on a bid of \$250,000. This property has a bonded indebtedness of \$1,500,000 and floating debt of about \$100,000. On Feb. 21 the same interests bought in the Central Market Street Railway of Columbus for \$150,000. Besides the purchase price, the buyers assumed a liability of \$500,000. The Columbus, Grove City & Southwestern sold the same day to the same interests for \$35,000. This property has debts of \$208,000. The Urbana, Bellefontaine & Northern property was sold Feb. 24 for \$175,000. In this case a bonded indebtedness of \$500,000 was assumed. The lease on the Springfield & Western Railway, a 10-mile line, was acquired with the Dayton, Springfield & Urbana. The entire system includes about 170 miles of road, for which the syndicate paid \$1,210,000 and assumed debts to the amount of probably \$3,826,000. The indications are that the stockholders of these properties will have but little equity after the floating debts and expenses of receivership have been paid.

It is stated that the syndicate will take steps immediately to extend the Urbana, Bellefontaine & Northern from Bellefontaine to Lima. This would give the syndicate through routes from Columbus to Lima and Toledo, and from Cincinnati to Lima and Toledo without making it necessary to make arrangements with the Dayton & Troy and the Western Ohio lines, which thus far it has been unable to acquire. W. Kelsey Schoepf, the active head of the syndicate, denies that the Columbus Railway & Light Company's property is to be acquired. He has also denied that the syndicate is attempting to acquire the Columbus, Delaware & Marion property.

RECONSTRUCTION OF GEARY STREET RAILWAY IN SAN FRANCISCO

At a meeting of the Supervisors of San Francisco, Feb. 19, the new plans for the Geary Street, Park & Ocean Railway were filed by City Engineer Woodward, and after they had been approved a resolution calling for the bids for the reconstruction of the line was passed by the board and signed by the Mayor. The date when such bids are to be opened has yet to be set.

The plans submitted are in lieu of plans and specifications presented Dec. 4, 1905, and subsequently withdrawn. The cost of the work is estimated at \$328,000.

In submitting the plan City Engineer Woodward said: "I desire to state that they have been prepared in accordance with instructions of the former Board of Supervisors, and provide for the use of the old rails and old roadbed, which, in my opinion, should not have been done. As municipal ownership is about to be given a trial in San Francisco, it should begin under the best auspices, and the entire road should have been newly constructed. The present roadbed will not long stand the heavy cars which will be used, and when it becomes necessary to properly rebuild the road, the blame should rest where it belongs, and not upon the present administration.

"The condition of the crossings at Jones Street and at Larkin Street is such that I have felt it absolutely necessary to build them anew as part of the present work.

"Your attention is called to the fact that all the other crossings along the line of the road will require reconstruction in the near future. Provision should also be made for the removal of the old tracks which are not utilized in the new road, including the turntable at Kearney Street, the Y at Grant Avenue, the curves at the First Avenue car house and the curve at Fifth Avenue. It is also very necessary that provision be made for the repair of the pavement on the roadway between the tracks and on either side thereof for the entire length of the reconstructed road, and for the construction of a new pavement between the tracks of the proposed new roadbed.

"As to the site of the car house, I wish to say that the Baker Street lot was bought against my protest. It is within the range of early probability that the new municipal railroad will have a branch road on Broderick Street, and I recommended, as did also former City Engineer Grunsky, that the lot on the corner of Geary Street and Broderick Street be purchased."

The route of the proposed line is as follows: From the west line of Kearney Street, out Geary Street turning into Point Lobos Avenue at Presidio Avenue, out Point Lobos Avenue to Fifth Avenue, past the present turn of the present line to the park, on to Tenth Avenue, and to Fulton Street at Golden Gate Park.

THE PLANS OF THE PUBLIC SERVICE CORPORATION

On Saturday, Feb. 24, President Thomas N. McCarter, formally admitted that plans are making for strengthening the finances of the Public Service Corporation. He is stated to have said that the details will all be divulged at the annual meeting of the company to be held April 2. From the statements made in unofficial sources it would seem that the plan is somewhat different from that first mentioned a few weeks ago, to which reference was made in the *STREET RAILWAY JOURNAL*. Then it was stated that J. P. Morgan & Company and the Pennsylvania Railroad were both to be admitted to ownership in the company through the issuance of additional securities. Now it is stated the negotiations contemplate the purchase by J. P. Morgan & Company of \$8,300,000 of the new \$12,500,000 stock which the Public Service Corporation arranged to issue at the next annual meeting and the acquisition by the United Gas Improvement Company, which holds one-fourth of the stock now outstanding, of a sufficient amount to give that corporation \$8,300,000 of the total issue of \$25,000,000. This would leave the Prudential-Fidelity interest, or the Newark investors, with \$8,400,000 of the total. Mr. McCarter has flatly denied the story to the effect that he is to resign from the company.

LOS ANGELES-PACIFIC IMPROVEMENTS

President E. P. Clark, of the Los Angeles Pacific Railroad, emphatically denies the persistent rumor that E. H. Harriman or the Southern Pacific Railroad Company has secured control of the Los Angeles Pacific Company, through the purchase of the interest of the Clark-Sherman syndicate. In talking about affairs of the Los Angeles Pacific Company to a representative of the *STREET RAILWAY JOURNAL*, Mr. Clark said the company has just about completed the floating of its issue of \$10,000,000 of bonds for the purpose of standardizing and re-equipping its system, and that in anticipation of this work, contracts have been let for new rails and accessories. The work of rehabilitation, so Mr. Clark says, will be carried on as fast as compatible with thorough workmanship.

ATTEMPT TO RAISE FARES IN MASSACHUSETTS

The difficulties encountered in raising fares has recently been illustrated in the case of the Boston & Northern Street Railway Company. This company formerly charged 10 cents between Melrose and Boston, but some time ago a 5-cent fare was tried as an experiment. It was soon found to be insufficient to meet the reasonable expenses of operation, and the company raised its fare to 7½ cents by selling ten tickets for 75 cents. The public, after considerable protest, lodged a complaint with the Railroad Commissioners, before whom the question is now for adjudication. Melrose is a suburb with 14,000 inhabitants, about 7 miles from Boston, with which it is also connected by the Boston & Maine (steam) Railroad. The fare on the steam railroad is 14 cents, with a commutation rate of 9 cents a trip. One of the complaints made against the Boston & Northern Railroad is that the commutation tickets are not sold by the conductors but must be purchased at one of the offices of the company. This is also true, however, of the steam railroad, and under all the circumstances it is difficult to believe that there are any good grounds for complaint.

TERMS OF ACQUISITION OF PHILADELPHIA COMPANY

Official announcement is made of the plan by which the United Railways Investment Company of San Francisco will acquire control of the Philadelphia Company, of Pittsburg. The plan does not contemplate the purchase, at present at least, of the entire capital stock of the Philadelphia Company, but only of 320,000 shares of the common stock, which represents a controlling interest. According to the official statement, the United Railways Investment Company will exchange \$37.50 (face value) in first lien collateral trust twenty-year 5 per cent sinking fund bonds and \$20 (par value) of investment company common stock for each share (par value of \$50) of the Philadelphia Company common stock, included in the 320,000 shares to be purchased. Under arrangements with Ladenburg, Thalmann & Company a syndicate has been formed to acquire from any depositing Philadelphia Company stockholder the common stock of the investment company, so payable to such depositor at a sum equal to \$95 a share, so that each depositing Philadelphia Company common shareholder may receive, if he prefers, for each share of Philadelphia stock \$37.50 in 5 per cent bonds and \$19 cash.

A TALE OF MISGUIDED ENTHUSIASM

Upon application of George W. Wormuth, the Superior Court of Indiana has appointed Joseph T. Elliott, Jr., receiver of the Interurban Publishing Company, of Indianapolis. This company was organized by E. H. Talbot, W. D. Herd, George W. Wormuth and others for the purpose of publishing the "Interurban Railway Journal"—a publication devoted to the interests of interurban electric railroads. The company issued \$10,000 capital stock, and plaintiff Wormuth alleged that he had not been allotted an equal share of the stock and lack of harmony among the stockholders, and also that the company was insolvent. The evidence showed that the company had commenced publication Nov. 25, 1905, and issued ten numbers of the journal. It then suspended because there were no funds to pay the cost of printing and salaries. E. H. Talbot, who was editor of the paper, was formerly editor of the "Railway Age," of Chicago.

IMPROVING THE PITTSBURG, KAN., SYSTEM

The extension of the electric railway line of the Pittsburg Railway & Light Company is now practically completed to Weir City, 10 miles southwest of Pittsburg and 6½ miles beyond Chicopee, the former terminus of the line. A further extension south from Weir City to Columbus, 13 miles distant, is now being built. When completed the line will pass through Chicopee, Klondike, Fleming, Daisy Hill, Weir City, Scammon, Skidmore, Tuerk and Stippville, all of which are mining towns, varying greatly in size. The road is being constructed for high-speed service, the maximum grade being 1½ per cent. A power house, to contain one 300-kw d. c. generator is being erected at Scammon. Three of the cars to be used on this line have already been received, and six more are now being constructed. The cars are finished in mahogany, and will seat forty people, and are driven by two G. E. No. 80 motors.

ANNUAL REPORT OF THE INTERNATIONAL TRACTION COMPANY

The International Traction Railway Company, of Buffalo (including International Traction Company, International Railway Company and Crosstown Street Railway Company) has issued its report for the year ended Dec. 31, 1905. It is as follows:

	1905	1904
Gross	\$4,484,643	\$4,088,426
Expenses	2,483,663	2,412,769
Net	\$2,000,980	\$1,675,657
Other income	68,562	64,515
Total income	\$2,069,542	\$1,740,172
Interest, taxes, rent, etc.	1,652,376	1,606,052
Surplus	\$417,166	\$134,120
Expended on extensions and betterments	345,310	.....
Net surplus	\$71,856	.....

President Pierce, of the company, in his remarks to the stockholders, says that within the last year the company has made long-time contracts for the purchase of power for the Tonawanda-Lockport-Olcott district. Besides, agreements have been made with several suburban roads by which their cars will be brought into the center of Buffalo over the lines of the company.

The entire capital stock of the Electric City Railway Company, of Niagara Falls, N. Y., has been purchased at a cost of \$108,500. This company owns valuable franchises and has 4 miles of track constructed.

All of the equipment of the International Traction Company is in use, and 150 new cars, to cost \$900,000, have been ordered.

President Pierce further says: "In the great and rapidly growing section of country covered by our city and suburban lines many extensions and betterments are being constantly required, and as the terms of our collateral trust mortgage make it impossible to borrow money by issuing additional bonds we shall be obliged during the next two years, at least, to expend the net earnings of the company in order to maintain our position, and, in addition, we may have to create some floating indebtedness. While it is to be regretted that we shall be unable to pay dividends for the present, yet your directors feel that they are best protecting and furthering the interests of the stockholders."

STREET RAILWAY PATENTS

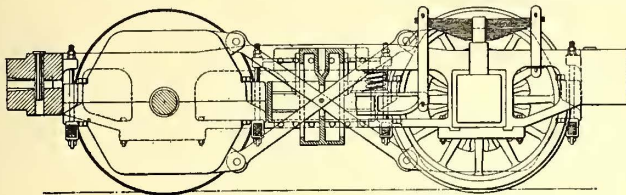
[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

UNITED STATES PATENTS ISSEUD FEB. 20, 1906

812,873. Ice Cutter for Surface Railways; Wm. H. Perry, Concord, N. H. App. filed Oct., 1905. A vertically adjusted drum mounted in advance of the car and provided with cutters, said drum being rotated through suitable gearing from the motor propelling the vehicle.

812,825. Railway Switch-Operating Apparatus; Clyde J. Coleman, Rockaway, N. J. App. filed Feb. 4, 1905. The switch is thrown by a piston in a cylinder containing an expansive fluid. The cylinder also contains a heat coil to heat and expand the fluid by means of an electric current.

812,851. Trolley for Electric Cars; John H. Kinter, Indiana, Pa. App. filed Aug. 5, 1904. Mounted on one side of the trolley harp and fixed to rotate above the wheel in a horizontal plane is



PATENT NO. 812,891

spider-shaped member for retaining the wheel against the conductor. The spider rotates to permit the passage of hangers, etc.

812,881. Hanger or Ear for Overhead Electric Trolley Wires; Abraham Richardson, Blackpool, Eng. App. filed Feb. 6, 1905. The hanger consists of two halves, which together clamp and hold the trolley wire. The screw for supporting the hanger has a surrounding ferrule which serves to clamp the two halves of the hanger together.

812,891. Interconnected Suspension Means for Gearless Motors; Robert Siegfried, Pittsburg, Pa. App. filed June 12, 1905. A pair of electric motors and supporting connections between the motors and the truck, and a pair of balancing-links, each of which connects the upper side of one motor with the lower side of the other.

812,900. Rail-Bond; Edward G. Thomas, Cambridge, Mass. App. filed Dec. 24, 1902. A bond designed to be located beneath the fish-plates and comprises a bundle of copper ribbons with a clamping plate at each end, arranged to be screwed to the rail.

812,991. Railroad Tie; Samuel N. Griffith, Chicago, Ill. App. filed May 14, 1904. Comprises a metallic trough and a pair of metal-bound blocks seated in the trough and adapted to receive the spikes employed in securing the rails in place, each block and its metal binding being removable as a unit from the balance of the structure.

813,052. Electric Brake for Vehicles; Joseph N. Mahoney, Astoria, N. Y. App. filed Nov. 8, 1901. An electric braking system comprising opposed braking surfaces and means for controlling the pressure between them by two currents, one of which varies relatively to the speed of the car, and the other of which is appropriately controlled, whereby the pressure between the braking surface is varied in relation to the speed of the vehicle.

813,091. Tramway Switch; Otto C. N. Gundersen, Spokane, Wash. App. filed July 12, 1905. A pair of sector gears in the roadbed which, when depressed, move the switch, one to the right and the other to the left, through suitable gearing.

813,101. Closed Conduit for Electric Railways; Augustus W. Lohman, Sr., Chattanooga, Tenn., and Johan Pruis, Chicago, Ill. App. filed March 22, 1905. A conduit system in which the grip-slot is normally closed by spring shutters. The shutters have wedge faces, so as to be displaced during the passage of the collector shoe. A sectional conductor is also provided, which is temporarily energized during the passage of the car.

813,154. Automatic Switch for Electric Railways; Victor Joksch, Karlin-Prague, and Josef Petrick, Prague, Austria-Hungary. App. filed May 26, 1905. The tongue of the railway switch is controlled by a solenoid with two coils, and the current can be sent to one or the other of said two coils by changing the position of a small switch-lever in the car itself, said lever being arranged in a secondary current.

813,249. Convertible Car; Frank B. Stanley and John L. Gillmore, Bellingham, Wash. App. filed Aug. 12, 1905. Side seats are arranged in sections, and an operating lever extending length-

wise of the car swings the seats across the car for summer use.

813,267. Reversible Car Seat; Hubert Witte, St. Louis, Mo. App. filed July 7, 1905. Details of a "walk-over" car seat.

813,295. Adjustable Track or Trolley Wire; Willie Hills, Kansas City, Kan. App. filed May 6, 1905. Consists of two wires, one arranged vertically above the other, and means for adjusting both vertically and laterally.

813,346. Adjustable Brake Hanger; George M. Brill, Philadelphia, Pa. App. filed May 1, 1905. Consists of a rod having a ball at each end resting in adjustable sockets, which in turn rest in casings, one of which is attached to the brake beam and the other to the car truck.

813,389. Process for the Prevention and Laying of Dust in Roads, etc.; William M. Sandison, Ashfield, Ayton, Scotland. App. filed Feb. 28, 1905. Consists in the application to the surface of roads or pavement dressing of an aqueous emulsion obtained by combining wool-fat with an alkali or alkaline salt.

PERSONAL MENTION

MR. THOMAS WHITING has resigned as claim adjuster of the Old Colony Street Railway Company, of Boston.

MR. J. P. ALEXANDER, who was formerly with the Westinghouse Companies' Publishing Department, has just been appointed assistant purchasing agent of the Wheeling Traction Company, of Wheeling, W. Va.

MR. E. R. MASON, vice-president of Porter & Berg, is now recovering from an operation performed on him several weeks ago for appendicitis. Mr. Mason was taken to the Lakeside Hospital very suddenly, under the advice of his physician, to be operated upon. He has had a very severe case but is now well on the way to recovery. His many friends, both personal and in a business way, will no doubt be very much pleased to hear that he is out of danger and will be able to resume his duties very shortly.

MR. JOHN H. MERRILL, who recently resigned as auditor of the Western Ohio Railway to become permanent secretary of the Central Electric Railway Association, with headquarters at Indianapolis, was the guest of honor at a banquet given last week by his former associates in the Western Ohio. All of the roads in that district were represented, and President E. C. Spring and Treasurer A. W. Anderson, of the Central Electric Railway Association, were present and made addresses.

MR. W. M. WALMSLEY has been appointed general manager of the Sao Paulo Tramway, Light & Power Company, Ltd., of Sao Paulo, Brazil, and will sail to assume the duties of that office on March 5. Mr. Walmsley was engineer for the Electric Traction Company and Fairmount Park Transportation Company, of Philadelphia, and chief engineer and general manager of the MacAfee Company, during which time he built and operated the Augusta-Aiken Railway, the Ohio River Electric Railway, the Blue Grass Traction Company, New Orleans & Ponchartrain Railway, etc.

MR. ROBERT H. DERRAH, who has for nearly a year and a half been connected with the Boston & Northern and Old Colony Street Railway Companies as passenger agent, has tendered his resignation, to take effect March 1. Mr. Derrah leaves the service of the companies to carry out other business plans. Mr. Herbert A. Faulkner, who succeeds Mr. Derrah, is a young man of long newspaper experience, having been actively engaged in daily newspaper work for the past twelve years. For the past five years he has been successively city editor of the Brockton "Times" and "Enterprise," and came from the latter desk to this position. He has also contributed to other publications.

MR. C. O. BAKER has been appointed general freight and passenger agent of the Dayton & Western Traction Company, with headquarters at West Alexandria, Ohio, succeeding Mr. E. H. Morrell, resigned, to enter other service. Mr. Baker began his railroad career with the Adams Express Company, and filled several important positions with the express companies before accepting a position of messenger and conductor with the Dayton & Western Traction Company. During his term in the latter position he was largely instrumental in building up a profitable express business, and when the company's line was extended to Richmond, Ind., he was made representative of the passenger and express departments at that point. His appointment to his new position is considered good augury for the company, and the management is to be complimented on their selection of Mr. Baker for the position.

TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. * Including taxes. † Deficit.

COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends	COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends	
AKRON, O. Northern Ohio Tr. & Light Co.....	1 m., Jan. '06	73,235	41,619	31,616	22,667	8,949	MILWAUKEE, WIS. Milwaukee El. Ry. & Lt. Co.....	1 m., Jan. '06	278,152	139,617	138,534	84,217	54,918	
	1 " " '05	65,465	37,092	28,373	22,917	5,456		1 " " '05	256,458	130,228	126,230	74,351	51,880	
	12 " Dec. '05	963,187	516,390	446,797	276,744	170,053		12 " " '05	3,848,696	1,551,463	1,797,233	931,016	866,217	
	12 " " '04	895,731	486,980	408,751	273,664	135,087		12 " " '04	3,285,378	1,592,414	1,692,964	916,460	776,505	
AURORA, ILL. Elgin, Aurora & Southern Tr. Co.....	1 m., Dec. '05	42,981	24,022	18,959	9,333	9,625	Milwaukee Lt., Ht. & Tr. Co.....	1 m., Jan. '06	44,915	19,842	25,073	21,737	3,336	
	1 " " '04	38,504	22,468	16,036	9,333	6,703		1 " " '05	38,523	19,781	18,742	18,943	4,201	
	6 " " '05	267,037	140,945	126,082	55,839	70,243		12 " " Dec. '05	639,128	252,557	386,572	255,314	131,258	
	6 " " '04	240,090	130,767	109,323	55,839	53,484		12 " " " '04	492,228	216,964	275,264	203,731	71,533	
BINGHAMTON, N. Y. Binghamton Ry. Co....	1 m., Jan. '06	20,471	12,476	7,995	7,376	619	MINNEAPOLIS, MINN. Twin City R. T. Co....	1 m., Jan. '06	407,865	205,519	202,346	109,708	92,638	
	1 " " '05	18,238	11,336	6,902	7,097	†195		1 " " '05	351,121	175,314	175,806	97,323	75,481	
	7 " " '06	174,007	88,209	85,798	50,765	35,033		MONTREAL, CAN. Montreal St. Ry. Co....	1 m., Jan. '06	238,230	158,830	79,400	37,099	42,310
	7 " " '05	155,866	81,209	74,658	49,022	25,636			1 " " '05	203,235	151,676	51,560	19,035	32,524
BUFFALO, N. Y. International Ry. Co.	3 m., Dec. '05	1,042,562	614,203	428,359	240,471	187,888	4 " " '06		957,599	616,134	341,466	102,838	238,628	
	3 " " '04	937,094	501,885	435,209	235,995	199,214	4 " " '05		841,350	553,982	287,367	75,328	212,039	
	CHAMPAIGN, ILL. Illinois Traction Co....	1 m., Jan. '06	233,903	125,442	108,461	-----	-----	OAKLAND, CAL. Oakland Traction Consolidated.....	1 m., Dec. '05	131,375	67,348	64,027	35,026	29,000
		1 " " '05	191,360	102,979	88,381	-----	-----		12 " " '04	111,154	60,441	50,713	26,525	24,188
CHICAGO, ILL. Aurora, Elgin & Chicago Ry. Co.....		1 m., Dec. '05	48,327	27,104	21,223	-----	-----		12 " " '05	1,258,136	659,261	598,875	318,550	280,335
		1 " " '04	30,516	20,010	10,506	-----	-----		San Francisco, Oakland & San Jose Ry. Co....	1 m., Dec. '05	49,170	20,673	28,497	13,425	15,072
	6 " " '05	365,166	183,847	181,319	-----	-----	1 " " '04	41,840		16,786	25,053	11,560	13,493	
	6 " " '04	267,540	136,495	131,046	-----	-----	12 " " '05	535,134		234,998	300,136	159,840	140,295	
Chicago & Milwaukee Elec. R. R. Co.....	1 m., Jan. '06	43,443	22,694	20,750	-----	-----	12 " " '04	419,350		180,409	238,940	111,000	127,940	
	1 " " '05	24,826	14,654	10,173	-----	-----	OLEAN, N. Y. Olean St. Ry. Co.....	1 m., Dec. '05	10,180	5,620	4,559	2,550	2,010	
	12 " Dec. '05	594,875	244,552	350,323	-----	-----		1 " " '04	8,437	4,013	4,424	2,663	1,761	
	12 " " '04	464,655	176,038	288,618	-----	-----		6 " " '05	68,789	34,140	34,649	15,831	18,818	
CLEVELAND, O. Cleveland, Painesville & Eastern R.R. Co....	1 m., Jan. '06	15,858	*9,118	6,740	6,678	62		6 " " '04	80,378	29,620	30,758	15,820	14,939	
	1 " " '05	13,346	*9,737	3,608	6,663	†3,055	PEEKSKILL, N. Y. Peekskill Lighting & R. R. Co.....	1 m., Dec. '05	11,904	*6,381	5,523	-----	-----	
	12 " Dec. '05	245,089	*141,270	103,819	80,830	22,989		1 " " '04	10,482	*6,166	4,316	-----	-----	
	12 " " '04	225,751	*136,021	89,730	80,250	9,480		6 " " '05	68,562	*35,068	33,495	-----	-----	
6 " " '04	-----	-----	-----	-----	-----	6 " " '04		62,688	*34,201	28,487	-----	-----		
Cleveland & Southwestern Traction Co.	1 m., Jan. '06	46,567	27,550	19,018	-----	-----	PHILADELPHIA, PA. American Rys. Co....	1 m., Jan. '06	199,901	-----	-----	-----	-----	
	1 " " '05	34,760	22,777	11,983	-----	-----		1 " " '05	102,742	-----	-----	-----	-----	
	12 " Dec. '05	543,227	314,254	228,973	-----	-----		7 " " '06	1,048,659	-----	-----	-----	-----	
	12 " " '04	475,362	293,615	181,746	-----	-----		7 " " '05	853,423	-----	-----	-----	-----	
Lake Shore Electric..	1 m., Dec. '05	66,558	*34,758	31,799	20,404	11,395	ROCHESTER, N. Y. Rochester Ry. Co....	1 m., Jan. '06	157,762	92,426	65,336	27,985	37,351	
	1 " " '04	54,778	*33,443	21,334	20,404	930		1 " " '05	134,951	77,591	57,361	26,986	30,375	
	12 " " '05	788,268	*428,588	351,680	244,850	114,830		12 " Dec. '05	1,787,858	973,476	814,383	332,133	482,250	
	12 " " '04	659,873	*433,710	226,164	214,817	†18,658		12 " " '04	1,499,719	824,490	675,228	319,970	355,257	
DETROIT, MICH. Detroit United Ry....	1 m., Jan. '06	417,831	*250,234	167,597	92,242	75,355	ST. LOUIS, MO. United Railways Co. of St. Louis.....	1 m., Jan. '06	697,927	347,836	350,090	275,064	75,027	
	1 " " '05	356,195	*229,205	126,990	93,437	33,553		1 " " '05	606,496	371,664	234,832	240,262	†5,430	
	12 " Dec. '05	5,169,638	*3041522	2,128,116	1,113,293	1,014,823		12 " Dec. '05	8,460,016	4,414,866	4,045,150	3,291,418	753,732	
	12 " " '04	4,584,582	*2763092	1,821,490	1,075,786	745,704		12 " " '04	9,977,564	5,263,837	4,713,727	2,933,522	1,780,205	
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.....	1 m., Dec. '05	128,511	57,694	70,817	-----	-----	SAN FRANCISCO, CAL. United Railroads of San Francisco.....	1 m., Dec. '05	631,004	-----	-----	-----	-----	
	1 " " '04	115,403	45,650	69,753	-----	-----		12 " " '04	572,500	-----	-----	-----	-----	
	12 " " '05	1,351,576	597,452	754,124	-----	-----		12 " " '05	7,061,352	-----	-----	-----	-----	
	12 " " '04	1,363,549	596,157	767,392	-----	-----		12 " " '04	6,647,612	-----	-----	-----	-----	
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.....	1 m., Dec. '05	87,327	50,329	36,998	-----	-----	SAVANNAH, GA. Savannah Electric Co.	1 m., Dec. '05	54,146	37,525	16,621	10,904	5,717	
	1 " " '04	73,260	45,473	27,786	-----	-----		1 " " '04	48,454	32,855	15,599	10,552	5,047	
	12 " " '05	949,498	580,832	368,665	-----	-----		12 " " '05	586,236	348,027	238,209	127,694	110,515	
	12 " " '04	83 " ,231	533,295	301,937	-----	-----		12 " " '04	544,144	316,784	227,360	126,121	101,239	
FT. WORTH, TEX. Northern Texas Tr. Co	1 m., Nov. '05	66,271	36,247	30,023	9,938	20,086	SEATTLE, WASH. Seattle Electric Co....	1 m., Dec. '05	235,789	155,731	80,059	23,916	56,143	
	1 " " '04	47,634	30,621	17,013	9,100	7,913		1 " " '04	208,727	150,500	58,227	25,320	32,908	
	12 " " '05	658,906	387,077	271,829	117,372	154,457		12 " " '05	2,565,914	1,674,012	891,902	291,649	600,253	
	12 " " '04	551,716	330,244	221,472	107,911	113,560		12 " " '04	2,321,235	1,609,639	711,596	295,472	416,123	
HANCOCK, MICH. Houghton County St. Ry. Co.....	1 m., Dec. '05	16,853	12,139	4,713	3,786	927	SYRACUSE, N. Y. Syracuse R. T. Co....	1 m., Dec. '05	90,905	50,982	39,923	20,723	19,200	
	1 " " '04	17,079	13,493	3,587	3,333	254		1 " " '04	79,282	46,524	32,758	19,259	13,499	
	12 " " '05	167,007	168,643	†1,576	43,658	†45,234		6 " " '05	510,077	282,693	227,384	123,038	104,846	
	12 " " '04	199,513	135,414	64,098	40,444	23,654		6 " " '04	440,612	248,457	192,155	121,726	70,429	
HOUSTON, TEX. Honston Electric Co.	1 m., Dec. '05	46,413	29,794	16,619	8,749	7,871	TERRE HAUTE, IND. Terre Haute Tr. & Lt. Co.....	1 m., Dec. '05	61,063	39,678	21,385	10,988	10,898	
	1 " " '04	38,106	23,481	14,625	8,269	6,356		1 " " '04	52,070	32,510	19,561	9,222	10,399	
	12 " " '05	517,315	313,525	203,791	106,504	98,286		12 " " '05	629,760	414,518	215,243	122,418	92,825	
	12 " " '04	357,183	314,523	42,661	96,336	†3,675		12 " " '04	569,429	369,005	200,424	113,873	86,550	
HUDSON, N. Y. Albany & Hudson R. R. Co.....	1 m., Jan. '06	22,858	*17,479	5,379	5,000	379	TOLEDO, O. Toledo Rys. & Lt. Co..	1 m., Dec. '05	175,744	*81,697	91,047	42,460	43,587	
	1 " " '05	20,117	*16,980	3,137	5,000	†1,863		1 " " '04	165,929	*77,836	88,093	41,693	46,400	
	6 " " '06	216,597	*160,705	55,892	35,000	20,892		12 " " '05	1,913,456	*972,994	940,462	510,307	430,155	
	6 " " '05	188,221	*141,775	46,446	35,000	11,446		12 " " '04	1,752,833	*923,208	829,625	499,874	329,751	
YOUNGSTOWN, O. Youngstown-Sharon Ry. & Lt. Co.....	1 m., Dec. '05	54,197	*25,690	28,507	-----	-----	MILWAUKEE, WIS. Milwaukee El. Ry. & Lt. Co.....	1 m., Jan. '06	278,152	139,617	138,534	84,217	54,918	
	1 " " '04	46,487	*26,452	26,035	-----	-----		1 " " '05	256,458	130,228	126,230	74,351	51,880	
	AKRON, O. Northern Ohio Tr. & Light Co.....	12 " Dec. '05	963,187	516,390	446,797	276,744		170,053	12 " " '05	3,848,696	1,551,463	1,797,233	931,016	866,217
		12 " " '04	895,731	486,980	408,751	273,664		135,087	12 " " '04	3,285,378	1,592,414	1,692,964	916,460	776,505