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## Block Signal Systems

A recent serious collision on a well-equipped road calls attention to the inevitable personal factor in the safe operation of electric roads. From the best reports yet received the accident, a head-on collision, resulted from an injudicious motorman running by a danger signal and not keeping his car under close control. If anything should serve to accentuate the value of strict discipline it is such an unfortunate occurrence. Of course, on large double-track or even single-track systems it is possible to provide automatic block devices which cut off current from a section in which a danger signal is set, but such schemes are rather complicated and troublesome, and on most roads we regard them as at present impracticable. The next best thing is a proper block signal system, plus rigid discipline of the operating force. This is quite sufficient to insure safety under all practical working conditions, but its value turns upon the control of the human factor. The recent tendency to trade union rule on street railways we believe to be directly responsible for the undoubted difficulty of enforcing proper discipline on many roads. The personal reliability of a motorman is not, and never will be, a proper subject of arbitration. Either he obeys orders and displays proper discretion in the performance

of his duties or he does not—there is no middle ground. The modern fast interurban car requires an unusual degree of skill and judgment on the part of the motorman, and these qualities are not insured by his membership in the union. We wish the public could be brought to a full understanding of the fact that any interference with the discipline of a road is a direct menace to public safety. Yet the arbitration of questions of discipline is one of the commonest features of union demands. Only last week we noted another instance of it, which we regard as without exception the most obnoxious and dangerous feature of unionism.

## Second-Hand Apparatus on New Roads

The use of second-hand apparatus in street railway work is a subject worthy of no small consideration in times of uncertain deliveries and crowded factories. Conditions often justify the purchase of worn machinery for temporary operation, especially when the load on a plant has increased so rapidly that, pending the delivery of new units, the original installation is inadequate to handle the traffic, or when the resources of the operating company will not permit the adoption of the latest types of engines and generators. It is also true that very often perfectly modern machinery can be purchased second hand, simply because a large road can frequently afford to operate machinery for a short time and then discard it for large units or to complete a polyphase installation.

It would be foolish and untrue to claim that all the second-hand apparatus on the market is either good or bad exclusively. Most of us have seen machinery which proved to be a genuine bargain when purchased and operated after giving good and faithful service to its original buyers; on the other hand, there is no reasonable doubt that many railway engineers have looked with pity upon the painful operation of asthmatic second-hand engines and sputtering generators which no repair shop could redeem, and whose excessive appetite for steam and thermal radiating capacity turned the operating records into chronicles of extravagance and inefficiency. It is safe to say that too much cannot be known about second-hand machinery before its purchase. If possible it should be thoroughly tested before acceptance, always inspected, and in every case its history ought to be scrutinized with extreme care. If this plan is followed there should be no trouble.

Second-hand apparatus is usually purchased by established operating companies rather than for brand new systems, and there is good ground for believing such a course to be the part of wisdom. A case in point is furnished by a new Eastern road recently placed in operation. The line connects a large city with a fertile suburban territory, and when fully completed will join several important towns and another prominent city to the original municipality. Rolling stock, roadbed, track and overhead work are all of exceptionally high quality, but the engine room of the power station contains four ancient generators, three of which were old timers in the days of the Chicago Exposition of 1893, all being belted to two engines, which were used to supply power to one of the earliest electric roads in

New England. Innumerable troubles have appeared since the road started, and at times the power has been so poor that but a single car could be operated on the line. No records of fuel consumption have as yet been kept at the power station, but evidence indicates that it will be impossible to run the plant economically as long as the obsolete machinery is retained. Even the single car has been repeatedly stuck on heavy grades of 3 per cent to 6 per cent on account of the inability of the power station properly to carry the load. The old machinery mars the appearance of the whole plant, destroys all chance of good efficiency records, introduces a heavy depreciation factor at a period in the road's life which would ordinarily be unencumbered with such charges, and illustrates a penny-wise-and-pound-foolish policy which is strongly out of place in a system otherwise thoroughly commendable. The outcome will doubtless be the purchase of modern generating units, but it is reasonable to infer that in buying the old apparatus the will-o'-the-wisp of getting something for nothing received more attention than the strict business-like and progressive requirements of the situation.

### The Limit of Speed on Highways

The Massachusetts Railway Commission has just made a ruling on the permissible speed of trolley cars which seems to call for comment. The cause was an application for ratification of a town act allowing a speed of 20 miles an hour on certain streets. The decision of the Commissioners was adverse, and in connection with it they promulgated a general line of action looking toward limit of speed in highways and better control of the cars. Like most of the effusions of this body it is somewhat vague in its requirements, but it seems to cover the following points: 1. No single-truck car to run more than 15 m. p. h. unless by special permission. 2. Slow down at all crossings to such a point that car can be stopped "immediately." 3. Slow down on curves "to meet the condition of limited vision." 4. Test working of brakes at reduced speed before coasting a heavy grade. 5. When skirting narrow road slow "to meet this condition whenever such road is in rightful use by others." 6. Slow when necessary in using traveled road on which other vehicles have rights. Now, these rules are concocted with rightful intent, but what on earth do they really mean? How about double-truck cars? One seldom cares to run the single-truck cars at high speed, anyhow, and rules to be much of use must include all cars. What is stopping "immediately"—in 2 ft. or in 50 ft.? Rules 5 and 6 seem devised to protect vehicles and pedestrians, but we defy any two motormen to agree on their practical meaning. We approve of proper regulation of speed on public highways, but we believe that the limit allowed electric cars should be at least as high as that permitted to automobiles. An electric car which is confined to a track that all may see is no more dangerous than a "vermillion devil" at the same speed dodging all over the highway. Moreover, the former is a public convenience, while the latter, from the standpoint of 99 per cent of the people, is a public nuisance. The essence of safety is to limit all vehicles using the public highway to speeds at which they are under such control as to make the highways safe, and more particularly to punish with inexorable severity accidents due to reckless speed. A legal limit of speed is a farce unless offenders against public safety at any and all speeds are treated to an old-fashioned brand of swift justice.

### Report on Electrolysis in St. Louis

The question of electrolysis appears still to present itself occasionally and cause unnecessary alarm to city authorities and other owners of subterranean metallic structures.

At one time a considerable degree of concern was felt throughout the country as the result of the discovery of electrolytic damage in a number of places. This has properly given way, in the majority of cases, to the calmer attitude brought about by the full and complete scientific investigations made in many localities, and furthermore by proof of the fact that the damage has been very much exaggerated. It has been conclusively shown that all trouble from this cause can completely and easily be overcome by proper maintenance of track and bonding and the rational use of return feeders, coupled (in some instances) with a connection of the water pipes at the neutral or positive areas to return conductors. The apprehension which formerly existed was undoubtedly the result, in many cases, of the misguided enthusiasm of certain investigators and of alarming statements made by those incompetent properly to consider the subject.

In this connection attention should be called to a recent report made to the city of St. Louis by E. E. Brownell. If this report does not cause something of a renewal of apprehension on the part of waterworks engineers, it will doubtless be because they are now too well informed upon the subject to be misled.

We learn from this report that "electrolytic corrosion must be wholly governed by Ohm's law. To disregard this well-known law of electrochemistry would be equivalent to attempting to break down all the defined laws of chemistry. This rule or law must be conceded as absolute." Again, we are informed that "all metallic piping lines, cables, etc., that lie in direct contact with the earth through which these currents traverse must suffer more or less electrical dissociation, depending entirely upon Ohm's law."

It will be new to scientists that Ohm's law is a law of electrochemistry. It was generally thought to be a law expressing the relation between electrical pressure, resistance and current flow, and that the conspicuous case where it does not apply is that of electrolytic conduction. Nevertheless, the writer of the report referred to bases his whole calculations in utter disregard of local potentials or counter electromotive forces set up by chemical affinities and polarization, and armed only with an imperfect knowledge of Ohm's law, undertakes to solve the complicated problems of electrochemistry.

A similar reversal of accepted electrical laws is characteristic of most of the computations contained in the report. Thus, it is commonly understood that a resistance measurement between pipe and rail, if it were possible to make such measurement with any degree of accuracy, would express the earth resistance between the entire connected rail system on the surface and the entire connected pipe system below the surface. From this report, however, we learn that each such measurement represents the resistance of the earth at the point measured, and that the flow of current from pipe to rail, or vice versa, can be obtained by dividing the observed potential difference by the observed resistance, and that the total current flow between rail and pipe may be found by adding the several results so obtained at each of the points of measurement. It would appear that this was an excellent method of making out a case of damages, but we do not understand why Mr. Brownell

should have limited himself to ninety-two measurements when the 122,980 lbs. of metal which he gravely asserts to be removed from the pipes of St. Louis every year, could have been multiplied ten or one hundred times by the simple process of taking ten or one hundred times as many measurements.

Incidentally in the report we learn that "The electrical state of the earth in St. Louis is indeed quite extensive and serious, with great electrical distortion." We extend to St. Louis our condolence in being afflicted not only with boodle aldermen but with an electrical state which is indeed quite "extensive and serious"—if this report is to be believed.

The "great distortion" may be judged from the table of currents given by Mr. Brownell and calculated on the above extraordinary basis, which shows currents simultaneously passing in opposite directions between rail and pipe. Thus we learn that on Vandeventer Street there are 625 amps. flowing out of the pipe, and 40 amps. flowing into it; but we are informed that in the entire city 6149 amps. are leaving the pipes, while 6407 amps. are entering them, and we marvel that enough more readings were not taken so that 61,490 might have been found leaving and 64,070 found entering. We are not informed what becomes of the excess of current entering, but we may perhaps infer from the report that it is absorbed and becomes a permanent part of the water supply. From these figures as a basis we learn that "according to Ohm's law the amount of metal removed electrolytically from the distributing system is 122,980 lbs.;" for Mr. Brownell is "convinced and thoroughly satisfied that the application of Ohm's law is the only correct and practical basis of calculating the rate of electrolytic dissociation."

The average of Mr. Brownell's resistance measurements is .051 ohms, and with the 6149 amps. which he finds flowing it is evident that the earth drop in St. Louis must be 313.6 volts, so that Mr. Brownell may, perhaps, be conservative in saying that "the electrical state of the earth in St. Louis is indeed quite extensive and serious."

The report fairly bristles with other interesting and remarkable remarks, and were it not for the serious influence that such statements, accompanied by a great showing of authoritative assertion, may have with those not sufficiently familiar with the subject to recognize the true facts we should regard the document as wholly humorous, but as it is just this sort of misinformation which is responsible for much of the alarm which has arisen from time to time, we are compelled to take a more serious view.

That some electrolytic corrosion is still going on where railway return systems are not properly kept up there can be no doubt. There can also be no doubt that much that is ascribed to corrosion by street railway currents is either not electrolytic at all, or is due to local action where metals of different composition are buried adjacent to one another, such corrosion being often found in places where no electric railways exist. But where electrolysis does exist the determination of the extent and cause is a problem worthy of the best skill, experience and technical training, and should not be left to those who cannot properly diagnose the situation.

Incidentally, we note in the St. Louis report that the city of Buffalo, though "it can probably boast of the best track construction of any city using the single trolley," is nevertheless losing "not less than 24,000 lbs. of iron per year." A letter written this month by the Deputy Water Commissioner of

Buffalo says, however: "We have not experienced any trouble from electrolysis. I have not found a leak on any of our mains which would indicate that as the cause." Evidently the city of Buffalo does not know how badly it is suffering, or else Mr. Brownell is again mistaken.

### Overdoing the Park Business

For several years the street railway park has been coming more and more to the front as a factor tending to increase the gross earnings of urban systems. It is a long stride from the simple rustic seat by the shore of a suburban pond to the complicated product of the landscape gardener and amusement manager's skill, which daily draws thousands of recreation seekers into its interesting domains. Great progress has been made in the laying out and operation of these parks, and many comforts added to increase their popularity, but it is well to remember that there are economical limits to the expenditures which may be made with safety.

Experience, for instance, has shown that it is hazardous to start in on a very elaborate scale in creating a park property where there is not enough traffic to warrant the expenditure. We have in mind a case in the South where the owner followed this course, and finally has invested over \$75,000 in such a proposition. As it is impossible to earn anything like a fair return on such an investment as this, he is now trying to sell out at a figure considerably below the original cost, and the railway company which he is approaching naturally hesitates to accept such a burden of fixed charges accompanied by the relatively low-earning capacity entailed. The park, naturally, attracts a great many people, but the returns do not amount to enough to make it a paying venture.

As it is very easy to spend a large sum in park development, it behooves the street railway manager to move with great caution before recommending the establishment or purchase of any high-cost park, however attractive it may appear on the surface. Especially is it desirable that a park be located on the main line of an electric road, for the operating difficulties in attempting to handle a park from a spur track connection are by no means imaginative. The passengers in the through cars do not want to be delayed while the car is run out to the park and back, and it becomes necessary to operate special cars to the park, which is an expensive alternative. It is also probable that a park located but two or three miles from a city or town will do a better business than one a good deal farther away. On the other hand it should not be within easy walking distance of the centers of population.

It is far better to begin in a small way and spend money on a park as it is justified by the increase in net earnings shown in the financial reports, than to sink large sums of money in uncertain ventures of high first cost. Nothing in these comments is intended to decry the street railway park as an income and traffic producing agency, for the experience with such attractions in this country speaks for itself. We simply wish to emphasize the need of watching out for the dangers of over-capitalization and to apply to the park business the tried and trusted maxim—"Make haste slowly!" It is a pretty good plan to do some thoroughly conservative work with pencil and paper in the way of interest and operating expense problems before committing oneself strongly in favor of liberal expenditures for enterprises related to transportation, but not of immediate connection with it.

NOTES ON THE DES MOINES CITY RAILWAY

The Des Moines City Railway operates what was one of the first street railway systems of the country to adopt the electric traction. The company has always been somewhat original in

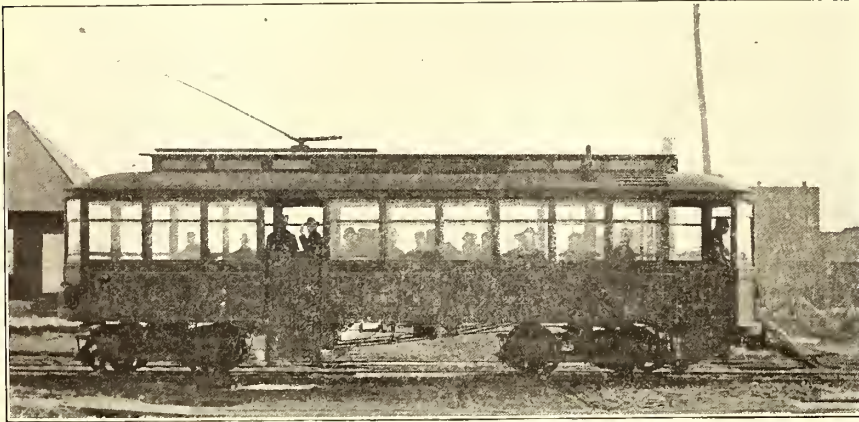


FIG. 1.—DES MOINES CAR, WITH SIDE ENTRANCE AND NO REAR PLATFORM

its methods of working out various problems as they came up, and the practice in Des Moines has in many cases not followed the "cut and dried" standards of practice found elsewhere. This company's ordinary schedule calls for fifty-seven cars.

All cars are operated on the telephone despatching system. Telephone booths are located at the end of each line, by which communication is had with the chief despatcher. All cars pass the company's waiting room and the Union depot. A despatcher, or starter, is located at the waiting room in addition to the telephone despatcher.

ROLLING STOCK

Probably the most originality is found in the company's rolling stock. A number of types of cars have been tried since the company began to operate double-truck cars. While it is unnecessary to mention the several types that have been tried, there is considerable interest attached to the car which bids fair to become the company's standard for both summer and winter use. This car is shown in Fig. 1. The first striking thing to be noted about it is that there is no rear platform. The entrance is at the side. The Minneapolis type of gate is used. It is opened and closed by a lever on the motorman's platform, and is opened by the motorman only when the car is at a standstill. This gate is of wood, as seen. In some respects this car may be compared to the standard Denver car described

in the STREET RAILWAY JOURNAL of Feb. 7, 1903, which is also a side-entrance car. Aside from having the entrance only at the side, however, these two cars have very little in common. In the Des Moines car the compartment in front of the side entrance is closed like an ordinary car body. This compartment is 22 ft. long. It is peculiar in its seating arrangement, cross seats being installed on one side of the car and a side seat on the other side. This gives a very wide aisle, to facilitate passage when the car is crowded, but when the car is lightly loaded, as it is during much of the day, all the passengers desiring can have cross seats, which seats, as is well known, are, as a rule, preferred. The rear compartment, which is 14 ft. long, has side seats, and is a smoking compartment. In winter this compartment is closed except that there is no partition between the entrance and the smoking compartment, that is, the entrance to the car forms a part of the smoking compartment. The length of the car over all is 40 ft. It is equipped with Taylor trucks. This type of car the management

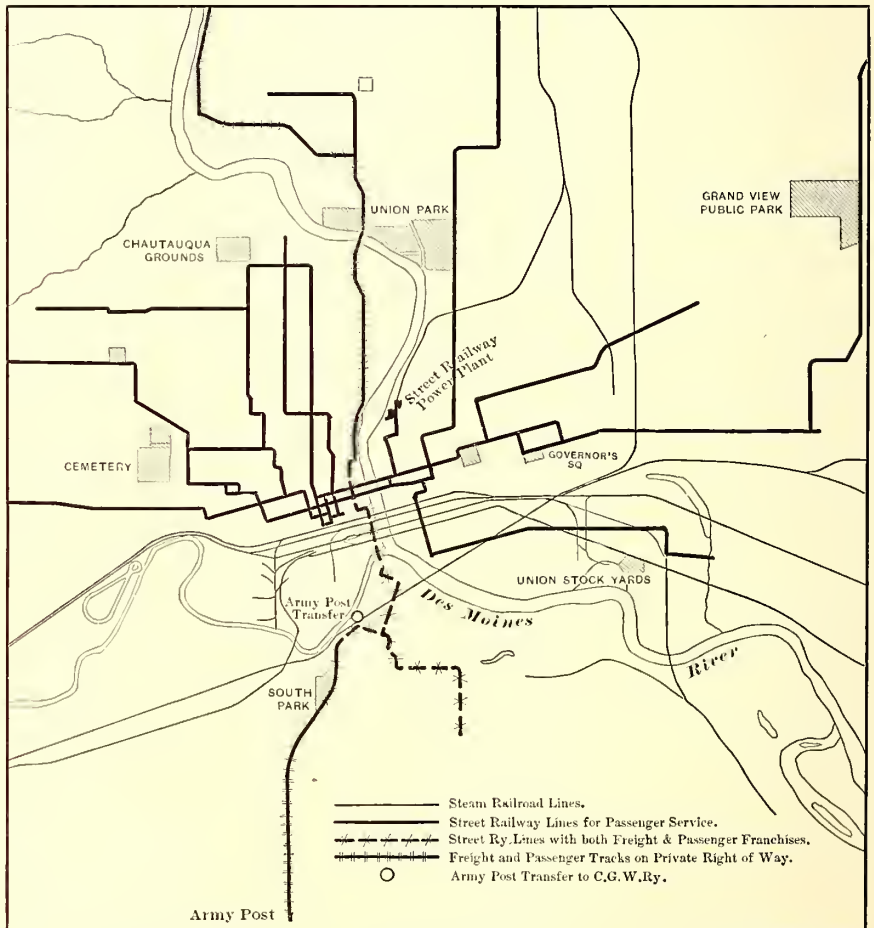


FIG. 2.—MAP SHOWING SYSTEM OF DES MOINES CITY RAILWAY



FIG. 3.—BOX FREIGHT CAR USED AS TRAILER IN DES MOINES

thinks is the most popular with the public of any car that has been tried, as it caters to the desires of various people. In winter there is a half-open smoking compartment, which is much more satisfactory to smokers and those who desire to ride outside than would be a crowded rear platform. The ordinary compartment for non-smokers is in no way interfered with. The entrance is not nearly as likely to be obstructed by standing passengers as is the rear platform. By letting the windows down in summer it becomes a pleasant summer car. The absence of a rear platform gives the car a somewhat peculiar appearance to those unaccustomed to it, but this, of course, is no particular ob-



amount of freight, as do also coal mines in that locality. The Des Moines City Railway Company's freight line in reality takes on the nature of a city junction and transfer railway for freight purposes, as far as its usefulness is concerned, although

line crosses and exchanges freight with two steam roads, the Chicago Great Western and the Chicago & Northwestern. Connection is made with several other steam roads near the heart of the city. South of Des Moines is a United States



FIG. 5.— ELECTRIC FREIGHT TRAIN IN DES MOINES

regular city passenger traffic is carried over this same route. Freight is handled with a locomotive made at the company's shops. In this connection it should be mentioned that the northern end of the line joins the belt line outside the city limits, owned by the Interurban Railway Company, an allied corporation. The Interurban Railway Company operates the inter-

army post, reached by the Interurban Railway Company's line. Freight is hauled out from Des Moines over this line, and this is the only railroad to the army post. Figs. 3 and 5 will give an idea of the rolling stock used for freight handling by the Des Moines City Railway and Interurban Railway Company. Most of the freight cars are owned by the Des Moines City Railway Company.

NEW POWER STATION

The company is now enlarging its power house and taking out antiquated apparatus which has heretofore been kept as a reserve. The power house and car house are located near the center of the city, as seen on the map, Fig. 2. The map of

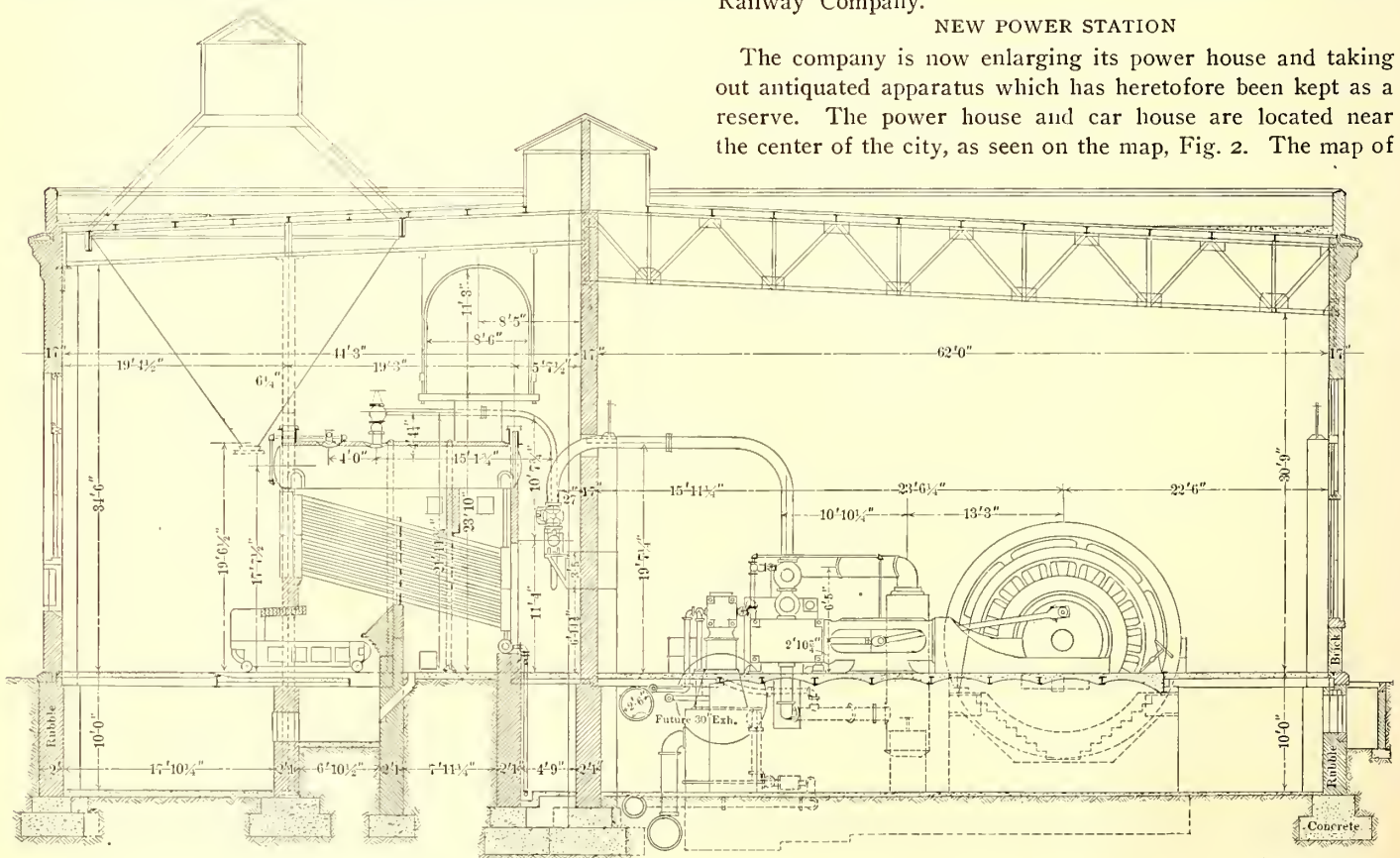


FIG. 6.— CROSS SECTION OF NEW POWER STATION

Street Ry. Journal

urban line from Des Moines to Colfax. Passenger traffic for the interurban line to Colfax goes over Walnut Street and then north to the northeast corner of the city, past Grandview Park, as seen. Freight traffic from the interurban line is taken across the belt line, which is not shown on the map, Fig. 2, and is brought down over the Des Moines City Railway Company's freight line, which parallels the river. The interurban belt

the company's property, showing the general arrangement of the power houses, is given in Fig. 4. The Chicago & Northwestern Railway adjoins the property at the left, and the Des Moines River at the right. The storage tracks at the southern part of the property occupy space which is to be devoted to the new car shops mentioned later. Only that portion of the power house shown by full lines is completed. That part of

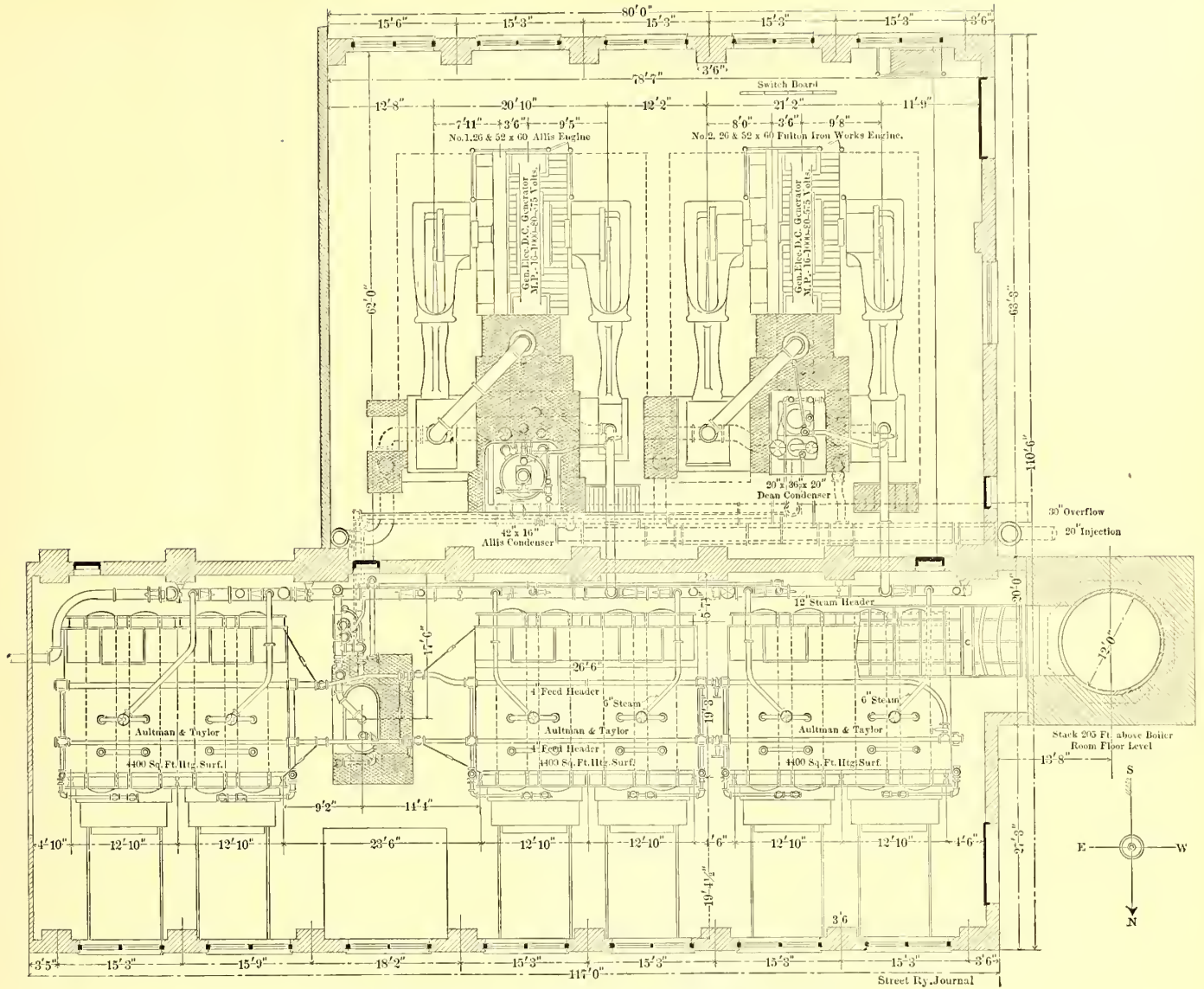
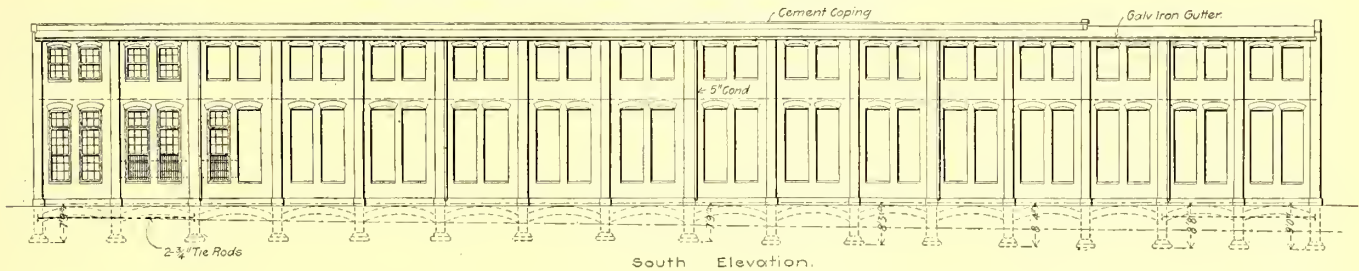
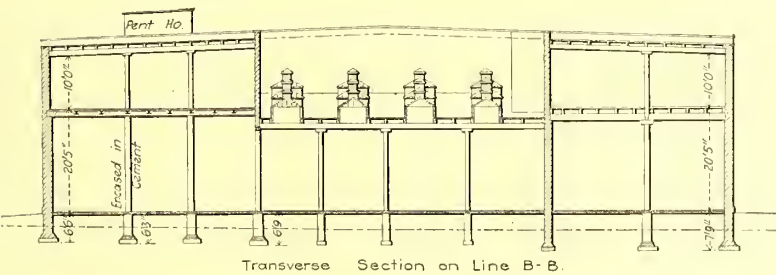


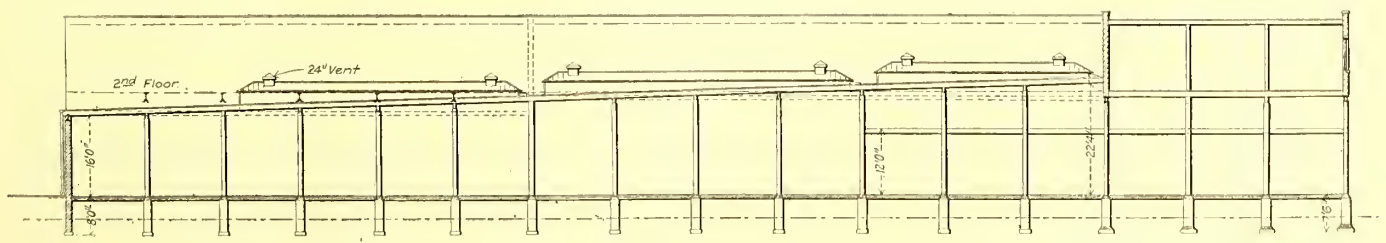
FIG. 7.— PLAN OF POWER STATION, SHOWING PIPING



South Elevation.



Transverse Section on Line B-B.

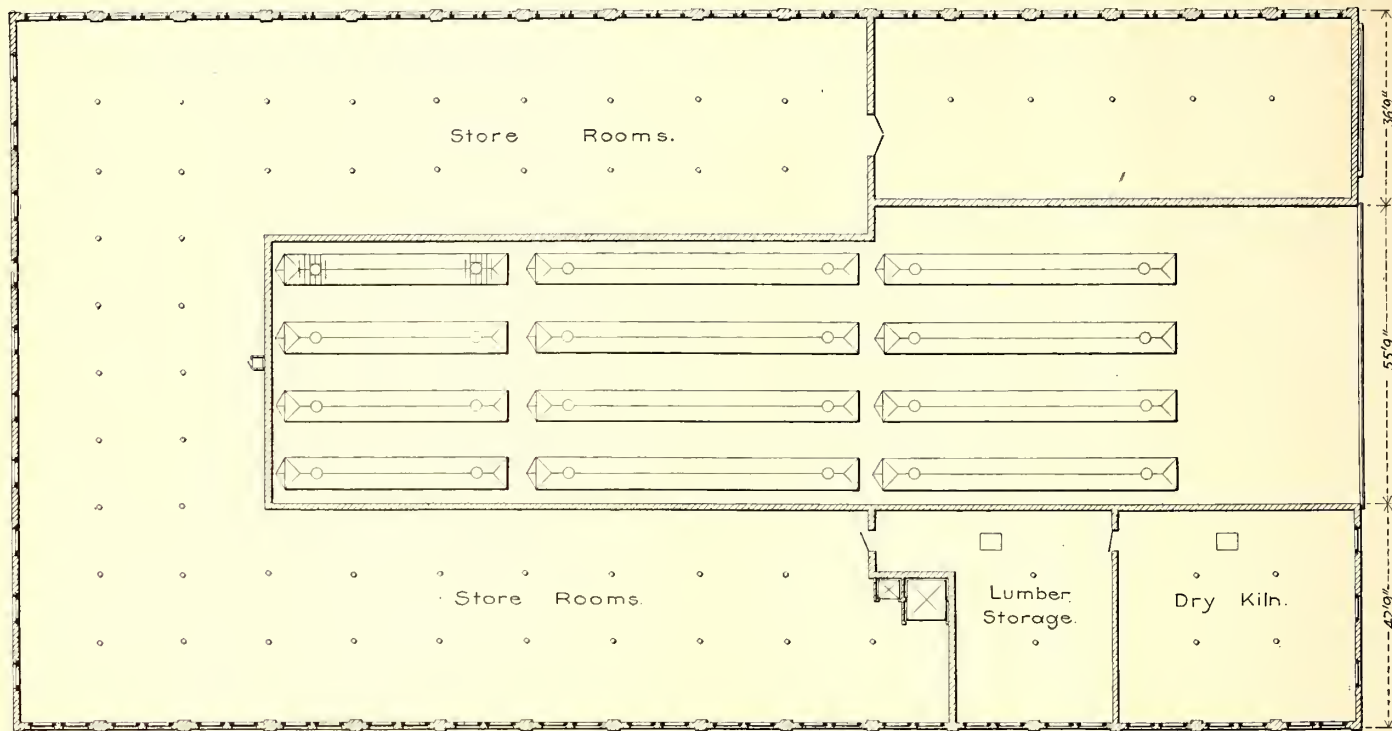


Longitudinal Section on Line A-A.

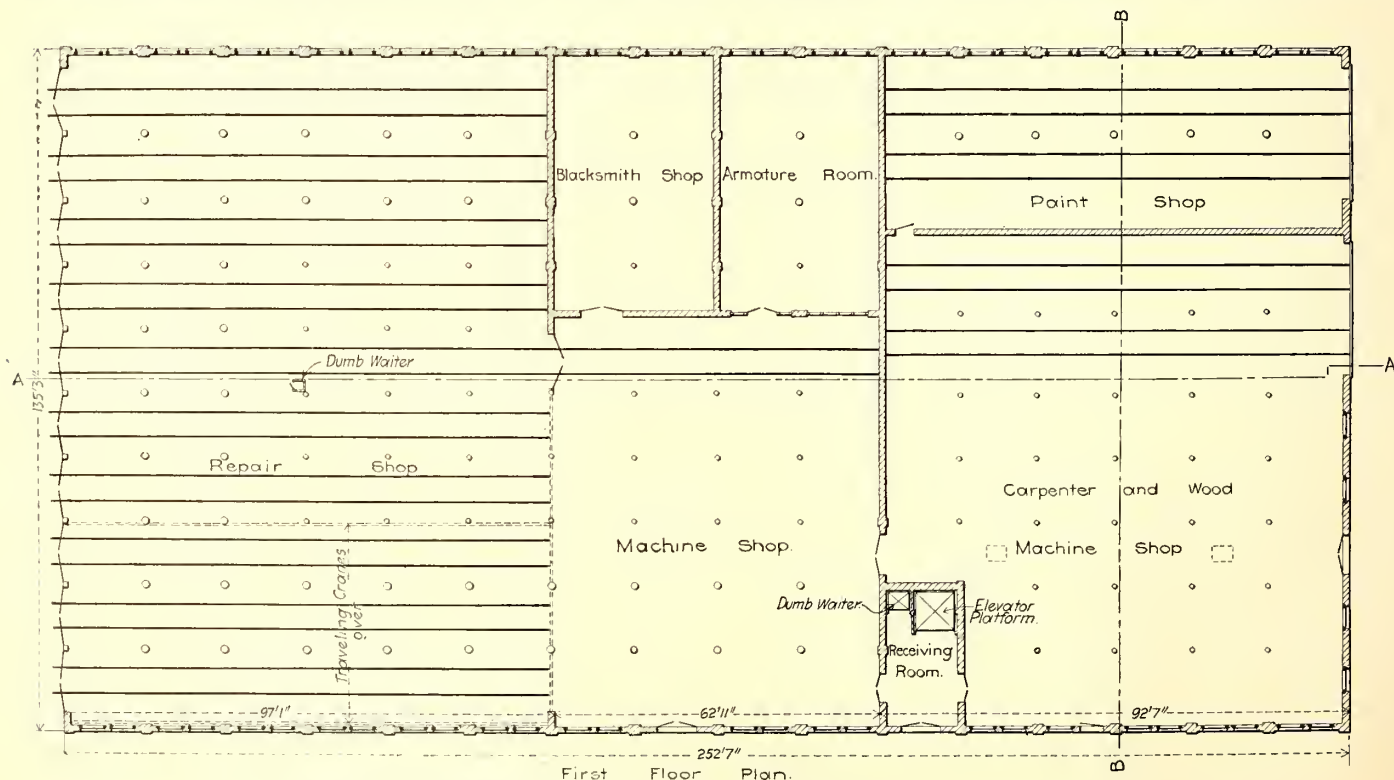
FIG. 8.—SIDE ELEVATIONS AND SECTION OF NEW REPAIR SHOPS

the power house shown by dotted lines is on ground heretofore occupied by the old power house and shops. The old power house had simple non-condensing Corliss engines, belted to a line shaft, which drove a lot of D-62 generators. The saving made in operating expenses when the old power house was shut down and the road was operated with the large compound,

sub-station at Mitchellville. In case the interurban lines are extended, as they probably will be, so that a large amount of alternating current is required for transmission, alternating-current generators can be put in and the present inverted rotary converter can be used as a regular rotary converter at some sub-station. The boilers are of Aultman & Taylor make.



Second Floor Plan.



First Floor Plan.

FIGS. 9 AND 10.—PLANS OF FIRST AND SECOND FLOORS, NEW REPAIR SHOPS

condensing direct-connected units, was something enormous. Fig. 7 is a plan of that portion of the power house which has just been completed, and Fig. 6 is a sectional elevation. The generators are 1050-kw direct-current General Electric, connected to Allis-Corliss compound engines. To supply the Interurban Railway Company's Colfax line an inverted rotary converter of 300 kw has been put in, which, with the aid of step-up transformers, gives 13,000 volts three-phase for transmission to a

NEW SHOPS

The company has always done a great deal of its own car rebuilding and repair work, and has also built some of its own cars. This will be done on a larger scale than ever before when the new shops, plans of which are seen in Figs. 8, 9 and 10, are completed. The company maintains its own iron foundry, which is a rather unusual practice with street railway companies. This is kept in a small building by itself. A



cupola capable of melting 1½ tons of iron at a heat is installed. The company casts its own brake-shoes and all the small cast-iron parts needed in car maintenance.

FEEDERS ACROSS THE RIVER

Feeders are taken directly across the river from the power station with a single span on a pole tower, from one side to the other. The method of laying the return feeder in the bed of the river is interesting. In the winter, when the river was frozen thickly over, some 50-lb. rail, with cast-welded joints, was laid on the ice. When the ice melted in the spring this sank, and the company had a permanent return feeder from the east to the west side of the river.

CAR FOR STATE FAIR TRAFFIC

The Des Moines City Railway Company handles its greatest crowds at the time of the Iowa State Fair, which is held every fall, east of the city. At that time every bit of rolling stock available has to be brought into service for temporary use in hauling State Fair crowds. Additional trailers like the one shown in Fig. 11 have been constructed. They are rather peculiar

company this spring built one of the largest and best equipped park theaters in the United States. Fig. 13 is a view taken during the construction this spring. As seen, it is located on the hillside or the banks of a lagoon. The high side furnishes the necessary slope for the main floor. It has a gallery, and is

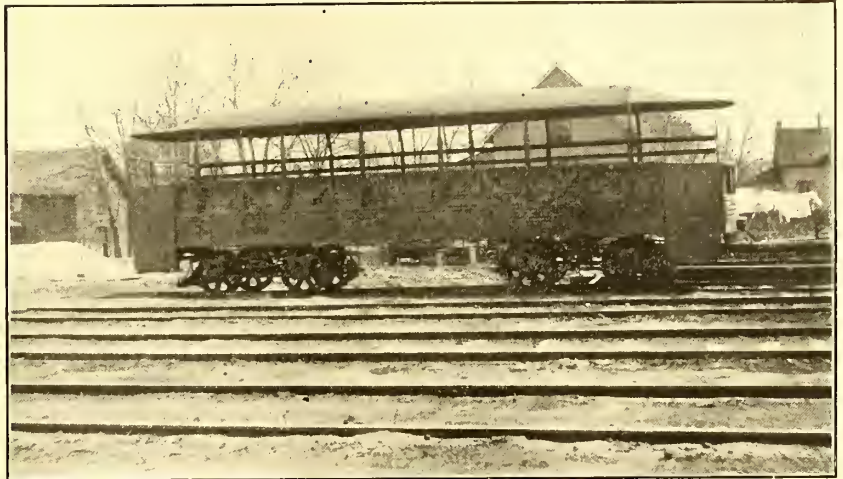


FIG. 11.—TRAILER FOR USE DURING STATE FAIR

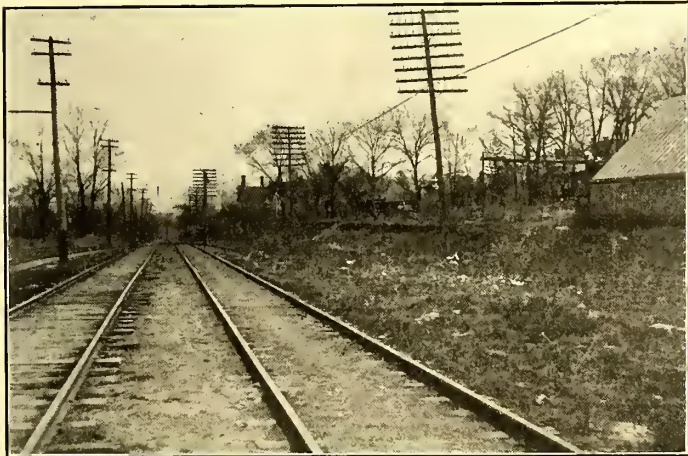


FIG. 12.— DOUBLE TRACK ROAD ON PRIVATE RIGHT OF WAY.

in appearance, but they serve well to handle the crowds and were not expensive to build.

A DESIRABLE LOCATION FOR TRACKS

Fig. 12 is a view in one of the outlying residence portions of the city, showing one of the company's principal lines, which is on a private right of way paralleling one of the finest boulevards. This track is an inheritance from an old steam dummy line. It is too bad there have not been more such lines the country over, as the private right of way is so desirable, from an operating standpoint, because of the freedom from interference by steam traffic, the freedom from paving maintenance and the greater ease with which the track can be kept clear of dirt and in good operating condition. It serves the entire population located along the boulevards without in any way interfering with pleasure traffic on the boulevards. It is, perhaps, too much to expect that this method of operation over a private right of way will be extended, but upon seeing how well the arrangement works one cannot help regretting that more routes over private right of way were not secured in the earlier days of street railway business.

INGERSOLL PARK

At Ingersoll Park, in the western part of Des Moines, the

especially designed to be cool and comfortable in all weather. This opera house seats 4200, and is practically as complete in its appointments for staging high-class productions as any metropolitan opera house. The interior will be fitted with 1000 incandescent lamps, and folding opera chairs for the seats. The proscenium will be 34 ft. wide and about 26 ft. high. Other details regarding this opera house were given on page 744 in this journal for May 16, 1903. It is an undertaking in which President J. S. Polk, of the Des Moines City Railway Company, has taken great pride. He has taken pains to see that it is as good as it could be made.

The company is practically under the same management as it has been in years past, the officials now being as follows: President, J. S. Polk; secretary and superintendent, A. G. Maish; treasurer and general manager, George G. Hippee; master mechanic and chief engineer, J. E. Welch. For 1902

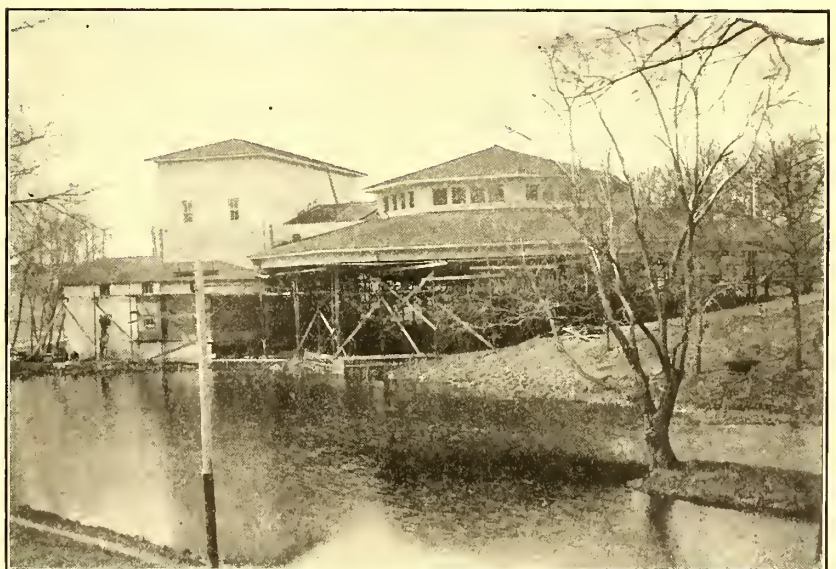


FIG. 13.— SUMMER THEATRE IN COURSE OF CONSTRUCTION AT INGERSOLL PARK

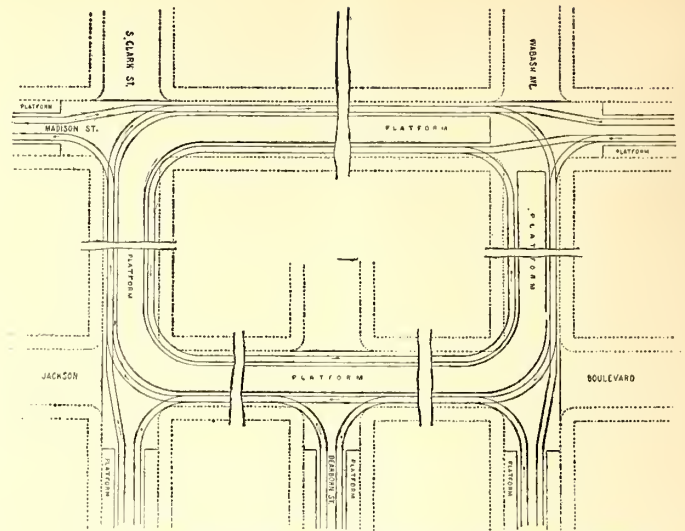
the gross receipts were \$483,150; operating expenses, \$310,075; net earnings, \$173,075.

The Brooklyn Rapid Transit Company carried nearly 2,000,000 passengers on July 4. This breaks the company's record.

PROPOSED INNER CIRCLE SYSTEM FOR CHICAGO

The recent discussion of the underground street railway problem of Chicago has brought out a number of plans besides those submitted by Mr. Arnold with his report. Among these is one by A. S. Robinson, lately chief engineer of the Northern Michigan Railroad, which consists essentially of one inner circle or loop subway, upon which cars of open construction will move only in one direction, acting as a transfer, and stopping at all stations. This subway, surrounding four, six or nine blocks, as might be finally determined upon, would be centrally located and accessible to the street car lines coming in from the North Side, West Side and South Side. For the sake of illustrating his system Mr. Robinson has indicated this loop or belt line as surrounding the nine blocks bounded by Clark, Jackson, Wabash and Madison in the map.

The street railway lines reaching the downtown district would enter their respective subways about as indicated in Mr. Arnold's plans, and approach the belt line, or, as Mr. Robinson

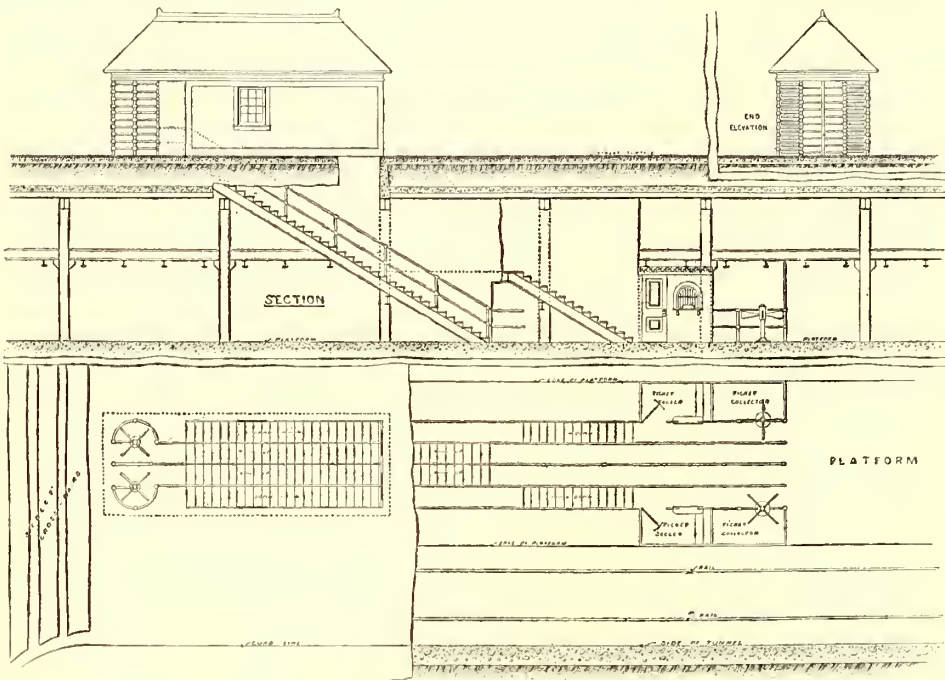


PLAN SHOWING INTERSECTIONS WITH BELT LINES

one exception, there are no grade crossings in the whole system, and that all cars, of whatever main line, while in the belt subway run in the same direction. The inner circle, using an independent track, allows cars to be run in the opposite direction, thus facilitating the rapid transfer of passengers.

The one exception of grade crossing is at the northeast corner of the inner circle, where connection is made with the main lines for supplying cars to and removing them from the inner circle during the rush hours. This crossing, however, is in a track that is used only by the occasional through cars, and hence the danger of grade crossing accidents is reduced to a minimum.

Mr. Robinson calls attention to the fact that in the inner circle system here submitted he has secured the minimum depth of tunnel, as the sub-



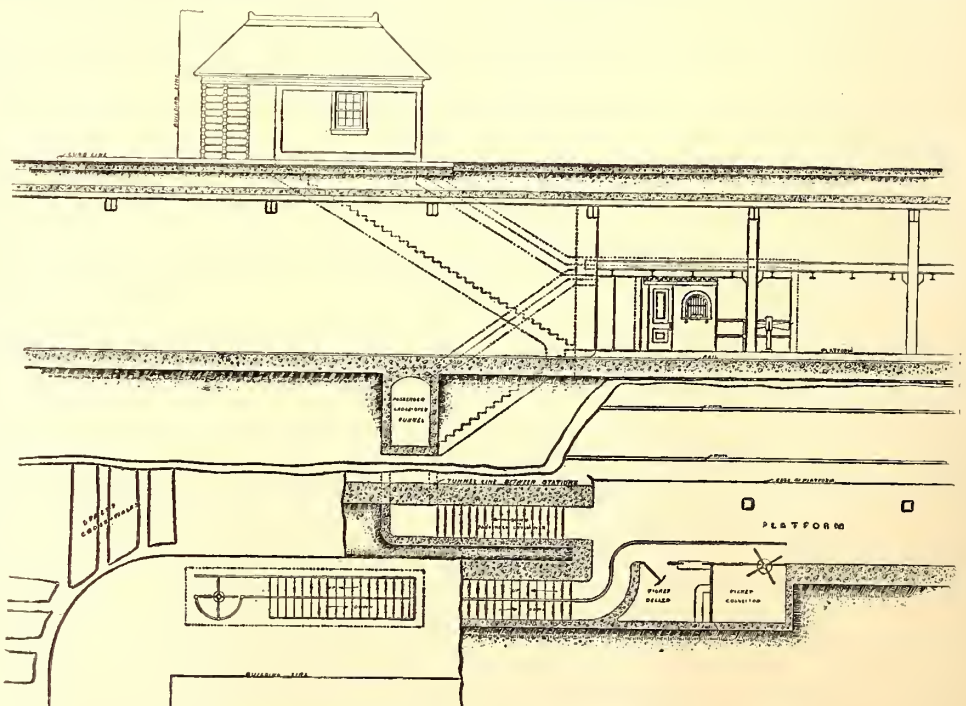
PLAN AND SECTION OF BELT LINE TERMINAL

calls it, the "Inner Circle," in the most direct manner, thus eliminating as much unnecessary curvature as possible.

These main lines, as they may be called, would each form loops in the downtown district and pass into the same subway with the inner circle belt line, and be separated from it by the passenger platform, thus making the "belt" on one side and the main line cars on the other, running in the opposite direction to the inner circle cars.

Those portions of the main line loops in the subway that are parallel with the inner circle would all be connected up, thus making another or outer belt in the same subway as the inner circle belt, and separated from it by the passenger platform. The latter belt would serve for the transfer of through cars, if desired, from one main line to any other.

It will be seen from a study of the accompanying illustrations that, with



PLAN AND SECTION AT END OF MAIN LINE STATION



for instance, Indiana Avenue, and terminating on a neighboring line, as on the north end of Michigan Avenue, is effected through passenger cross-over tunnels, which will be provided at the point where these two (or any other two) lines first come in contact, as shown by short lines on the map, crossing the streets.

In this manner, this class of traffic can be transferred without entering the inner circle.

These belt lines, passing around nine blocks, as assumed, give a continuous platform twelve blocks long, all of which is available for discharging and receiving passengers from the lines coming from the North Side, West Side and South Side, thus giving the maximum length of platform for the operation of trains, and this, too, in addition to the stations on the main lines away from the inner circle, of which there could be one at each street intersection or oftener as the traffic demands.

### PRIVATE TELEPHONE SYSTEM OF THE MANHATTAN RAILWAY COMPANY

On April 20, 1903, an independent telephone system was placed in service on the Manhattan Railway division of the Interborough Rapid Transit Company, of New York. This installation is particularly noteworthy, as it is one of the first of its kind in the East, and is one of the largest private exchanges not connected with the Bell system. The entire equipment, exclusive of the cable work on the elevated structure, was installed by the Lambert Schmidt Telephone Manufacturing Company, of New York, under the direction of Hugh Hazelton, electrical engineer of the Manhattan Railway Company. Mr. Hazelton was assisted by W. H. Kinlock, who is now in charge of the system.

This installation is of the central energy type, the battery being located at a central point. The maximum distance from the central station to instruments at the extreme end of the line is about 8½ miles. If any one at the extreme end of the line were to talk to a person at another instrument in an adjoining room, the total length of the circuit would, therefore, be about 17 miles. It will be noted that this distance is considerably greater than is ordinarily allowed for telephoning on central energy systems. At first there was some apprehension that the longer lines might not give satisfactory service on account of their extra resistance and capacity, but the Lambert Schmidt Company made a special study of this question, and succeeded admirably in adapting its system to meet the special conditions.

This equipment comprises a complete telephone exchange with switchboard, motor-generator charging sets, ringer sets, and storage batteries. There are at present about 300 telephones in use over the lines of the Manhattan Railway. A telephone is located in each passenger station and switch tower, and telephones are also provided for all of the offices, power house, sub-stations and car shops.

The exchange is located at Ninety-Ninth Street and Third Avenue, in rooms specially built for it above the car shops of the company. Fig. 1 is a floor plan of these rooms, showing the general arrangement of the apparatus.

The main operating room, part of which is shown in Fig. 2, contains the telephone switchboard, the distributing frame, fuse rack, relay and coil racks, and the wire chief's desk.

The switchboard, which is of handsome design, is built of mahogany. The front and rear panels can be readily removed, thus making all parts easily accessible. About 300 lines are at present in use, but the present arrangement of the board permits the ultimate use of about 600 lines. Positions are provided for six operators, each position containing fifteen pairs of inter-

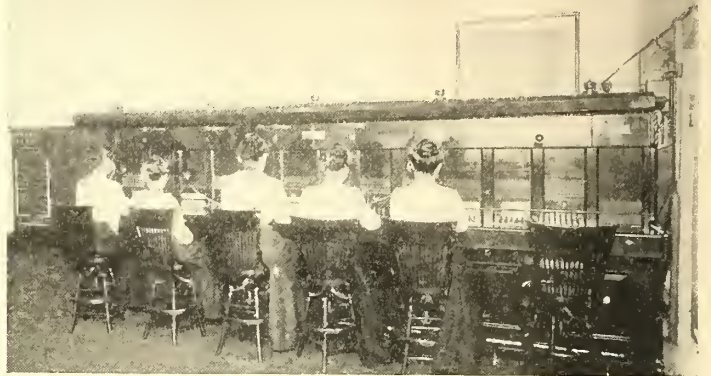


FIG. 2.—SWITCHBOARD IN MAIN OPERATING ROOM

communicating plug circuits consisting of double supervisory lamp signals and combination ringing and listening cams. The cords are colored white, brown or green, each cord being of a color different from the adjacent ones. The switchboard is also provided with a testing section on which a voltmeter and cord circuits are placed for making ordinary line tests.

The board is operated as follows: When subscriber takes

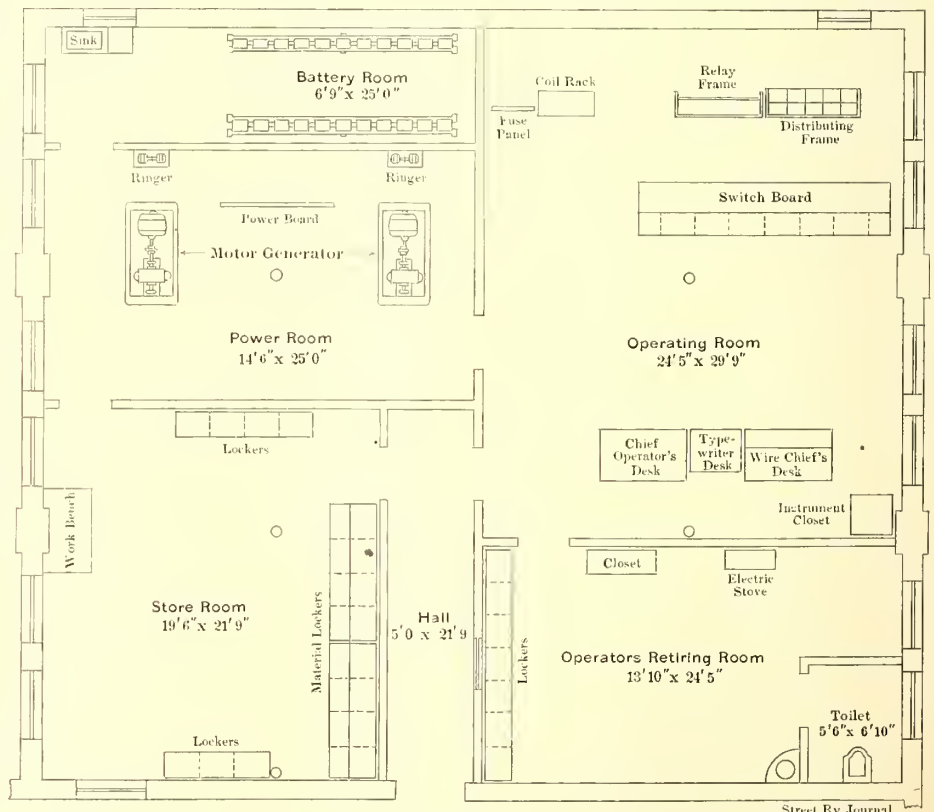


FIG. 1.—PLAN OF TELEPHONE STATION, MANHATTAN ELEVATED RAILWAY

receiver off hook, the line lamp lights up as well as a larger lamp placed at the bottom of each set of line lamps. The operator answers by inserting plug in jack, which extinguishes the lamps. Upon learning the desired number, the operator inserts mate of plug in jack of called subscriber. The supervisory lamps light up again and remain so until the called subscriber responds by taking off the receiver. While conversation is being carried on both lights are extinguished, but when the subscribers have stopped talking and have hung up their re-

ceivers, the operator knows that connection is no longer desired, and takes down the plugs.

For night service an extra relay is put in, which causes a bell to ring in addition to the lighting of the lamp signals. This feature makes it unnecessary for the night operator to watch the entire board, and also serves to attract his attention if he is doing something else.

The incoming lines run to one side of the distributing frame,

sets and the ringer sets above them, with the transformers between. The battery connections are clearly indicated in the middle of this figure.

Fig. 5 is an illustration of the power board. This board is of white Italian marble, 6 ft. 6 ins. square. The two voltmeters are arranged so that the voltage of the charging machines, as well as that of each storage cell, can be read. Besides the two Weston voltmeters there are three Weston ammeters. The

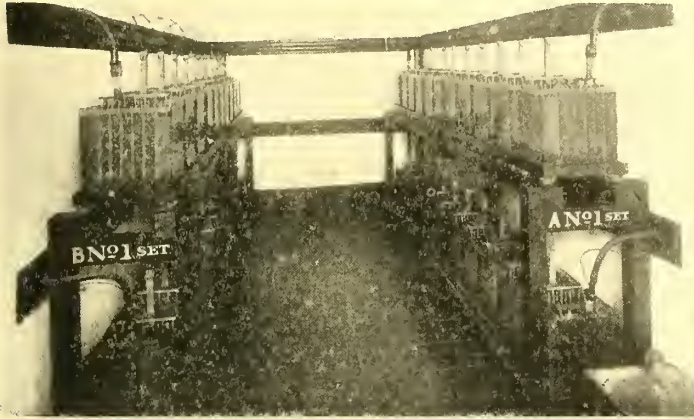


FIG. 3.—STORAGE BATTERY PLANT

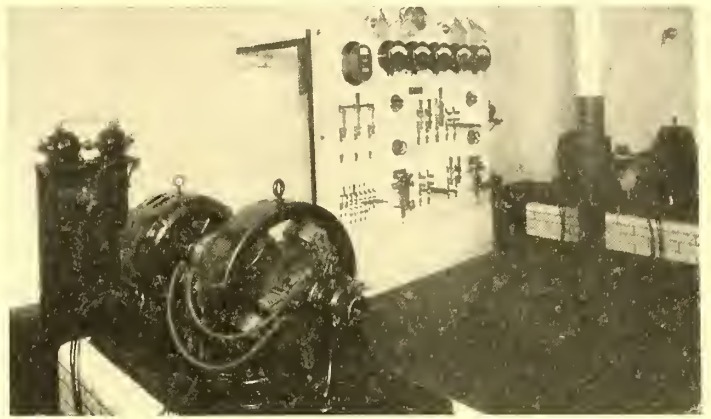


FIG. 5.—POWER BOARD

which is placed behind the switchboard, and are jumpered across to the other side, from where they connect with the relays and the jacks.

The battery is connected to fuse panel, where fuses are provided for each cord circuit and all other principal leads. Lightning protection is secured by using carbon blocks with perforated strips of mica between.

The wire chief's desk is placed in front of the switchboard and is so arranged that the man in charge of it can act both as monitor and wire chief. It is provided with cord circuits and the necessary connections for observing the service, and is also provided with a complete testing outfit for making special tests.

The entire power equipment, consisting of charging sets, ringing sets and batteries, is in duplicate. Each charging set consists of a 5-hp 390-volt, three-phase General Electric induction motor directly coupled to a 3-kw, 30-volt Holtzer-Cabot telephone generator running at 750 r. p. m. The current for running these motors is obtained from the Ninety-Ninth Street sub-station through step-down transformers. Each set is mounted on an iron base supported by a white enamel brick foundation about 12 ins. high. The ringing current is obtained from Holtzer-Cabot motor-generator sets, the motor taking about 24 volts from the storage battery, and the generator delivering 75 volts alternating current.

The batteries, which are mounted in the tiled-brick room, shown in Fig. 3, are of the Chloride Accumulator type, size E-11, furnished by the Electric Storage Battery Company. Each set consists of eleven cells in parallel and two in series. Only one set is used at a time, one being charged while the other is discharging. The battery room is provided with a ventilator which readily carries off the fumes from the cells.

A wiring diagram of the power circuits is shown in Fig. 4. In the lower part of the figure are shown the motor-generator

middle ammeter indicates the current discharged from the battery in circuit to the board. Each of the other ammeters serves to indicate the charging current from either of the charging sets. The main switch for controlling the current received from the sub-station is mounted on the left of the board. Above this switch is a Westinghouse polyphase wattmeter, which measures the incoming current. Beneath the main switch small switches are placed for controlling the ringers. The switches

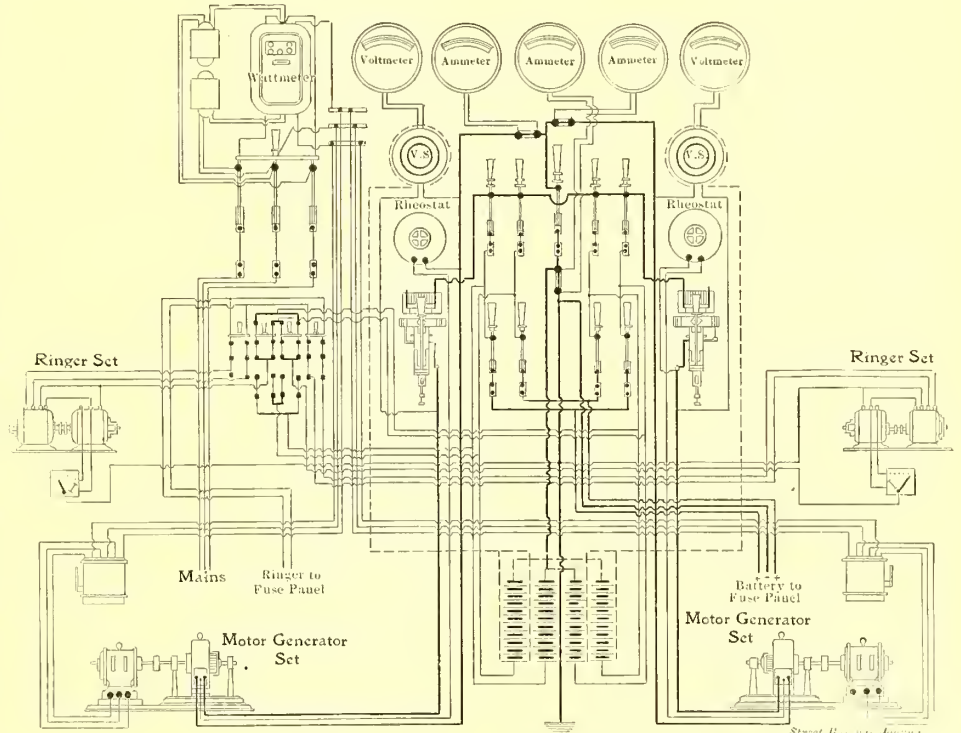


FIG. 4.—WIRING DIAGRAM OF POWER CIRCUITS

on the center of the board are used for charging the batteries, and for connecting the batteries to fuse panels. They consist of four positive switches and one negative switch. There are two positive switches for each battery, while the negative switch is common and the negative side is grounded. Two I. T. E. under-and-overload circuit breakers are provided for protecting the batteries when charging.

All outside wiring consists of lead-covered cables ranging in

size from 5 to 120 pairs. They are suspended from a galvanized guy wire fastened to the elevated structure with iron brackets or hangers. The cables are spun to this guy with a marline and are potheaded at each station. The wires are brought out to binding posts mounted on hard rubber strips in an oak junc-

communication between the company's offices, stations, car shops and switch towers. In cases of accidents, where it is important to cut off the current on a given section of the line, the proper sub-station can be quickly notified by telephoning from the nearest telephone station. It is not the company's intention, however, to supplant the Morse system now in use for despatching trains. When the Interborough Rapid Transit Company's subway is completed, additional telephones will be installed and connected with the Ninety-Ninth Street Exchange, the present board having been designed with that object in view.

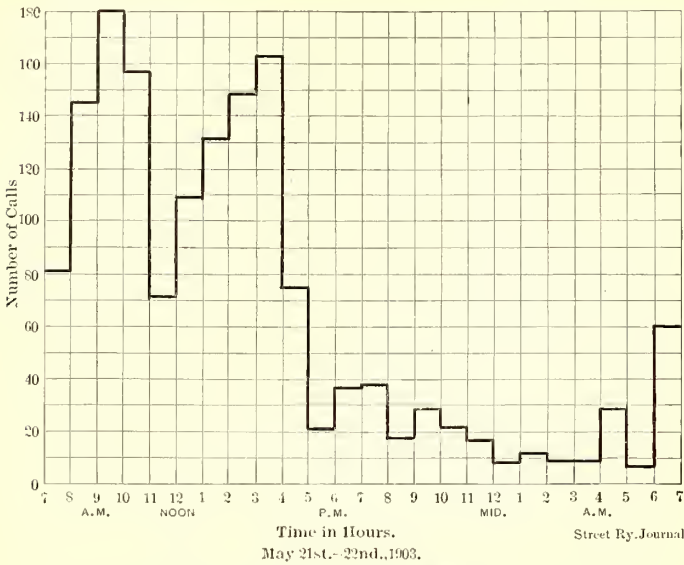


FIG. 6.—TELEPHONE CALLS PER HOUR, MAY 21-22, 1903, MANHATTAN RAILWAY COMPANY

tion box placed inside the station waiting-room. This construction permits rapid testing and arranging of connections. It is a well-known fact that lead sheathing deteriorates very rapidly when subjected to vibration, and, therefore, every precaution was taken to minimize the vibration as much as possible. An installation of lead-covered cables, supported from an elevated structure in the manner above described, has been in service in Brooklyn for seven or eight years with satisfactory results. The cables were installed by the Manhattan Railway

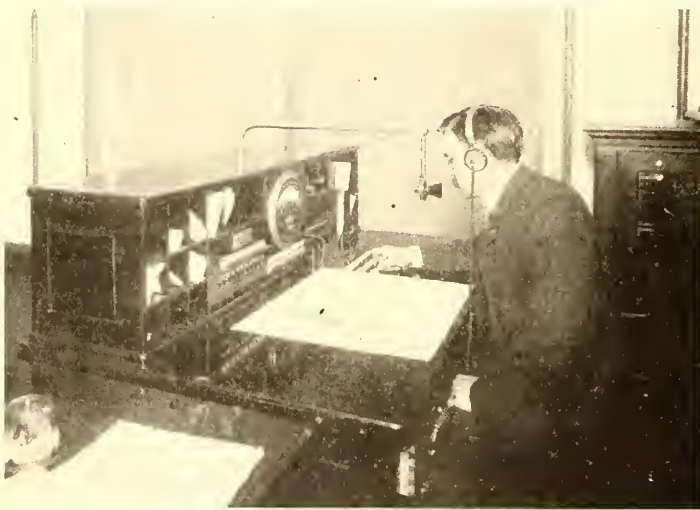


FIG. 7.—WIRE CHIEF'S DESK.

Company, and it was only after considerable experimenting that the present method of cable suspension was adopted.

The force required for the operation of the system consists of Telephone Engineer W. H. Kinlock, eight telephone operators and five repair men. Women operators are employed for the day service, but the night service is taken care of by men. The operators work in three shifts, which are so arranged that during the busiest hours there are five operators at the board. The curve shown in Fig. 6 indicates graphically the number of calls at different hours of a representative business day. Fig. 7 shows Mr. Kinlock seated at the wire chief's testing desk.

This system is extensively used for the general business of the company, and is proving very valuable for facilitating inter-

### PERPETUAL FRANCHISE IN OHIO

The street railway interests of Columbus, Ohio, scored a noteworthy victory on June 25 when the Circuit Court upheld the principle that electric railways may hold perpetual rights in the streets of a city. The court held that the Columbus Railway Company has franchises in perpetuity in East Main Street, State Street, Oak Street and West Broad Street, four of the most important thoroughfares in the city, and dismissed quo warranto proceedings brought by E. L. Taylor, prosecuting attorney of Franklin County, Ohio, to oust the company from its claims. A motion for a new trial was overruled and the case will be carried at once to the Supreme Court of the State.

Judge A. N. Summers, of Springfield, wrote the syllabus, which is as follows:

"The right to construct and operate a street railway in the streets of a city prior to the act of May 14, 1878, was a franchise privilege granted by the State upon condition that the city consent to its exercise.

"Such consent given prior to said act without limitation of time or to a corporation with successors during the term of its charter is revocable only by legislative authority.

"A franchise or privilege to construct and operate a street railway granted and consented to prior to said act without limitation of time is perpetual, but subject to be determined by the General Assembly under section 2, article 1, or under sections 1 and 2 of article 13 of the constitution.

"The limitation in said act of the consent to the term of twenty-five years was prospective in its operation and not the exercise by the General Assembly of any of the powers reserved to it by said sections of the constitution."

The suit was filed in April, 1901, and the petition set forth in brief that the street railway company contended illegally that its franchises in the streets named remained in force perpetually. The company set up the defense of estoppel, claiming that the city, county and State were barred by the statute of limitations from preventing it from using the franchises exercised for twenty-one years.

### INDIANA INTERURBAN AT 65 MILES AN HOUR

Some remarkably swift runs have been made recently by one of the interurban cars of the Union Traction Company of Indiana, as high as 65 miles an hour having been recorded. The test was made with a Westinghouse four-motor equipment, each motor having 110-hp capacity, instead of the two-motor equipments previously used.

The run between the Muncie and Indianapolis terminals, a distance of 56.55 miles, was made in 106 minutes—an hour and 46 minutes. There was the usual great loss of running time in getting out of Muncie, passing through Anderson, going into Indianapolis and passing through twelve or fifteen towns along the route.

The average speed under even these unfavorable conditions was 32 miles an hour, which meant that the car had to work up to 60 miles an hour on several long stretches of straight track.

**THE CENSUS REPORT ON THE STREET RAILWAY INDUSTRY**

The long expected census report on street and electric railways, entitled "Bulletin No. 3," has just been issued by the Census Office, and is a very valuable and bulky volume, containing a large number of tables and 193 pages. The report, which was issued by W. M. Steuart, chief statistician of manufactures, has been prepared under the direction of T. Commerford Martin and E. Dana Durand, special experts, and is very much more complete than that issued for 1890. The statistics cover the reports of 817 operating electric railway companies and 170 leased companies, making a total of 987 companies. These companies owned or controlled 22,576.99 miles of single track. The par value of the capital stock and funded debt outstanding, as reported, amounted to \$2,308,282,099. The average net capital liabilities per mile of single track owned for the companies reporting both factors were \$96,287. The total income and expenses of the operating companies amounted to \$250,504,627 and \$219,907,650, respectively. The companies gave employment on the average during the year to 133,641 wage earners, and paid \$80,770,449 in wages. There were 7128 salaried officials and clerks employed, to whom \$7,439,716 was paid in salaries. The roads carried 5,871,957,830 passengers of all kinds.

The report states that the Census Office in collecting these statistics has almost invariably received the hearty co-operation of the street railway companies, all of which, with the exception of twenty-two, have furnished complete returns. Some of these companies reported that the information concerning financial operations was not available, and in two or three cases the information was refused on the ground that it was of a private character. In addition a further report is being prepared containing detailed statistics for all street and electric railway companies, with an analysis of the same; also a discussion treating in detail the development of the modern street railway system, the generation and distribution of electric current, car equipment and a variety of other features upon which the technical efficiency and economy of the street railway service depend. Details will also be given as to the methods of installing and operating interurban street railway systems and of handling passengers, freight, mails, express, etc. The growth of mileage and traffic will be discussed, and the effect of this development upon distribution of population. Other subjects which will receive consideration are capitalization, the relation of expenditures to receipts, and the general financial results of operations, the terms of franchise, rates of fare, accidents, safety appliances, etc., and the wages and conditions of labor.

A few of the details of statistics given in Bulletin No. 3 are given below.

**TABLE 1.—NUMBER OF COMPANIES AND MILES OF SINGLE TRACK GROUPED ACCORDING TO MOTIVE POWER: 1890 AND 1902.**

CHARACTER OF POWER	1902		1890		PER CENT OF INCREASE.	
	Number of Companies	Miles of Single Track	Number of Companies	Miles of Single Track	Number of Companies	Miles of Single Track
United States .....	849	122,589.47	761	8,123.02	11.6	178.1
Electric .....	747	221,920.07	126	1,261.97	492.9	1,637.0
Animal .....	67	259.10	505	5,661.44	386.8	395.4
Cable .....	26	240.69	55	488.31	352.7	350.7
Steam .....	9	169.61	74	711.30	387.8	376.2

<sup>1</sup> Includes 12.48 miles of track duplicated in reports of different companies.  
<sup>2</sup> Includes 6.06 miles operated by compressed air.  
<sup>3</sup> Decrease.

Table No. 1 shows the number of companies and miles of single track grouped according to motive power in 1890 and 1902, the statistics contained in the Bulletin covering all of the street railways in the United States that were in operation during any part of the year ending June 30, 1902.

Of the total single-track mileage, 21,914.01 miles, or 97 per cent, were operated by electric power, and 416.36 miles, or 1.9 per cent, by other mechanical traction, while only 259.10 miles, or 1.1 per cent, were operated by animal power, as compared with 69.7 per cent in 1890. Of the total trackage in use by all companies 84.3 per cent was owned by the operating companies and 15.7 per cent leased. It appears from the reports that 3,424.96 miles of single track were on private right of way

**TABLE 2.—COMPANIES GROUPED ACCORDING TO LENGTH OF LINE: 1890 AND 1902.**

	1902		1890	
	Number of Companies	Length of Line	Number of Companies	Length of Line
Total .....	817	16,651.58	2691	35,119.53
Under 10 miles .....	394	1,957.16	557	2,304.49
10 to 20 miles .....	219	3,148.91	99	1,353.42
Over 20 to 30 miles .....	76	1,878.54	16	400.39
Over 30 to 40 miles .....	34	1,197.83	7	251.74
Over 40 to 50 miles .....	25	1,117.05	4	178.04
Over 50 to 60 miles .....	16	892.86	2	101.57
Over 60 to 70 miles .....	12	785.22	2	130.33
Over 70 to 80 miles .....	7	532.46	1	76.48
Over 80 to 90 miles .....	6	515.30	1	84.42
Over 90 to 100 miles .....	3	277.12	—	—
Over 100 miles .....	25	4,349.10	2	238.65

<sup>1</sup> Operating companies.  
<sup>2</sup> Exclusive of 15 lessor companies.  
<sup>3</sup> Exclusive of 663.94 miles estimated in 1890.

owned by the company. Occasionally the railway is built on a private right of way not owned by the company, an example of which would be a toll bridge owned by a bridge company, to whom payment for the privilege of using it was made.

**TABLE 3.—AVERAGES FOR OPERATING COMPANIES: 1890 AND 1902.**

ITEMS	1902	1890
Average per company:		
Length of single track .....	27.65	11.51
Capital stock and funded debt outstanding .....	\$2,825,314	\$677,388
Number of passenger cars .....	74	46
Number of fare passengers carried .....	5,886,848	2,865,454
Number of employees .....	164	100
Average number of employees per passenger car .....	2	2
Average number of fare passengers carried per car .....	79,774	62,237
Average number of fare passengers per car mile .....	4.43	(1)

<sup>1</sup> Car mileage not reported in 1890.

There were 377.11 miles of single track on right of way of this character.

In Table 2 the operating companies reported in 1890 and 1902 are grouped according to the length of line. The "length of

**TABLE 4.—RELATION OF STREET AND ELECTRIC RAILWAYS TO POPULATION, 1890 AND 1902.**

GEOGRAPHIC DIVISIONS	Year	Population <sup>1</sup>	Total Number of Fare Passengers Carried	Average Number of Rides Per Inhabitant
United States .....	1902	75,994,575	4,809,554,438	63
	1890	62,622,250	2,023,010,202	32
Increase .....		13,372,325	2,786,544,236	31
North Atlantic .....	1902	21,046,695	2,618,528,979	124
	1890	17,401,345	1,141,187,460	66
Increase .....		3,645,350	1,477,341,519	58
South Atlantic .....	1902	10,443,480	332,541,075	32
	1890	8,857,920	101,647,174	11
Increase .....		1,585,560	230,893,901	21
North Central .....	1902	26,333,004	1,344,000,951	51
	1890	22,302,270	538,309,887	24
Increase .....		3,970,725	805,691,064	27
South Central .....	1902	14,080,047	210,103,861	15
	1890	10,972,893	98,065,026	9
Increase .....		3,107,154	112,038,835	6
Western .....	1902	4,091,349	304,379,572	74
	1890	3,027,613	143,860,655	48
Increase .....		1,063,736	160,518,917	26

<sup>1</sup> Population shown for 1902 is that reported at the census of 1900.

line," as given in the report, means the length of the roadbed, or, in the case of a railway lying entirely within city limits, the length of street occupied. In determining the length of single track switches and sidings are included, and double track is reckoned as two tracks.

Table 3, giving averages, indicates the increase since 1890 in the size of the companies and their equipment.

The extent to which street and electric railways are used,

TABLE 5.—INCOME ACCOUNT, OPERATING COMPANIES: 1902

Gross earnings from operation.....		\$247,553,999
Operating expenses.....		142,312,597
Net earnings from operation.....		105,241,402
Income from other sources.....		2,950,628
Gross income, less operating expenses.....		108,192,030
Deducts from income:		
Taxes—		
On real and personal property.....	\$5,895,542	
On capital stock.....	2,931,252	
On earnings.....	2,719,287	
Miscellaneous.....	1,592,818	
		\$13,078,899
Interest—		
On funded debt.....	35,223,284	
On real estate mortgages.....	93,078	
On floating debt.....	2,769,549	
		38,085,911
Rent of leased lines and terminals.....		25,518,225
Other deductions from income.....		912,018
		77,595,053
Net income.....		30,596,977
Deductions from net income:		
Dividends on \$45,047,155 preferred stock.....	2,053,202	
Dividends on \$305,897,861 common stock.....	13,828,908	
		15,882,110
Surplus for year.....		14,714,867

and the increase in their use as measured by the average number of rides per inhabitant, are shown by Table 4, which gives the total population, number of fare passengers carried, and average number of rides per inhabitant, for the United States and for each geographic division.

Of the total number of operating companies 252 reported that they generated electricity for sale for light and power purposes.

Table 5 presents the principal totals in the form of income account prescribed by the Street Railway Accountants' Association of America. There were 578 operating companies reporting a net income amounting to \$34,352,684, and 220 reporting a net deficit of \$3,755,707. The difference between these amounts, \$30,596,977, is shown as the net income for all

TABLE 6.—PRINCIPAL SUBDIVISIONS OF OPERATING EXPENSES WITH PER CENT THAT EACH ITEM IS OF TOTAL: 1902.

ITEMS	Amount	Per cent of total
Total.....	\$142,312,597	100.00
Maintenance of ways and structures.....	12,118,296	8.52
Maintenance of equipment.....	16,676,532	11.72
Operation of power plant.....	23,062,328	16.20
Operation of cars.....	62,454,679	43.88
Miscellaneous.....	25,812,000	18.14
Wages, supplies, etc., incidental to electric service.....	2,188,753	1.54

operating companies. The item of \$2,950,628, "income from other sources," consists principally of the interests on deposits, loans, bonds and other securities; but it includes also income from other operations carried on in connection with street railways, such as waterworks, ice plants, etc.

The operating expenses, \$142,312,597, are analyzed in Table 6, together with the percentage which each total forms of the aggregate. In this connection it should be stated that a condensed balance sheet for all the companies was contained in a preliminary bulletin issued by the bureau and published in the STREET RAILWAY JOURNAL for May 9, 1903.

The report takes up very thoroughly the mechanical and electrical equipment of each road. These are given in detail for each road, whereas the financial information is given by States only. In glancing over the statistics of track equipment it will be seen that the style and weight of rail varies greatly. Thus the minimum weight of rail per yard varies from 15 lbs., reported for the Paso Robles Street Car Company, of Paso Robles, Cal., to 113 lbs., reported for the Kingsbridge Railway Company, of New York, N. Y. The maximum weight varies from 15 lbs., reported by the Paso Robles Street Car Company,

of Paso Robles, Cal., to 135 lbs., reported by the Union Traction Company, of Philadelphia, Pa. Of the 817 operating companies 367 use T-rails exclusively, and 390 reported T-rails in connection with girder, groove or full groove.

There were 66,784 cars of all classes reported. The largest number, 3612, reported for a single company is given for the Boston Elevated Railway Company, of Boston, Mass., which includes cars operated on both surface and elevated tracks. There were 60,290 passenger cars, and 6494 cars used for express, work, or other purposes. Comparing the number of passengers carried and the passenger car mileage with the number of cars, it appears that each car carried on the average 97,395 passengers and traveled 18,003 miles during the year. Of the passenger cars, 32,658 were closed and 24,259 open. Combination closed and open cars were reported by 105 companies, the total number being 3134, of which 1203, or 38.38 per cent, were used by twenty-two companies in California. Combination passenger and express cars were used by ninety-nine companies, the number being 239. The use of express, freight or mail cars was reported by 205 companies, the largest number being shown for the St. Louis & Belleville Electric Railway Company, of Belleville, Ill., an interurban freight line operating between East St. Louis, Ill., and Belleville, Ill. There were 1727 snow-plows and 793 sweepers reported.

Steam was used by 540 companies as the primary motive power to generate electric current. The statistics concerning steam power classify the engines according to horse-power. There were, in all, 2336 engines, with a total horse-power of 1,298,133, or 556 hp per engine. Of this number 1588 engines each were reported as having 500 hp or under, with a total horse-power of 420,551, or an average of 265 for each engine. There were 431 engines having a horse-power of over 500 but under 1000 each, the total horse-power being 297,757, or 691 per engine, and 317 engines having a total horse-power of more than 1000 each, the total being 579,825 hp, or 1829 per engine. The Pittsburg Railways Company, of Pittsburg, Pa., reports forty-seven engines, which is the largest number returned by a single company. The greatest amount of steam horse-power, 79,075, is reported by the Interurban Street Railway Company, of New York, N. Y. The greatest number of large engines, i. e., engines having more than 1000 hp each, is reported by the Union Traction Company, of Philadelphia, Pa., which had twenty-one engines with a total of 37,800 hp, but the Interurban Street Railway Company, of New York, N. Y., with only fifteen engines, reported a horse-power capacity of 78,600, while the Boston Elevated Railway Company, of Boston, Mass., with twenty engines, reported a total of 48,200 hp.

There were 159 water-wheels, with horse-power of 49,153, used as the primary power in the generation of electric current. The average horse-power per water-wheel was 309. There were 129 wheels of 500 hp or less, twelve of over 500 and under 1000, and eighteen of 1000 and under 2000. Of the total horse-power 34,215, or 69.61 per cent, was reported by sixteen companies in the States of California, Georgia, Maine, Minnesota and New York. The largest plant of this character was shown for the Twin City Rapid Transit Company, of Minneapolis, Minn. This company reported the use of twelve water-wheels ten of which had 1000 hp each.

There were 441 alternating-current generators reported, with a total of 231,924 hp. These machines were used by 163 companies.

Of the 5,871,957,830 passengers carried, 4,809,554,438, or 81.91 per cent, were fare passengers, and 1,062,403,392, or 18.09 per cent, were transfer passengers. The transfer passengers included those using free transfers, also in a few cases those using transfers for which an additional payment was required. There were 4455 transfer points reported. The average number of fare passengers per mile of single track operated in the United States was 208,600. In preparing this average only the companies from which complete statistics were received are



considered. The average ranges from forty-eight, reported for the Chicago General Electric Railway Company, of Chicago, Ill., a small road operating only one car by storage batteries, to 2,142,857, reported for the Los Angeles Electric Incline Railway Company, of Los Angeles, Cal.

The fare passengers per car-mile for all companies averaged 4.43, and ranged from .01 for the Chicago General Electric Railway Company, of Chicago, Ill., to 69.15 for the Monongahela Incline Plane Company, of Pittsburg, Pa. It was impossible to obtain information concerning car hours from a large percentage of the companies. However, 390 companies furnished this information. Their total car hours for the year amounted to 65,869,342, of which passenger cars formed 65,403,287, or 99.29 per cent, and freight, mail, express and other cars 466,055, or .71 per cent. The fare passengers per car-hour for the companies reporting both factors averaged 33.28, and ranged from .02 for the Chicago General Electric Railway Company, of Chicago, Ill., to 89.24 for the Worcester & Southbridge Street Railway Company, of Worcester, Mass.

Pleasure parks are a feature of the modern street railway business, and often a large source of income, and so have some space devoted to them. The number reported amounted to 352, but does not include pleasure parks belonging to cities, towns or communities and entered by the street railway companies.

### INTERURBAN CAR TESTS

The data presented on this subject by W. E. Goldsborough and P. E. Fansler, in a paper before the American Institute of Electrical Engineers, at the twentieth annual convention, at Niagara Falls, June 30, were secured in a series of tests made on the cars of the Union Traction Company of Indiana. Clarence Renshaw, who was prominently identified with this work, contributed an exhaustive review of the subject to the *STREET RAILWAY JOURNAL*, of Oct. 4, 1902. The present paper gives the detailed reports and explains the circumstances affecting the results, thus forming a valuable record for reference. The work was divided under two general heads, namely, "General Tests of Equipment" and "Special Car Tests."

The objects of the general tests on the interurban and limited cars were: First, to determine in detail the kilowatt-hour consumption of individual cars, both local and limited, between stated points, en route from Muncie to Indianapolis and vice versa; secondly, to average these results and to determine the maximum and minimum kilowatt-hour consumption over the route; thirdly, to ascertain, in so far as possible, the general effect of stops and the personality of the motormen as factors in car consumption economy.

In accumulating data for these purposes, an observer was placed on each of the interurban cars operating between Indianapolis and Muncie throughout the three days of the general test.

The special car tests were undertaken to ascertain how nearly the car equipments were being worked up to their rated capacity. The first point to be considered in connection with such tests was arranging adequate means for accurately determining the cycle of current fluctuations and the temperatures of the windings and cores. It should be kept in mind, in this connection, that in street railway service motors are subjected to more variable conditions than are ordinarily to be found in industrial plants, and, consequently, it is very much more difficult to predict the exact effect upon the motor of operating it for propelling a car over a given road than it is to predict the capacity of a motor for the handling of a certain load in stationary practice.

The schedule speed of local trains between Indianapolis and Muncie is 23 m. p. h. On clear stretches running through the country the speed frequently runs up to 50 m. p. h., but in general, averages about 38 m. p. h. In the towns, however, a

slower rate of speed is required, which brings the schedule in the country to 27 m. p. h. When operating within the city limits of Anderson and Muncie 20 miles an hour are not, in general, exceeded, and at Indianapolis the rate varies from 21 miles in the suburbs to 10 miles in the business districts. The schedule speed in Indianapolis is 10.28 miles.

It is noticeable that the maximum rate of power consumption in all cases occurs in the cities. The power consumption per car-mile in Anderson being greatest, in Muncie least and in Indianapolis more or less of an average between the other two places. This increase in the power consumption in the cities is due to the slower speeds, more frequent stops, and, very often, to low voltage. As between cities the maximum power consumption in Anderson is 4.84 per car-mile, whereas in Indianapolis it is only 3.62 per car-mile.

The least power consumption per car-mile reported is on one of the westward trips between Yorktown and Daleville, where as low a value as 1.43 kw-hour per car-mile is given. This is but 30 per cent of the maximum consumption cited for the eastern trip in Anderson.

The urban and interurban data brings out very clearly the fact that within the city limits the car consumption per car-mile is considerably greater than in running through the country. The maximum values for city service run as high as 7.6 kw-hour per car-mile and average 5.88, whereas in the country the maximum value either east or west does not exceed 3.45 kw-hour per car-mile and averages not more than 2.87 per car-mile. During the eastbound trips the urban cars on the average consumed 17 per cent of the power running 10.4 per cent of the distance, their power consumption in the cities per car-mile being on the average 74 per cent in excess of what it was in the country.

The number of stops made by a car on different trips undoubtedly has quite an effect upon the amount of power consumed. The greater the number of stops the greater the amount of time deducted from the regular running time, and, the greater must be the acceleration of the train to enable it to make up the lost time. This is quite clearly brought out by the fact that the limited trains average on their eastern trips only 103 kw-hours, whereas the local trains average 129 kw-hours on their eastern trips, an increase of 35 per cent. As a rule the limited trains after leaving Indianapolis only stop once at Anderson in their run to Muncie. Going west the limited trains usually pull in at sidings to allow eastbound trains to pass. This probably accounts for the fact that the kilowatt-hour consumption of the westbound limited trains is somewhat greater than the kilowatt-hour consumption of the eastbound limited trains, although the westbound limited trains are relatively running down grade, Muncie having an elevation of about 100 ft. above Indianapolis. The number of stops made by the local cars outside of the cities averages about 34.

An average taken of the runs made by the local cars, east and west, shows them to be very much the same. For instance, the average of the eastbound locals is 129 kw-hours, and of the westbound 131 kw-hours, practically the same.

The best run going east shows a car consumption of 111 kw-hours; the highest car consumption going east is 162 kw-hours, a difference of 49 per cent. The average of the eastern trips made by the first car mentioned is 115 kw-hours, and the average of the trips made by the other car is 139 kw-hours, a difference of 21 per cent. Among the westbound local trains this car shows the highest consumptions, which indicates that its running gear was affected in some particular. As the two cars are of the same weight and equipment, and as the runs made by them are sufficiently close together to admit of the supposition that the average stops made during the day by the two cars is very much the same, it is assumed that the difference in power consumption is caused by the equipment of one car being in better condition than that of the other, as the

personal equation of the motorman in the operation of his car in local interurban service is practically without effect where a number of runs are taken into consideration.

A comparison is made of the performance of all the limited trains in service. The most noticeable thing in connection with the data given is that the variations in the power consumption per trip in the limited service are very much less than those in the local service. As between the different runs by limited cars, the tables show again that the differences in the consumption of eastbound trains are less than the differences in the consumption of westbound trains. The minimum possible power consumption per trip whether east or west is 95 kw-hours, or practically the same as that given for the local trains. The fact that the limited runs show up so much better than do the local runs is undoubtedly due to the number of starts in the limited trips being very much less, the limited cars having the right of way and the best motormen being in charge of them.

The variation in the power consumption of limited cars running through the cities does not vary in excess of 50 per cent between the maximum and minimum values, whereas, in the case of the local cars differences as great as 300 per cent are recorded. The maximum urban consumption per car-mile by the limited cars is 4.42 kw-hours, against 5.88 by the local cars. The best urban performance shown by the limited cars is 2.31 kw-hours per car-mile, against 2.92 by a local car. The best average urban consumption for the limited cars is 2.8 kw-hours on eastbound trips against 3.79 kw-hours by the local cars. In general, therefore, at all points, the limited cars show better handling, more uniform records and records which are much lower than the average of the local car performance. Occasionally, however, a car in local service will show a better record over a short distance than will the limited cars.

The comparison of limited east and westbound trains shows little difference between them. The consumption of the westbound trains is uniformly slightly higher than that of the eastbound. This is a distinct characteristic of the traffic over this system.

Another interesting phase on this subject is brought out by the results which are given in a table showing the work of the different motormen given in terms of the minimum, average and maximum power consumption of the cars in their charge during the three days of the general test. The best trip going east shows a power consumption of 108 kw-hours, which is 43 per cent less than the highest car consumption, 154 kw-hours recorded. It is interesting to note that these minimum and maximum records were made by the same man, the average of his three trips, however, is 126 kw-hours, which differs but by 1 per cent from the average of all his eastbound trips. These results, more than any others, bring out the fact that the variations in the power consumption in local service are chiefly due to conditions existing at the time of specific runs. The average of the first man going east is 8 per cent higher than his average going west. The average of the second man going east is 6.5 per cent less than his average going west. The third man shows the greater consumption on his eastbound trips; the fourth man the greatest on his westbound trips, and so on for the others. Apparently, a motorman who so operates his car as to produce a greater power consumption on his eastern trip than on his western, does so consistently, possibly, through some personal idea as to the way in which his car should be conducted over different portions of the road. For instance, the first man's minimum, average and maximum is less on his western trips than on his eastern; in the same way the work of the second man shows that on his eastern trip his minimum, average and maximum were consistently less than the minimum, average and maximum on his western trips. This condition holds true for five out of the seven men reported as operating local cars.

## CENTRAL TERMINAL STATION PLANS FOR NEW YORK

Plans have been submitted to the Board of Estimate by Bridge Commissioner Lindenthal and Henry Hornbostel, his consulting architect, for a new municipal building and railroad terminal combined, to cover the blocks and triangles between Tryon Row, Duane Street and William Street.

The present scheme is a much more elaborate one than that outlined by the Mayor, and it is not expected that it will be put in execution in its entirety for many years. The purpose in submitting it at this time is to secure the adoption of a plan that will be followed in the development of the idea, and thus insure harmony in the completed work. To illustrate this it is but necessary to mention some of the provisions of the plans, which include the erection of a building along the northern side of Chambers Street, the architecture of which conforms to that of the new Hall of Records. This is to be the city's administrative building. It is suggested that all the buildings in the City Hall Park, except the City Hall, but including the old County Court House, be removed, and that the site of the postoffice be purchased and added to that of the park. The City Hall would then stand alone in a garden which would have within it no other masonry than some ornamental entrances and a flight of granite steps, these opposite the rear entrance of the City Hall and leading by a viaduct over Chambers Street to the suggested administration building.

The practical part of the plans are those relating to the new city and railroad terminal building. The part of the structure to be used as a railroad station will face on Tryon Row, extending back about 600 ft., and will be as high as the new Hall of Records. In the basement will be passages and stairways to the present subway station, and to the stations in Park Row and Center Street of the contemplated subway extensions. On the ground floor are to be the surface car tracks. To provide ample accommodation for passengers Chambers Street and Park Row are to be bridged over by the building. William Street is to be straightened so as to form a continuous thoroughfare with Center Street. The sidewalks will be placed in the arcades, from which stairways will lead to a level slightly above. On this level ten trolley loops will be provided for the Brooklyn cars.

The first floor above the Brooklyn trolley car level is set aside for the elevated railroads. It is planned to have four tracks for these trains and five platforms, permitting sixty six-car trains to arrive and depart every hour. Incoming and outgoing passengers will have separate passageways. The second floor will be for the Brooklyn Bridge trains. It will have a capacity of sixty trains an hour, and will be so arranged as to furnish room for the trains on the suggested loop connecting the Brooklyn and Manhattan bridges.

Above these is planned to have five office floors with an area of 36,000 sq. ft. each. The rental value of this space is estimated at \$360,000 a year.

The feature of the whole construction will be a campanile to be built at the northern base of the terminal building. As now designed, it will be about 650 ft. tall and contain forty-two stories. It would give room for nearly all the offices the city now has to rent in private buildings. It is proposed to build the campanile, at first, only to the level of the roof of the station structure.

Mr. Lindenthal estimates the cost of the new building at \$9,025,825. To complete the campanile would cost an additional \$1,468,800.

It would require an expenditure of not less than \$30,000,000 to carry out, in their entirety, the whole of the plans Messrs. Lindenthal and Hornbostel have drawn. But Mr. Lindenthal intimates that this vast outlay would be justified in view of the splendid results, financial as well as artistic, which would be obtained. The scheme of architectural magnificence presented would, he says, rival the Place de la Concorde in Paris, Trafal-



cut off so as to leave a length of 5½ ins. This was suspended by means of a wire stirrup underneath a beam, as shown in Fig. 1. Into the ear was screwed the bolt of the round top hanger to be tested. To the cap of the hanger was suspended a weight of 200 lbs. A current of 200 amps. was then sent through the iron. The time which elapsed between closing the circuit and the separation of the parts of the hanger under the influence of the weight was noted.

These times in minutes were as follows:

A	B	C	D
50	34	94	74

Two similar samples from the same manufacturer were tested, one with the cap underneath, as above described, and the other with the ear beneath. The times between the closing of

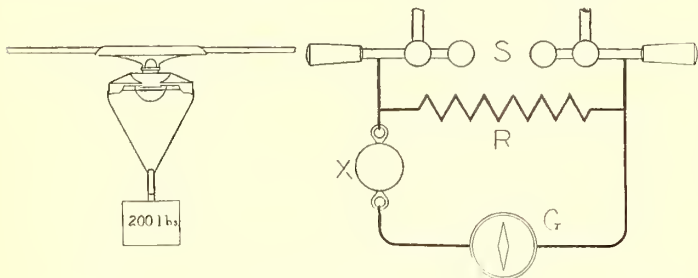


FIG. 1

FIG. 2

the circuit and the breaking down of the insulators were respectively 31 minutes and 33 minutes. This indicates that the position in regard to vertical arrangement during test is immaterial.

Efforts were made to determine roughly the character and the composition of the insulating materials employed by each manufacturer. Upon ignition, by applying a lighted match, each of the insulating materials burned quietly with a very small flame. There was some smoke and in all cases the characteristic odor of burning shellac. Each sample when placed in alcohol went partially into solution, leaving a residue. Mica and asbestos were present in some of the residues.

If the binding material be, in all cases, shellac, it is evident that the softening temperature is an indeterminate quantity. Shellac is somewhat viscous at ordinary temperatures, and its viscosity rises rapidly with increase of temperature. Insulating bolts, one from each manufacturer, were placed in boiling water and were allowed to remain until they had assumed the temperature of the water, i. e., 100 degs. C. In each case the insulating material had softened so as to permit of moulding under slight pressure. The viscosity, at a given temperature, is also dependent upon the relative amount of shellac to the other material present. This amount is liable to variation in samples of the same type from the same manufacturer.

INSULATION RESISTANCE

The resistance of an ordinary strain insulator is very large, and, if it were not for the large number of them which are connected in parallel on a trolley system, no consideration need be given to this point. It is difficult to determine rapidly the individual resistances in ohms, hence the following method of determining the relative resistance values was devised.

A Holz machine when run at a constant speed, owing to its practically infinite internal resistance, functionates as a constant current generator. For obtaining the comparative values of the resistances of the insulators, such a machine was used as a source of e. m. f., and an arrangement of apparatus, as shown in Fig. 2, was employed:

- where S = spark gap of the Holz machine.
- X = insulator under test.
- G = a mirror galvanometer.
- R = a resistance in which is included the leakage resistance of the Holz machine, and of the connecting wires.

By connecting together the two terminals of the insulator X, by means of a copper wire, practically all of the current I, which is produced by the machine, is made to pass through the galvanometer and it produces a deflection θ<sub>x</sub>. Upon removing the copper wire a current i<sub>r</sub> will flow through the galvanometer, giving a deflection θ<sub>r</sub>.

This deflection will be inversely proportional to the resistance of X. The rest of the constant current I will pass through R, which includes the leakage paths. Representing this current by i<sub>r</sub>, there exists the following relations:

$$I = i + i_r$$

$$I - i = i_r$$

$$i_r R = i_x X = (I - i_x) R$$

$$X = \frac{I - i_x}{i_x} R$$

Since I and i<sub>x</sub> are proportional to deflections θ and θ<sub>x</sub> respectively,

$$X = \frac{\theta - \theta_x}{\theta_x} R$$

By substituting for X another insulator, its resistance can be quickly determined in terms of R in a similar manner. This method is better suited for getting the comparative resistances of insulators of the same shape, than for getting their absolute resistances. A portion of an insulator's conductance unquestionably consists of surface leakage.

The resistances obtained are given below in terms of an arbitrary standard:

2-IN. GLOBES			2½-IN. GLOBES		
A	B	C	A	B	C
61	98	1.7	27	36	1
55	76	12.0	55	18	1.5
			61	37	1

SMALL BROOKLYNS		LARGE BROOKLYNS			
	B	C	A	B	C
	35	40	0.7	39	27
	35	43	0.8	41	27

SPECIFICATIONS

Specifications for the various forms of insulators used in trolley construction must vary with local conditions and with the policy of the user. Specifications for Globe and Brooklyn Strain insulators should cover the following points:

1. Dimensions.
2. Size of eye.
3. All samples tested shall break in the eye.
4. The average ultimate tensile strength of all samples subjected to mechanical test shall not be less than A pounds, and no individual sample shall show a tensile strength of less than 85 per cent of the average tensile strength of all the samples that are tested.
5. The average break-down voltage, for samples which have been broken in the eye in the mechanical test, shall not be less than B volts, and no individual sample shall break down at less than 90 per cent of B volts.

As to the values to be specified for ultimate tensile strength and break-down voltage, the following are suggested, where high-class insulators for use on 500-volt lines are to be specified.

	Ultimate Tensile Strength in lbs.	Breakdown Voltage
2½-in. globes .....	6,000	7,000
3-in. globes .....	9,000	10,000
Small Brooklyn .....	9,000	10,000
Large Brooklyn .....	18,000	10,000

Owing to the comparatively low softening temperature of the insulating materials generally used, and to the close proximity of the working conductor when in service, it is important that specifications for round top hangers should impose a test for softening temperature. The following "hot rod test" is suggested:

Round top hangers when suspended free from draft in an

inverted position by means of a bronze ear weighing 8 ounces and being 5 1/2 ins. long, the ear clamping the middle of a round rod of soft iron 1/4 in. in diameter, and of at least 20 ins. length between connectors, must be able, without breaking down or becoming permanently deformed by more than 1-16 in., to sustain a weight of 200 lbs. from the cap for one hour, a current of 200 amps. being passed continuously through the iron rod, the rod being cold at the start.

SIGNALS IN STARTING ELEVATED TRAINS

Brooklyn, N. Y., June 24, 1903.

EDITORS STREET RAILWAY JOURNAL:

"The Buffalo Express" recently stated that more power was required to start a car than to stop it—two bells being necessary in the first case, while one was sufficient in the second. This reasoning was probably meant to apply to surface roads, but it is true in an exaggerated degree in the case of the elevated railroads in New York, since they have adopted the electric traction. On this road it ordinarily takes ten bells to start a six-car train, each conductor or guard having to pull twice on a bell rope that only extends the length of one car, while the guard on the forward car does not pull his bell rope until the bells on all the other cars have been rung in succession.

If the bell in the motorman's apartment was electrically connected with all the train gates in series then the last gate that was closed would ring the bell to start the train. This arrangement would also relieve the guards from the necessity of handling a bell rope at all, and they could then give their entire attention to the gates, which at times is desirable. There would also be an element of increased safety in this scheme, as under the present methods, after the rear guard has closed his gates and rung his bell, the train may not start immediately, but naturally he does not want to open his gates again for a late comer, not knowing when the train will start. But with the system here advocated the fact of even one single gate being reopened after being once closed would be an assurance that the motorman's bell could not ring. Or in case the gates were all closed the train might not start, owing to the road being blocked by a semaphore signal, in which event it would be perfectly safe to open any of the gates again if found necessary. Opening a gate a second time is not advocated as a general thing, but if necessary on rare occasions it could be done with safety. Of course, the motorman would not want the bell ringing all the way between stations, so he could open a switch in the bell circuit after the train had gone about its own length, and then close this switch again at the next stop. This switch might be arranged to work automatically, so as to be closed when the train is at rest, and open when train is in motion, but the first plan mentioned seems the more simple and reliable.

This scheme would probably complicate the matter of coupling up a train in the yard to get it ready for a run, but it would simplify the bell ringing to start a train, and the bell ringing takes place at each station, while the coupling operation takes places only once a day, or not more than once for a round trip in the most extreme case.

WALTER GRIBBEN.

THE TRANSFER QUESTION IN NEW YORK

New York, June 27, 1903.

EDITORS STREET RAILWAY JOURNAL:

I notice in your last issue a decision of the Supreme Court in the case of the Interurban Street Railway Company which must be regarded by everyone as extremely sensible. The attempt to force the issue of free transfers by a writ of mandamus is a serious assault on the liberties of traction companies in general, as well as a most dangerous attempt to es-

tablish a bad precedent. When adequate legal remedies exist the resort to the summary power of the court is a grave menace to the foundations of our system of free government. Courts have something else to do than to superintend the operation of traction companies, and if they have power at will to order corporations and persons to do this, that and the other without limit, it would seem to the plain rational citizen that the ordinary system of civil government is superseded, and its officers reduced to supernumeraries.

Injunctions and writs of mandamus are extreme measures, only to be used in cases of dire necessity, and then with great judgment and caution. They are not intended to supersede ordinary government or ordinary legal processes, but to supplement them in certain rare cases where ordinary remedies are inadequate. There should be no government by injunction when any other kind of government is possible, and it is very fortunate that the present attempt at coercion by summary process failed.

The question of transfers at any particular point must be settled for the benefit of the whole community, not solely in the interest of the residents along one particular line. The sober-minded members of this community believe that the Metropolitan street railway companies are trying to give the best possible service to the public. They may make mistakes, but this policy is certainly not one of them, and it is unfortunate that a statute requiring transfers at all connecting points, that might be suitable in a small city, should be made to apply to an immense system like that of the Interurban Street Railway Company.

A. P. JOHNSON.

TIME - TABLE OF THE PROVIDENCE & DANIELSON RAILWAY

The Providence & Danielson Railway Company, like many other interurban lines, collects 5-cent fares at different points along the route and has adopted an ingenious method of indicating to the passenger where these different fares are collected. The company issues a pocket time-table and places an

Table with columns: STATIONS, [M], Sc. Fare Collected after leaving Stations indicated by Stars. Rows include Providence (Mkt. Sq.), City Line, Pocomtuc, Moswanicut Lake, North Scituate, Ashland, South Scituate, Richmond, Power-House, Rockland, Clayville, Foster Center, North Foster, East Killingly, Elmville, Danville, Wildwood Park, Putnam, Webster, Worcester, Danielson.

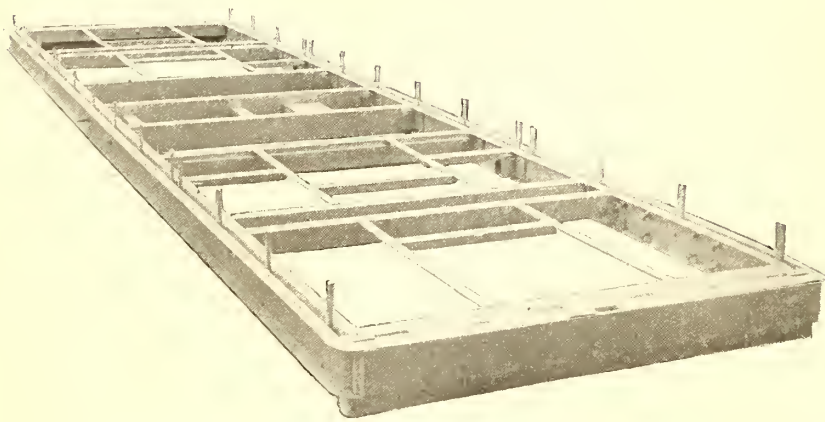
PORTION OF TIME-TABLE—PROVIDENCE & DANIELSON RAILWAY

asterisk next to the station after leaving which an additional nickel is required for passage. A portion of the time-table is reproduced herewith, from which the plan followed can easily be understood. In addition, on the last page of the time-table, a table is published showing the fares, distances and time required between Providence and the principal cities along the route.

One of the most expensive bridges ever constructed by an electric railway company has been contracted for by the Toledo Urban & Interurban Railway Company. The bridge will span the Maumee River between Maumee and Perrysburg. It will be 1430 ft. long, and will be built of steel with stone and concrete piers. The contract was awarded to the American Bridge Company, and the price will be \$280,000. The company will lease the right to use the bridge to other interurban roads entering the city from the south.

### A STEEL CHANNEL BOTTOM FOR CITY CARS

A type of car bottom construction which is finding very extensive use but about which very little has been said, is that which is known as the steel channel car-bottom construction of the St. Louis Car Company. The peculiar feature of this bottom is the opportunity that it gives for a very low car body in city service without interfering with the strength of the car by cutting down the strength of the sills. One of these bottoms under construction is illustrated by the accompanying engraving. This particular bottom is one of an order for the



STEEL CHANNEL BOTTOM FRAME FOR CITY CARS

Louisville Railway. Similar construction has been employed on the standard cars with which the Chicago City Railway Company is gradually equipping its lines, and also under the new cars of the St. Louis & Suburban Railway. These, however, are only two of the most notable and extensive car orders in which this type of bottom has been employed.

In this bottom the longitudinal strength is obtained entirely by the two channel steel side sills. Sufficient strength is obtained in these so that there is no necessity for the usual heavy longitudinal timbers under the middle, and, consequently, there is a certain amount of room saved for the turning of the trucks which would not otherwise be available.

### A NEW CABLE BRACKET FRAME

G. M. Gest, of Cincinnati and New York, who has invented many valuable specialties for use in conduit construction, has recently placed on the market the cable bracket frame illustrated herewith. This frame is made of galvanized angle-iron, and is supplied at top and bottom with anchors which are built in the wall with the frame itself. The face of the frame is flush with the wall, and therefore takes up no room in the manhole.

The galvanized cast-iron cable bracket is secured to the frame by means of a galvanized T-head bolt with a special nut so designed that the bracket is removed by being lifted straight up. By means of the special nut the bracket can be adjusted to any angle, and as the slot in the frame is unobstructed from top to bottom the bracket can be adjusted to any height desired.

The frames are made in the following lengths: Twelve ins., 24 ins., 30 ins., 36 ins., 42 ins., and the brackets are made in three sizes, single, double and triple. Longer frames than the above are made to special order. The brackets and bolts are removable at any time, and very little time is required



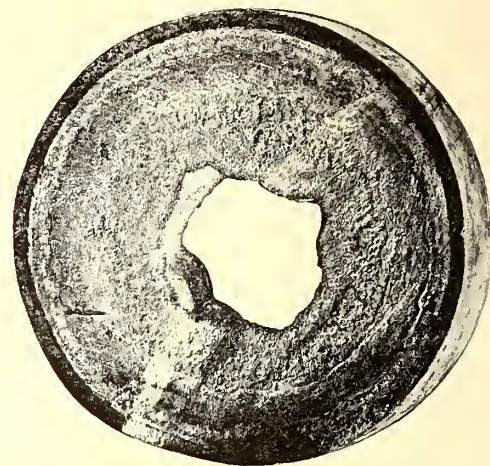
CABLE FRAME

to change from a single bracket to a double or triple type. As all parts are heavily galvanized they will last as long as the conduit system itself.

### SCALE IN BOILER TUBES

Although the accumulation of scale in boiler tubes may appreciably affect the cost of generating power, the importance of keeping the tubes clean is often overlooked.

The accompanying cut illustrates one of 215 tubes in the



SECTION OF SCALE CHOKED PIPE

boilers of a street railway company in the South. The water used was very bad and scale actually accumulated to the thickness of an inch. As the operating conditions prevented the plant being shut down for any extended length of time the company was at a loss how to have the tubes rapidly cleaned. Its attention was called, however, to the "Weinland" mechanical cleaner, made by the Lagonda Manufacturing Company, of Springfield, Ohio, and in a very short time after the cleaner was adopted all the tubes were thoroughly cleaned without injury to any of them and with very little trouble or expense.

### WIND-BREAKS FOR HIGH SPEED INTERURBAN CARS

After a series of practical experiments the Pacific Electric Railway Company, of Los Angeles, Cal., has decided to put wind-breaks on all of its long-distance cars. The experiments were made on the company's Long Beach division, between Los Angeles and the ocean. Four different shaped wind-breaks were tried. The one adopted will resemble the cow-catcher of a locomotive. The base of the structure will be on a level with the floor of the car. From this point the knife-like edge extends upward at an angle of 45 degs. to the top of the car. The minor portions of the sides are rounded off in a convex curve to the sides of the car. The forward part of the structure will be constructed of glass, and it may be feasible to have the motorman sit in this hood, where he may control his car undisturbed.

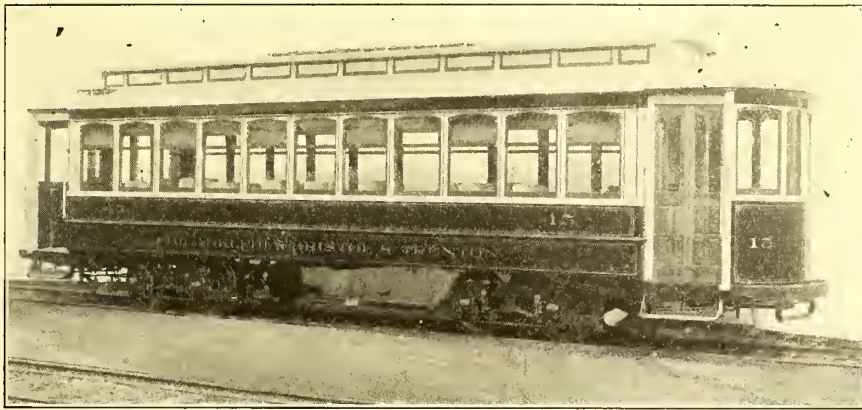
To drive at a speed of 60 miles an hour a car equipped with this wind-break it took 220 hp. Without the hood the same car, with its flat front, required 290 hp to attain the same speed. This is a saving of about 24 per cent of energy. At a speed of 50 miles an hour the test with and without the hood registered 137 hp and 170 hp, respectively. At one time the car attained a speed of 68 miles an hour.

These experiments were made against a stiff ocean breeze. R. S. Masson, consulting electrical engineer of the company, under whose directions the tests were made, says that the use of the wind-break on all long-distance cars is an assured fact in the light of such practical and satisfactory results.

**MORE SEMI-CONVERTIBLE CARS FOR PHILADELPHIA SUBURBS**

The J. G. Brill Company has recently finished a number of fine cars for the Philadelphia, Bristol & Trenton Street Railway Company, to be used for the present on the 9-mile division between Bristol and Morrisville. Later the cars will run to Torresdale, 7 miles south of Bristol. At Croydon this railway runs over a 3/4-mile elevated structure, as the company has not yet been permitted to lay surface rails in that section. The lines extend for most of the distance over private way. The service is distinctly interurban, for which this type of car is particularly suited, having all the features for comfort and convenience for summer as well as winter use. They are substantially constructed for carrying heavy loads at fair speeds. Many cars of this type are now in operation on electric railways between towns near Philadelphia.

The car illustrated is of the size most largely used. The



SEMI-CONVERTIBLE CAR FOR BRISTOL, PA.

length over end panels is 30 ft. 8 ins.; length over vestibules, 40 ft. 1 in.; from panels over end panels, 4 ft. 8 1/2 ins.; width over sills, 7 ft. 10 1/2 ins.; width over posts at belt, 8 ft. 2 ins.; sweep of posts, 1 3/4 ins.; from center to center of posts, 2 ft. 8 ins.; height from track over trolley board, 12 ft. 1 1/2 ins. The corner posts are 3 3/4 ins. thick, and the side posts 3 1/4 ins. Side sills, of long-leaf yellow pine, are 4 ins. x 7 3/4 ins., plated on the inside with 3/8-in. x 12-in. steel, to which plates the posts are securely bolted. End sills are 5 1/4 ins. x 6 7/8 ins. The interiors are finished in natural-color cherry, and the ceilings are three-ply birch, handsomely decorated. Entrance to the vestibules is from either side, the doors folding against the corner posts of the car. The vestibule windows are each composed of one light and drop into pockets. The car windows are raised into roof pockets by means of trunnions at the sash corners moving in grooves entirely of metal.

Each car is furnished with angle-iron bumpers, radial draw-bars, "Dumpit" sand-boxes, track scrapers, "Dedenda" gongs and ratchet brake handles, all of the builder's make. The trucks are Brill 27-G with 4-ft. wheel base, 33-in. wheels, and equipped with 50-hp motors, two per car.

**FURTHER DEVELOPMENTS IN RICHMOND STRIKE**

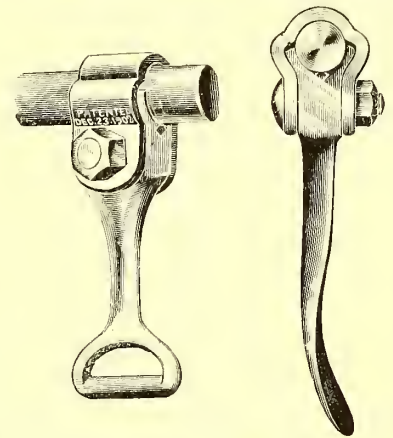
The continued presence of militia in Richmond and Manchester, and the determination of the authorities to preserve order, has had a very quieting effect on the strikers in both cities. Cars are running on the lines of the Virginia Passenger & Power Company, and are being well patronized. The strike sympathizers have taken to cowardly tactics by placing obstructions on the tracks and throwing missiles at cars during the night, but the watchfulness of the military sentinels has prevented serious damage.

Under the general laws of Virginia, railway companies have the right to arm their motormen outside of city limits. The Virginia Passenger & Power Company has taken advantage of this right and has furnished each motorman and conductor with a shotgun and buckshot-filled shells. These guns are placed in special racks from which they can be quickly taken for use.

At present most of the trouble is confined to Manchester, one man having been killed and another wounded there on July 4. In Richmond all is so quiet that part of the soldiers may be withdrawn at any moment.

**IMPROVEMENT IN REGISTER ROD HANDLES**

An improved register rod handle has been recently placed on the market by C. O. Oberg & Company, of Boston, Mass.



TWO TYPES OF REGISTER ROD HANDLE

The present practice is to have an eye or hole at one end of the handle through which the rod passes. The rod and handle are supposed to be held in rigid relation by means of a set screw. The fact is, however, that the eye stretches and the set screw becomes worn or broken from continued tightening, thus making it incapable of holding the handle rigid on the bar. This necessitates the replacing of the old handle. The only way to get a new one on is to loosen all the handles on the bar and remove the rod from its bearings and connections with the register. This, of course, involves considerable trouble and expense.

The new handle, two types of which are shown herewith, will do away with all these objectionable features. It may be put on or removed without disconnecting the rod from the register or from its bearings, none of the other handles has to be removed, and the operation of the register is not disturbed. It cannot get loose, even if worked both ways, on account of the powerful grip it has, and the hardened steel key which is set in the composition and which is pressed into the steel rod when the lock is tightened up.

The manufacturer states that these handles are made in any desired shape, that they cost about the same as the old style, and are much cheaper than the square rod handles.

**TAG SYSTEM FOR PACKAGES.**

The interurban lines operating into Indianapolis have adopted the tag system in their freight business. Tickets are being sold to the farmers and others along the lines, and when a package is to be shipped by express the shipper merely consults his schedule of rates and attaches to his package a ticket that will carry the package to its destination. A 5-gal. can of milk is carried to the city for 10 cents and is returned for 5 cents.

## FINANCIAL INTELLIGENCE

WALL STREET, July 8, 1903.

**The Money Market**

In spite of the fact that bank reserves are still far below the level of the season, a distinctly easier feeling is apparent over the money outlook compared with a month or even two weeks ago. Belief is gradually growing that liquidation in stocks has been so thorough that whatever needs may arise later on in the money market will be met without serious disturbance in speculative circles. There are no great demands upon bank credit, such as pressed so heavily upon surplus reserve last summer and the summer before. This in itself is a matter of incalculable importance. Then, again, we occupy an immensely better position in the international exchanges as compared with twelve months ago. European loans have been repaid on an enormous scale, estimates of the amount paid off reaching as high as \$200,000,000. This means a decided change from the condition last autumn, when affairs being at a crisis here Europe was not only unwilling to lend us more, but was refusing to renew accommodations already existing. Beyond any reasonable doubt we shall be able this season, should necessity arise, to borrow freely in the foreign markets, importing gold where it is needed to sustain domestic bank reserves. These two circumstances—the absence of new borrowing on the one hand and greater capacity for obtaining assistance from abroad on the other hand—are the two essential respects in which the present situation is reassuring as compared with a year ago. It is of less moment whether or not our local banks are able to strengthen their position materially between now and the harvest time. Exports of gold continue—\$2,800,000 more has gone out to Paris during the past week. Besides this, the currency inflow from the interior has slackened perceptibly. Arrivals of new gold from the Klondike and one or two scattered consignments from Australia will serve to help out in a measure, but the main hope during the next six weeks for adding to surplus reserves lies in a probable reduction of the loan account. Such reduction, it is expected, will occur from the paying off of the \$40,000,000 Pennsylvania loan and from the similar return of credits in one or two other syndicate enterprises. Call money, after a temporary rise to 10 per cent during the period of the first of July settlements, has now returned to a normal level. Time money, meanwhile, is rather easier, with sixty-day loans made at  $3\frac{1}{2}$  per cent, and six months money offered more freely by the banks at  $4\frac{3}{4}$  per cent.

**The Stock Market**

The general stock market has scarcely changed at all during the past two weeks. Operations for the rise continue to be held in check by the uncertainty of the crops, by the necessity already alluded to of strengthening bank reserves, and by the knowledge that the assimilation of undigested securities has not yet gone as far as it ought to be. On the other hand, short selling and bear manipulation are equally restrained by the evidence that genuine liquidation is over and by many proofs that stock prices are so low that any further decline would bring in plenty of investment buying. With these limits imposed on either side the market is naturally dull and narrow with trading confined to professional operators who take first one side and then the other, whichever for the moment seems to present the best opportunity for profits. Prices have fluctuated within a very small range, and from present indications they are likely to continue in this rut for some time longer. The thing now most anxiously awaited is definite news from the crops. In former years experience has shown that a moderate advance is not improbable in the summer despite the money uncertainties of the autumn close at hand. But such movements are, of course, entirely dependent upon good news from the harvest regions. The latest crop reports have been decidedly encouraging. Great improvement has been made in the condition of corn in particular since the middle of last month, and with all due allowance for the fact that the crop has had a late start and will be unusually liable to frost damage, the present outlook is for at least an average yield. Spring wheat indications, except in a few localities, are highly favorable, and taken together with an exceptionally large yield of wheat now assured, make it entirely probable that the total production will be one of the largest on record.

The local traction stocks are still governed pretty wholly by the course of the general market. Reports of largely increased

earnings on the Brooklyn Rapid Transit system, owing to the large volume of the summer traffic on the road, are receiving some attention. There is reason to believe that a new pool has been formed to operate in the stock, bidding up the price where general conditions permit and giving support on occasions of weakness. The other traction stocks have been very quiet. Investment buying is still noticeable from time to time in Manhattan Elevated, but several attempts which have been made by speculators to mark up the price have not met with much success.

**Philadelphia**

No very important changes have occurred in Philadelphia stocks during the two weeks period, nor is there any particular news. It is announced that the recent assessment on Rapid Transit stock has been fully collected, and the money will be devoted at once to the subway, extensions, and other contemplated improvements on the system. Rapid Transit shares in the market after getting down to  $10\frac{3}{4}$ , rallied to 11. Union Traction held steady around 45, while Philadelphia Traction sold at  $95\frac{1}{2}$ , the lowest of the season, and later at 96. Philadelphia Company common recovered sharply from  $41\frac{3}{4}$  to  $42\frac{1}{2}$ , on signs of investment buying. The preferred changed hands throughout at the one figure, 47. Other transactions of minor importance included American Railways at 45, Easton Electric at 15, United Traction of Pittsburg preferred at 50 and Consolidated Traction of New Jersey between  $66\frac{1}{2}$  and  $67\frac{1}{2}$ .

**Chicago**

Trading in the Chicago specialties is at a standstill and there seems to be no prospect of any real improvement until the everlasting traction question is out of the way. There are no new developments in the controversy over franchise renewals between the city authorities and the companies. Officials of the City Railway declare that they are perfectly willing to do the fair thing with the city, but they insist that there are vested rights in the property which must be recognized and they do not intend to be prevented from getting what is essential to continue their business. City Railway shares are down again from  $199\frac{1}{2}$  to 195, and Union Traction is weak at 4 to  $4\frac{1}{2}$ . Sales are reported in West Chicago at 62, Southside Elevated at 99, Metropolitan common at  $23\frac{1}{4}$  to 23, the preferred at  $67\frac{1}{4}$  and Lake Street on a rising scale from  $4\frac{1}{2}$  to  $5\frac{1}{4}$ . Traffic of the South Side Company for the six months ending June showed an increase of about 6 per cent over last year. It is said that the Aurora, Elgin & Chicago line, which is an offshoot of the Metropolitan, has increased its earning capacity more than 50 per cent since the opening of the Elgin branch. The current daily earnings of this branch are figured out as being at the rate of \$500,000 annually.

**Other Traction Securities**

In the Boston market the leading stocks as a rule have improved, but on very light dealings. Elevated shares recovered 5 points from 140 to 145, Massachusetts Electric common rose from 26 to 27 and back to  $26\frac{1}{2}$ , the preferred rose from 83 to 84, West End common from 89 to 91, but the preferred, after rallying 2 points from 109 to 111, lost the value of its gain. Prices are a trifle better in the Baltimore market, but business is too slow to give the movement any significance. United Railways stock is up from  $11\frac{1}{4}$  to  $11\frac{5}{8}$ , the income bonds from  $64\frac{3}{8}$  to  $64\frac{3}{4}$  and the general 4's from  $92\frac{3}{4}$  to  $93\frac{1}{4}$ . Other sales include Newport News & Old Point Comfort 5's at 100, City & Suburban 5's at  $112\frac{1}{4}$  and 112, City Passenger 5's at  $105\frac{1}{2}$ , Traction Consolidated 5's at 101 and  $101\frac{1}{4}$ , and Petersburg 5's at  $114\frac{3}{8}$ . Transactions on the New York curb market for the fortnight have been quite unimportant. They comprise sales of New Orleans preferred at  $43\frac{1}{4}$  and 43, the  $4\frac{1}{2}$  per cent bonds at  $85\frac{1}{2}$  and  $85\frac{3}{4}$ , American Light & Traction preferred between  $96\frac{1}{2}$  and 97, St. Louis Transit and 72, Washington Traction preferred at  $38\frac{3}{8}$ , the 4 per cent at 22 and  $21\frac{5}{8}$ , United Railways of St. Louis preferred at  $72\frac{3}{8}$  and 72, Washington Traction preferred at  $38\frac{3}{8}$ , the 4 per cent bonds at  $74\frac{1}{2}$ , and Brooklyn Rapid Transit 4s at 81.

**Iron and Steel**

The report of the United States Steel Corporation issued last night for the quarter and half year ending June 30, makes a much more satisfactory exhibit than had been looked for. Although comparison is made with the most flourishing period of the company's business a year ago, net earnings for the last three months show a decrease of only 3 per cent. This goes to prove that the popular idea of the recent reaction in the iron trade has been very much exaggerated. The very large orders for steel rails aggregating 250,000 tons from the Western railroads alone during



the past ten days have given a tone of increasing confidence to the whole iron industry. A good trade is also reported in structural steel, and in tin plate and tubes the current tonnage is very heavy. An undercurrent of improvement is also visible in the pig iron market, partly owing to the strike in the Southern foundries, which, promising to curtail production considerably, may perhaps bring in the long-awaited buying movement. Quotations are as follows: Bessemer pig iron \$19.85, Bessemer steel \$29.50, steel rails \$28.

**Metals**

Quotations for the leading metals are as follows: Copper 14 cents, tin 28 cents, lead 4 1/8 cents and spelter 6 1/8 cents.

**Security Quotations**

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Closing	Bid
	June 23	July 7
American Railways .....	45	44 1/2
Aurora, Elgin & Chicago .....	a24 1/2	17
Boston Elevated .....	a142	143
Brooklyn Rapid Transit .....	55 3/4	57 3/4
Chicago City .....	195	190
Chicago Union Traction (common) .....	3 1/2	4
Chicago Union Traction (preferred) .....	30	30
Cleveland Electric .....	*70	75 1/4
Columbus (common) .....	102	105 1/2
Columbus (preferred) .....	105	102
Consolidated Traction of New Jersey .....	67	66 1/2
Consolidated Traction of New Jersey 5s.....	105	105
Detroit United .....	72 5/8	73 1/2
Electric People's Traction (Philadelphia) 4s.....	99	99
Elgin, Aurora & Southern .....	a49	a48
Lake Shore Electric .....	10	a13 1/2
Lake Street Elevated .....	5	5 1/4
Manhattan Railway .....	136	136 3/4
Massachusetts Electric Cos. (common) .....	26	26
Massachusetts Elec. Cos. (preferred) .....	82	83
Metropolitan Elevated, Chicago (common) .....	23	24
Metropolitan Elevated, Chicago (preferred) .....	66	67
Metropolitan Street .....	124	122 1/2
New Orleans Railways (common) .....	11 1/2	—
New Orleans Railways (preferred) .....	42	43
North American .....	85	85 1/2
Northern Ohio Traction & Light .....	a22	21
Northwestern Elevated, Chicago (common) .....	21	21
Philadelphia Rapid Transit .....	11	†16 1/2
Philadelphia Traction .....	96	96
St. Louis Transit (common) .....	24 1/4	23
South Side Elevated (Chicago) .....	*98	97
Syracuse Rapid Transit .....	26	24
Syracuse Rapid Transit (preferred) .....	70	76
Third Avenue .....	113	115
Toledo Railway & Light .....	25 1/2	25 1/2
Twin City, Minneapolis (common) .....	95 7/8	98 1/2
Union Traction (Philadelphia) .....	45	44 3/4
United Railways, St. Louis (preferred) .....	72 3/4	72

a Asked. \* Ex-dividend. † \$10 Paid.

**CHICAGO ELEVATED REORGANIZATION PLAN**

It is officially announced that the Lake Street Elevated Securities Committee had received sufficient deposits of stock to warrant it in proceeding with its reorganization plan. It is known that in the main this plan provides for an assessment on the stock, the retirement of the present 5 per cent bond issue with a 4 per cent issue, and the giving of the stock in a new company in return for whatever assessment is made on the present stock issue of \$1,000,000. The plan, whenever presented, will be backed adequately by interests represented by Blair & Company, of New York. In fact, it substantially will be underwritten before it is presented.

J. B. Dennis, of Blair & Company, was in conference on July 7 with Lake Street and Northwestern Elevated officials. The decision to go ahead with the consideration of the reorganization plan resulted immediately from Mr. Dennis's presence in Chicago. The protective committee appointed by the stockholders is busy securing stock, and thinks it will be able to get a majority. This may or may not complicate matters from the Reorganization Committee's standpoint.

Mr. Dennis is quoted as saying the Ravenswood extension of the Northwestern Elevated would be actively taken up as soon as the ordinance is passed by the City Council. It is not expected that building operations can begin before next spring.

**CLEVELAND RAILWAY CONSOLIDATION**

The stockholders of the Cleveland Electric Railway Company have formally ratified the agreement of consolidation between that company and the Cleveland City Railway Company. It was voted to increase the capital stock from \$13,000,000 to \$23,400,000 in order to purchase outright the Cleveland City Railway Company's lines. Universal transfers have already been granted. Officers have been elected as follows: Horace E. Andrews, president; Christopher F. Emery, vice-president; George Russell, treasurer; John Ehrhart, assistant treasurer; H. J. Davies, secretary; John J. Stanley, general manager; George C. Mulhern, general superintendent. The chairman of the board of directors is Senator Hanna.

**TRACTION AND LIGHT CONSOLIDATION IN COLUMBUS, OHIO**

As stated in the STREET RAILWAY JOURNAL for June 27, the Columbus Railway & Lighting Company has taken over the Columbus Railway Company. It will also control the Columbus Edison Company. The new company has now perfected its organization by the election of officers and directors.

Robert E. Sheldon has resigned as president and director of the Columbus Railway Company and is succeeded by his son, Butler Sheldon. E. K. Stewart has resigned as first vice-president, treasurer and general manager, and his son, Frank T. Stewart, has been elected as vice-president and treasurer, to succeed him. The office of general manager has been abolished. Mr. Sheldon, Sr., and Mr. Stewart, Sr., were elected to the same offices in the Columbus Railway & Light Company, or the company which recently took over the holdings of the Columbus Railway Company, and the Columbus Edison Company's properties.

The board of directors of the Columbus Railway & Light Company, as reorganized, will be as follows: Robert E. Sheldon, E. K. Stewart, Theodorc Rhoades, Frederick Sinks, Clarence Clark, Emil Keisewetter and C. H. Lindenberg.

The minor officers of the Columbus Railway Company will hold similar positions with the holding company, and the former will practically pass out of existence, with the exception of a few officers who will retain titles in the Columbus Railway Company.

**OPENING OF NEW CLUB-HOUSE FOR BROOKLYN STREET RAILWAY MEN**

The new clubhouse which the Brooklyn Rapid Transit Company has built for its employees was formally opened on July 7. This building, which was described in the STREET RAILWAY JOURNAL for Dec. 13, 1902, contains a gymnasium, entertainment hall, billiard room, bowling alleys, baths, etc. There will also be classes in mathematics, mechanics and electricity. A skeleton car will be used for purposes of instruction in the school.

John F. Calderwood, vice-president and general manager of the Brooklyn Rapid Transit Company, in a very neat speech presented the building to its board of managers in the name of the company. In response to Mr. Calderwood's address, George F. Wolfram, a motorman, accepted the gift on behalf of the rank and file. Mr. Wolfram made a strong appeal to the men to join the Brooklyn Rapid Transit Sick and Death Benefit Association and told of the many advantages thereby gained, the association having paid out during the first six months \$1.25 for every \$1.00 paid in.

T. J. Nicholl, vice-president and general manager of the Rochester Railway Company, who organized the first Y. M. C. A. street railway branch in America, related the great improvement which had taken place in the character of the men since his company had opened the branch.

T. M. Dudley, secretary of the Young Men's Christian Association, spoke of the good work which has been done by that organization. He was followed by T. F. Moore, secretary of the International Committee who said that the Brooklyn Rapid Transit Company had placed the management of the club house in the hands of the Y. M. C. A. because it felt that the experience of that organization in such work would prove of the utmost benefit to railway employees.

This club house will be open to all employees of the Brooklyn Rapid Transit Company. The yearly dues for membership in the Sick and Death Benefit Association are \$6, and the annual payment of \$2 additional will entitle members to all the educational, social and athletic privileges enjoyed by similar Y. M. C. A. branches, but which usually cost \$10 to \$15 per year.

The spirit of this first meeting was so cordial as to leave no room for doubt that the opening of this building presages a new and happier era for the officials and men of the Brooklyn Rapid Transit Company.

## STREET RAILWAY LEGISLATION IN CONNECTICUT

The session of the General Assembly of Connecticut, recently brought to a close, saw not less than fifty special electric railway resolutions passed, while four general statutes bearing on street railways were enacted. In addition to this large special legislation the session was especially significant because of the persistent attempt that was made to stifle electric railway building by amending the general railroad law of the State. The progress of this struggle between the street railway and steam interests was reviewed from time to time during its progress in the *STREET RAILWAY JOURNAL*, the ultimate failure of the attempt being noted only a few weeks since.

Thirteen new street railway companies, most of them getting franchises for intertown lines, were incorporated. Perhaps the most important charter which was granted was the one authorizing the Groton & Stonington Street Railway Company to build an electric railway from New London to the Rhode Island boundary, where connections will be made for Westerly and Watch Hill. The capital stock of the company is \$600,000. The Norwich, Mystic & Westerly Street Railway Company, another ambitious project in New London County, has rights to build in Norwich, Preston, Ledyard, Stonington and North Stonington, and to run over into the State of Rhode Island. The maximum capitalization of the company is \$700,000.

Two new projects, which lie wholly within New Haven County, are important because they cover connecting links for trunk lines of street railway. One of them is embodied in the resolution incorporating the Wallingford Tramway Company with a franchise to build from the Meriden system at Montowese, in the town of North Haven. The road will be the connecting link from Naugatuck south through the Naugatuck Valley to the town of Seymour. The construction of the link will put Waterbury in connection with New Haven, Bridgeport and Ansonia. The company will be allied with the Connecticut Railway & Lighting Company, and will probably be controlled by that company. The maximum capital stock which the company is authorized to issue is \$1,000,000. Franchises for two other street railways which concern Naugatuck Valley, and which will traverse the boundary line between New Haven and Litchfield Counties are embodied in resolutions creating the Woodbury & Seymour Street Railway Company and the Woodbury & Middleburg Street Railway Company. The former corporation, capitalized at \$400,000, grants a privilege for a road in the towns of Woodbury, Southbury, Oxford and Seymour. The latter company, which has a capital stock of \$200,000, will operate in Woodbury, Middlebury and Waterbury, and will reach Lake Quassapaug, a summer resort in Middlebury.

In the geographical distribution of new electric railway companies, Middlesex County gets two. One of them, the Moodus & East Hampton Tramway Company, is chartered to build a line from East Haddam to the village of East Hampton, and thence to the Lake Pocotopaug, in the town of Chatham. It has a maximum capitalization of \$300,000. The other is the Middletown & Middlefield Traction Company, which will have a capital stock of \$150,000 and which will operate a suburban line in Middletown and Middlefield.

Other new corporations are the Crystal Lake Railway Company, chartered with a capitalization of \$150,000 to build a line in the towns of Summers and Enfield; the Voluntown & Jewett City Street Railway Company, authorized to issue \$100,000 capital and to operate in Voluntown and Griswold and the borough of Jewett City; the Plainville & Farmington Tramway Company, capitalized at \$50,000 and chartered to build a line in the two towns mentioned in the title; the Branford Railroad Company, which has a capital of \$50,000, and which will build from Pine Orchard to the Branford driving park, and the Pawcatuck Street Railway Company, which is incorporated with a capital of \$50,000, to construct a line in the town of Stonington.

Much of the other special legislation consisted of granting additional privileges and franchises to existing street railway companies. Nearly all of the prominent companies obtained new charter rights, and the authorized extensions to present systems represent scores of miles in the aggregate. Many of these franchises will not be utilized for a considerable time, but they are essential to the schemes of ultimate expansion. Another class of special trolley resolutions provided for a two-year extension of the life of the trolley franchises which have been granted but which have not yet been used. Many corporations which were chartered by previous legislatures, but which have not yet organized, are given until July 1, 1903, to begin work. A large project in the southwestern section of the State is embodied in a resolution authorizing the Greenwich Tramway Company to merge with other street railway corporations in Connecticut and New York. The name of the consolidated corporation is to be the New York & Stamford Street Railway Company,

and it is authorized to issue capital stock to an amount not exceeding \$2,000,000.

## IMPROVEMENTS IN JERSEY CITY AND NEWARK

The Public Service Corporation of Jersey City and Newark has already commenced on a number of important improvements in its service and rolling stock, which will add greatly to the facilities possessed for handling traffic.

Among these are considerable additions to its rolling stock. An order for twenty-five semi-convertible cars has already been placed with the J. G. Brill Company, and the company is getting out specifications for twenty-five half open and closed cars and for 100 standard closed cars with 30-ft. bodies. The closed cars and the semi-convertible cars will be equipped with a modified Detroit platform, that is with a 6-ft. platform with dividing rail. As the cars are double-enders this platform will of course be at both ends. The company has also ordered 1200 tons of rail, principally for renewals.

Included in the new construction which the company will build is a new line from Paterson to Ridgewood. This line will be from 5½ to 6 miles in length, the greater part of which distance will be over a private right of way.

## BOSTON & WORCESTER LINE IN REGULAR OPERATION

The Boston & Worcester Street Railway Company opened its line for operation between Boston and Worcester, Mass., July 1, and had all the traffic it could handle. It is the longest single electric railway in New England, and operates on the fastest time schedule. The cars have not been able to keep up to the schedule of two hours and fifteen minutes for the forty-four miles, but there is no reason to think that the schedule will be found too fast when a few temporary difficulties have been overcome. The time table posted by the company provides that cars leave Park Square, Boston, for Worcester at 6:15 a. m., and every thirty minutes until 9:45 p. m.; two later cars run only to the Wellesley Hill car house. The cars leave Worcester at 6:30 a. m., and every thirty minutes until 9:30 p. m. for Boston, at 10 and 10:30 p. m. for Wellesley Hills and 11 and 11:30 p. m. for Westboro. Cars running only to South Framingham from Boston enter the subway but the longer through cars are too large to go in. Details of the construction of this line, together with a map of the route, were given in the *STREET RAILWAY JOURNAL* of Oct. 4, 1902.

## AN AGREEMENT BETWEEN NEW ORLEANS COMPANY AND ITS EMPLOYEES

An agreement as to wages and conditions of service has just been entered into by the New Orleans Railways Company and its employees, which dates from July 1, 1903, and is binding until July 1, 1905. The agreement is the result of negotiations extending over a period of many weeks, and while in some of its provisions it seems most liberal the period of uncertainty as to unexpected action by the men is removed, and the signature is obtained of the representatives of the men to an agreement that if repudiated will bring into disrepute the whole labor organization.

In the first place the union is recognized, and in addition provision is made that any man expelled from the union by a majority vote shall be discharged by the company, if the request is properly made by the association. In the classification of employees and rates of wages, no changes have been made. In the case of the pitmen, however, there is a reduction of one hour in the working day. Other classes of barnmen get the benefit of every other Sunday off with pay. Overtime for motormen and conductors is to be paid for at the rate of thirty cents per hour, while all other employees who work overtime are to receive time and a half. For runs of five hours or less the pay is to be thirty cents per hour, while runs of over five hours and under seven and one-half hours are to be paid for at the rate of \$1.50. Runs over seven and one-half hours are to be paid for at the rate of twenty cents per hour.

A section of the agreement that seems to be loosely constructed says that "no motorman or conductor shall be compelled to work overtime, except in extreme cases." This section further "applies to extra as well as regular men, while said extra men are on duty as regulars."

The general style of uniform is to be decided by the company, but it is provided that the men shall be allowed to purchase their uniforms in the open market.

A regular schedule of time allowances, for which pay is to be received by the men at twenty cents per hour, is provided where the men return their cars to the end of a line at a considerable distance from the car house. Free transportation is provided for con-

ductors and motormen in uniform. In accident cases employees are to be paid for the time used in looking up evidence, and suspended employees are to be paid for the period of suspension if true cases are not brought against them. A working and an extra board are to be provided at each car house, and the extra board is to be worked according to seniority. Except in cases of emergency, all changes in schedules are to be posted forty-eight hours before going into effect.

Section 15 of the agreement says: "There shall be no sympathetic strike, so-called, and there shall be no strike of any kind for any cause or any grievance not arising from a grievance of the employees of the railways company, and there shall be no strike pending any matters admitting arbitration under this agreement. In order to carry out the intention of this provision, all employees shall, unless waived by the railways company, give the railways company forty-eight hours notice of their intention to resign and leave the employ of the railways company, and without the consent of the railways company not more than twenty-five conductors and twenty-five motormen shall resign from the service of the railways company within any twenty-four hours, resignations to take effect in order in which application therefor shall be made in writing to the railways company."

Except in cases of irregularities in registering fares or transfers, any employee having a grievance against the company is to have the right to appeal to the association for an adjustment of the grievance or reinstatement where discharge has resulted. If the association and the company cannot agree, then the question is to be submitted to a board of arbitration consisting of three members, one selected by the association, one by the company, and the other by the two already selected. The decision of this board is to be binding. In the case of discharge for irregularities in fares or transfers the accredited officer of the association is to be permitted to plead the case of the employee.

### ROUTE OF NEW TUNNEL IN BOSTON

The Rapid Transit Commission of Boston has voted on the proposed route of the new tunnel through the heart of the business section of the city. The route selected is the one known as the May Place-Devonshire Street-Union Street route, and provides from a point between Oak and Nassau Streets, to a point under Union Street near Haymarket Square, having stations in the vicinity of Summer Street and State Street, and such other stations, if any, as may hereafter be determined upon. It is to be a two-track tunnel, for the use of elevated cars or trains, as provided for in chapter 534, acts of 1902.

Under the special act authorizing the construction of a tunnel to facilitate local transit in Boston, it was provided that after a route had been determined it should be submitted to the Boston Elevated Railway Company, and if it dissented, it had three days to remonstrate to the railroad commissioners, and the finding of the latter would be a finality. The fact that the elevated people have been in consultation with the transit commissioners while the route was under consideration leads to the belief that it is entirely satisfactory and that the Railroad Commissioners will not be called in.

The southerly incline of the new tunnel begins at May Place, but no connection with the elevated structure on Castle Street is shown. This part of the work is entirely in the hands of the railway company, and it may unite the elevated and underground lines according to its own ideas. The incline will slope down to below the foundations of all intersecting buildings, until it reaches Bedford Street, where it follows the line of Kingston, Otis, Devonshire and Union Streets to its termination near Haymarket Square. The tunnel comes to a dead end at Union and Merrimac Streets, as the commission has not as yet determined on an extension from that point. It will not, however, connect with the present subway at Haymarket Square. Provision has been made for a station in the vicinity of Summer Street, and another near the Old State House. At the latter point the new subway will pass under the East Boston tunnel, being connected with it by flights of stairs or possibly elevators.

The length of the new line is 1 1-13 miles, and it is practically free of sharp curves and will be more suited than the old subway for the elevated trains. With the new tunnel in operation the present connection between the elevated structure at Pleasant Street and the subway will be discontinued, and the subway's whole length be given up to surface cars. The change will involve a heavy expenditure, as will also that at Causeway Street. Giving the old subway up entirely to surface cars will mean much in handling various suburban lines, as they can be run through to northerly and southerly points and avoid the changes now required at Scollay Square and Park Street,

The Transit Commission opened bids on July 7 for the construction of the section of the East Boston tunnel, between the westerly end of the Old State House and Scollay Square, at which point it will connect at grade with the existing Tremont Street subway. This will be known as section "F" while under construction. Eight bids were received, ranging from \$121,500 to \$229,170. The bids were: Metropolitan Contracting Company, \$229,170; H. P. Nawn, \$217,755; James J. Coughlan, \$191,365; Jones & Meehan, \$188,200; Shailer, Dunfee & Taylor, \$174,200; E. W. Everson & Company, \$158,600; Patrick McGovern, \$150,475; Coleman Brothers, \$121,500.

From the stipulations contained in the contract form, it is evident that the East Boston tunnel will not be ready for use this year. The contractor will have until Dec. 20, in which to complete section F, and this will not include the laying of track. By that time, however, all the other sections should be ready for use, and the work rushed to completion. Most of the work has been done in contract time, or a little better. The delay on the harbor section was due in part to the change in route after the contract for that section had been awarded, and work begun on lines intending to carry it through Fleet Street and Hanover Street.

### ELEVATED SHOPS BURNED IN NEW YORK

Three shops of the Manhattan Railway Company, of New York, were totally destroyed, with their contents, by a fire which broke out about 4 p. m. on July 4. The shops are situated in a block bounded by Lexington and Park Avenues, Ninety-Eighth and Ninety-Ninth Streets, and there are several of them, all numbered. Flames were first discovered in shop No. 2, known as the workshop. An alarm was turned in at once, but by the time the firemen got to work the flames had eaten their way to shop No. 1, known as the storage shop. To the rear of No. 1 is No. 3, known as the mills and carpenter shop. In it was from seven thousand to ten thousand feet of lumber.

The fire was confined to these three shops, though there was danger at one time that the paint shop would also be ignited. It contained hundreds of gallons of oil and other inflammable material. In shop No. 1 were stored fifteen new motor cars, and in the storage shop twenty passenger cars. These burned so fiercely that the firemen confined their efforts to saving the other shops, and to preventing the flames from spreading to the barns of the Interurban Street Railway Company, on the other side of Ninety-Ninth Street.

According to an official of the company the damage is between \$100,000 and \$150,000, the principal loss being fifteen motor cars, valued by the company at \$6,000 apiece, and twenty passenger cars, all of which are a total loss.

### TROLLEY EXCURSION FROM SARATOGA TO GLENS FALLS

The Hudson Valley Railway Company opened its line from Saratoga to Glens Falls last week with a special excursion for the members of the American Society of Mechanical Engineers and their guests. For some time the lines of the Hudson Valley system have been in operation from Waterford, connecting there from Albany and Troy to Mechanicville, Schuylerville, Fort Edward, Glens Falls, Caldwell and Warrensburg, with a branch from Mechanicville to Round Lake, Ballston and Saratoga. The Saratoga Lake road is a part of the combination. The new line from Saratoga to Glens Falls opens a second route between Glens Falls and Mechanicville. The extension northward from Saratoga follows the route of the old Mount McGregor Railroad as far as Wilton.

The party of mechanical engineers went to Glens Falls as the guests of President E. L. Eshley, of the Hudson River Power Company, to inspect the new dam across the Hudson at Spiers Falls, about ten miles southwest of Glens Falls. This dam will be finished next autumn at a cost of between \$2,000,000 and \$3,000,000. Electric power will be supplied to Glens Falls, Sandy Hill and Fort Edward, and it is presumed that power will also be transmitted to Schenectady for the use of the General Electric Company, to supplement that now furnished from Mechanicville. It is also possible that the United Traction Company will take power from Spiers Falls for the Albany and Troy street railway system.

### BRAZILIAN STEAM RAILROAD CONTEMPLATES CHANGING TO ELECTRIC TRACTION

The Companhia Trilhos Urbanos do Recife e Olinda e Beberibe at Pernambuco, Brazil, which operates a steam railroad about 12 miles long, desires to change its system to electric traction. Bento Tagalhaes, manager of this company, states that he wishes to receive full information on this subject from railway contractors and manufacturers.

## WORK OF FINANCING THE NASHVILLE COMPANY

The total issue of stock of the Nashville Railway & Light Company, as the successors to the old company is known, will be \$6,000,000, divided into \$3,500,000 common and \$1,500,000 preferred. Of this only \$5,000,000 will be put upon the market. The bond issue will be the same, \$6,000,000. A treasury reserve of \$1,000,000 of bonds, \$500,000 of common stock and \$500,000 preferred stock, \$2,000,000 in all, will be set aside for the purpose of making future improvements and purchasing other electric lines and properties. The bonds bear 5 per cent interest. By this plan there will be a total issue of \$12,000,000 stocks and bonds, but only \$10,000,000 securities will be placed upon the market. The plan provides that \$1,800,000 shall be spent now upon improvements of the Nashville system and properties. Of this amount over \$600,000 has already been expended. The reorganization of the Nashville Railway Company into the Nashville Railway & Light Company is made noteworthy by the fact that nine cities are represented among the underwriters, Birmingham, Atlanta, New Orleans, Baltimore, Richmond, New York, Boston and London being the home cities of the banking firms and individuals who have underwritten the issue. Despite the fact that a number of interurban lines are projected near Nashville, it is the general impression that the reorganized company will carry out on an extended scale the development of suburban and interurban lines.

## TROLLEY EXCURSION FOR NEWSPAPER MEN

The Trenton & New Brunswick Railroad Company, through Superintendent E. T. Wagenhals, tendered an outing to the newspaper men of Trenton and New Brunswick on June 24. Twenty-six were in the party altogether. A special car, the "Bound Brook," was used for the occasion, and it was gaily illuminated inside and out with electric lights. The party started from Trenton and arrived in New Brunswick at 8:43. A banquet was spread for the guests, and a return was begun at 10:33. On the home run the distance between Milltown Junction and the Fair Grounds, 24 miles, was covered in 44 minutes, and for more than half of the distance the speed exceeded 50 m. p. h. It was the first event of the kind that has ever been held by an electric railway company in that section of the State, and the most remarkable coincidence in connection with it was that the mystic "13" appeared in just thirteen occasions that evening. The local cars in which the scribes traveled from the City Hall, Trenton, to the Fair Grounds, run every 13 minutes, and it took 13 minutes to make the run. On the car that left 13 minutes before 7 there were 13 people altogether, and on the 7 o'clock car there were 13 of the party going upon the trip. Thirteen of the men were newspaper writers and 13 were not. Superintendent Wagenhals had

the field and armature are connected in separate circuits when the braking action is required, so that the reaction of the field will not affect the armature current.

731,508. Street Car Fender; Henry P. Schneider, Peoria, Ill. App. filed Oct. 10, 1902. Details of construction of a fender provided with pneumatic or other cushions to prevent injury to a person coming in contact therewith.

731,606. Trolley Pole Controller; John J. O'Donnell, Aylmer, Canada. App. filed Sept. 22, 1902. Details of a spring drum adapted to take up slack trolley cord.

731,806. Railroad Transfer Table; August Nelson and Frank X. Herrmann, Manitowoc, Wis. App. filed Oct. 18, 1902. A reciprocating transfer table provided with a cylinder having its axis arranged in the plane of movement of the table, a piston disposed in the cylinder, a cross-head connected with the piston, cross-head guides, a bar connecting the cross-head with the platform, a plurality of laterally yielding bolts carried by the table and guides or recesses for the reception of said bolts.

731,814. Combined Power and Brake System; William B. Potter and Clarence D. Clark, Schenectady, N. Y. App. filed Oct. 31, 1900. A train system comprising vehicles equipped with propelling motors and with an air brake system, engineer's valves located at any desired points along the train, circuit breakers in the several motor circuits, a plunger adjacent to each circuit breaker, and operatively connected with the air brake system and means whereby each plunger will cause its corresponding circuit breaking device to open the motor circuit only in case current is flowing therein when the brakes are actuated.

731,952. Device for Operating Street Railway Switches; Elias Robbins, Pittsburg, Pa. App. filed Jan. 2, 1903. A series of spring arms are arranged on the end of a shaft, which is spring mounted adjacent to the rail and means for rotating and depressing the shaft whereby the spring arms will engage and move the switch tongue.

731,954. Trolley Finder; Guy T. Roberts, San Diego, Cal. App. filed Feb. 24, 1903. Details.

732,009. Circuit Breaker Operating System; William B. Potter, Schenectady, N. Y. App. filed Oct. 31, 1900. Relates to the invention described in patent 731,814.

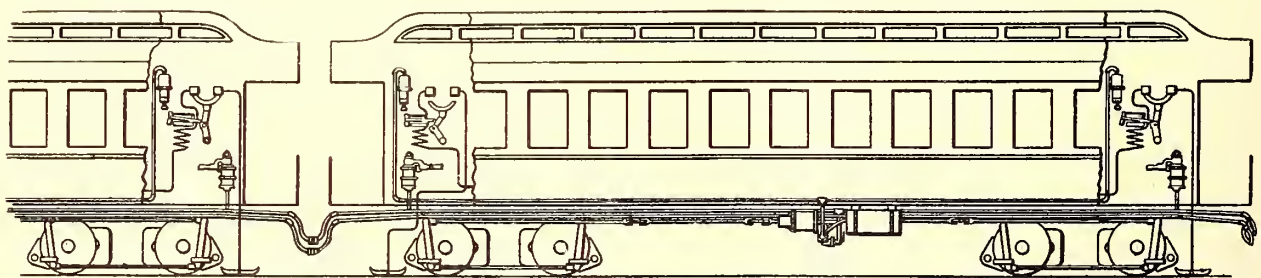
732,011. Street Railway Switch; James E. Scott, Louisville, Ky. App. filed Jan. 27, 1903. Details.

732,144. Trolley; John H. Walker, Lexington, Ky. App. filed March 14, 1902. The trolley harp and hub are so constructed as to afford good contact and lubrication.

732,145. Trolley; John H. Walker; Lexington, Ky. App. filed Nov. 20, 1902. A modification of the preceding patent.

732,157. Electric Railway; Arthur H. Bedworth, Boston, Mass. App. filed Nov. 13, 1902. When a car enters a block on a single track railway, it cuts off current from a short section of the track in the block ahead, thereby preventing other cars entering the block from the opposite direction.

732,272. Signaling System; Harold G. Brown, Melrose, Mass. App. filed Oct. 10, 1902. In railway systems in which direct current



PATENT NO. 721,814

13 lights upon the side of the car. One of the newspaper men, for a joke, rang up 13 fares on the register. There were 13 at Superintendent Wagenhals' table, and the thirteenth man was a coroner. There were 13 speeches made and the car left 13 minutes behind the schedule previously arranged upon the return trip. Lastly, the time made was 13 minutes better than the schedule. Everybody arrived home safe before midnight.

## STREET RAILWAY PATENTS.

UNITED STATES PATENTS ISSUED JUNE 23, 1903

731,455. Electric Brake; Ernest R. Hill, Winkinsburg, Pa. App. filed Dec. 29, 1899. The motor generates braking current and

is used for both power and signal operation, the object is to prevent the return current in the rail from operating the signal system when a part of the circuit of the latter includes the rail.

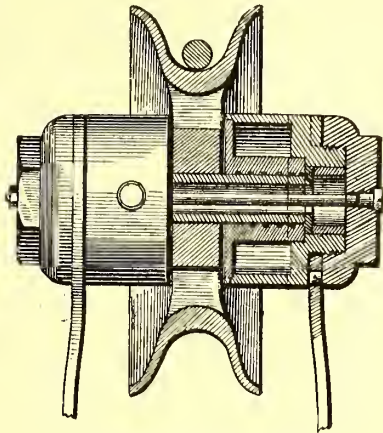
732,325. Rail Sander; James C. Thompson, Wilkinsburg, Pa. App. filed March 10, 1903. Relates to mechanism for applying sand both in front and behind the wheels of a car.

732,495. Trolley; George E. Allen, Pittsburg, and George Zimmer, Allegheny, Pa. App. filed April 15, 1903. Details of an arrangement for retaining the trolley wheel on the wire.

732,512. Electric Railway; Edward C. Boynton, Newburgh, N. Y. App. filed March 5, 1903. The current for the engine in a train or switching yard, is carried by overhead rails extending across all of the tracks, the locomotive carrying a shoe long enough to bridge from one rail to another, thereby receiving current at all times without the necessity of overhead switches.

732,559. Electric Signal; George F. Hilton, St. Augustine, Ill. App. filed July 21, 1902. A signal to indicate the approach of trains wherein an electric bell is placed in circuit with a bond, one terminal of which is insulated from the rail but mechanically connected therewith by the car wheel.

732,598. Clips; Louis Steinberger, Brooklyn, N. Y. App. filed Sept. 12, 1902. The connection between the clip and the car which



PATENT NO. 732,144

holds the trolley wire is more or less yielding to provide for strains brought upon the ear by the trolley wheel.

732,599. Turnbuckle Strain; Louis Steinberger, New York, N. Y. App. filed Feb. 24, 1903. Details.

732,600. Emergency Car Brake; William B. Storch and Valentin Storch, Knoxville, Pa. App. filed March 6, 1903. Heavy metallic shoes adapted to be thrown under the car axles and lift the car wheels from the track.

732,636. Track Sanding Apparatus; John C. Hooper, Baltimore, Md. App. filed Feb. 18, 1903. A track sanding apparatus provided with means by which the act of disconnecting the sand discharge tube from its casing automatically closes the sand box, so that the sand is prevented from leaking therefrom while the sand discharge tube is undergoing repairs.

### PERSONAL MENTION

MR. W. B. POTTER, chief engineer of the railway department of the General Electric Company, has just returned from an European trip of about three months.

MR. EBEN WHITE LOTHROP, of the engineering staff of Messrs. Stone & Webster, Boston, was married June 24, to Miss Bessie Holbrook Fox, of Duxbury, Mass.

MR. THEODORE WENTZ, of Findlay, Ohio, manager of the Toledo, Fostoria & Findlay Railway Company, has tendered his resignation, which has been accepted.

MR. T. C. RODERICK, formerly superintendent of the Owensboro City Railroad Company, has accepted the position of superintendent of the Indianapolis, Shelbyville & Southeastern Traction Company, of Indianapolis, Ind.

MR. DANIEL J. KANE has been appointed acting superintendent of transportation of the Milford & Uxbridge Street Railway, of Milford, Mass. Mr. Kane has been car despatcher for the company, and has been connected with Milford street railways for seven years.

MR. JAMES COFFIELD WARREN, JR., the representative in New York City of the Ohio Brass Company, of Mansfield, Ohio, was married at Norfolk, Va., on June 24, to Miss Martha Helen Grant, of Norfolk, Va., daughter of Mrs. Vernon Carvick Grant. The ceremony took place at five in the afternoon, at the home of the bride. Mr. and Mrs. Warren will make their home in New York.

MR. E. B. GUNN, superintendent of the Richmond Street & Interurban Railway Company, of Richmond, Ind., has been appointed as successor to Mr. R. K. Howard, superintendent of the Dayton, Springfield & Urbana Railway, of Dayton, Ohio, who recently resigned on account of his health and who will leave shortly for the West, where he will spend a year or so in traveling. Mr. Gunn has been connected with the interurban business in Indiana for several years. In appointing Mr. Gunn as successor to Mr. Howard there will be a few changes made in the officials. Mr. Howard was general superintendent of the Dayton, Springfield & Urbana branch of the Appleyard syndicate only, while Mr. Gunn

will assume the general superintendency of the Dayton, Springfield & Urbana and the Columbus, London & Springfield Railroads. Mr. Thomas, now superintendent of the Columbus, London & Springfield, has been given a similar position with the Central Market Street Railway in Columbus.

MR. H. M. LITTELL, of New York, has just accepted the position of general manager of the Rapid Transit Company, of Chattanooga, Tenn. Mr. Littell was president of the American Street Railway Association in 1896-1897, and has been prominently identified with the street railway industry, having been general manager of important companies in Cincinnati, New Orleans, Brooklyn and New York. He has recently been making his residence in New York City, and has been acting in an advisory capacity in street railway matters for well-known banking firms.

MR. ROYAL H. HOLBROOK, who has been acting as engineer during the reconstruction of the property of the People's Gas & Electric Company, of Burlington, Ia., has resigned from that company to become chief engineer of the Everett Pulp & Paper Company at Everett, Wash. Mr. Holbrook has been engaged at Burlington for about a year past, previous to which time he was superintendent of the Ottumwa Traction & Light Company. He is well known as an engineer in Iowa, and it is with regret that his street railway friends see him leave this field.

MR. A. L. SCOTT has given up his position as general manager of the Fort Wayne Traction Company, Fort Wayne, Ind., which he has held for five years, to become assistant to Mr. George F. McCulloch, president of the Union Traction Company, of Indiana. He will be associated with Mr. McCulloch in the general offices of the company in Indianapolis. When Mr. McCulloch came to Fort Wayne to purchase the Fort Wayne Traction Company, he evidently realized that Mr. Scott was a thorough and able street railway manager. He left Mr. Scott in charge of the Fort Wayne system only until he could promote him to a position where he would be of greater value. Mr. Scott's new position will put him in close touch with all of the Union Traction Company's interests.

ASSISTANT GENERAL SUPERINTENDENT HENRY E. REYNOLDS, of the Old Colony Street Railway Company, who has just been promoted to that office from that of superintendent of division No. 1 of that system, has been connected with the street railways making up the system since 1884, when he entered the employ of the Brockton Street Railway Company as a conductor, at the age of seventeen years. After running on that railway as conductor two months, he was taken into the office as a clerk, and on account of his recognized ability as a street railway man, was successively promoted to the positions of book-keeper, assistant treasurer and treasurer. His services in these various positions of trust covered a period of seventeen years. When the street railway lines were consolidated as the Old Colony Street Railway Company, he was assigned, March 1, 1901, to division No. 1, as superintendent, with headquarters at Quincy, which position he had held until his promotion as assistant general superintendent of the entire system, a position which his long experience and ability are believed well to qualify him to fill. Mr. Reynolds will have direct supervision of the Quincy, Brockton & West Roxbury divisions, with headquarters at Brockton.

MR. SAMUEL M. KENNARD, has resigned as president of the St. Louis & Suburban Railway, of St. Louis, Mo., and will probably be succeeded by Mr. Julius S. Walsh, president of the Mississippi Valley Trust Company, the Terminal Railroad Association, the Union Electric Lighting Company, and numerous other big corporations. It is understood that Mr. Julius S. Walsh, Jr., will be made vice-president, succeeding his father in that position. Mr. Kennard's resignation was tendered on June 24, and accepted in a communication from the board of directors, signed by the secretary, June 29. Mr. Kennard, in his letter of resignation, stated that he could not, in justice to himself and other organizations with which he is connected, retain the presidency of the Suburban beyond the expiration of his first year of service, which ended July 7. He added that he would be pleased to remain in the executive committee, and that after his return, about Sept. 1, from the East, would render every service possible. Mr. Kennard succeeded Mr. Charles H. Turner as president of the Suburban Company, and it was under his administration that the company was refinanced and the system practically rebuilt. The board adopted resolutions, a copy of which was sent to Mr. Kennard, setting forth that it accepted the resignation with sincere regret, and expressed gratification that Mr. Kennard was to remain on the executive committee. On behalf of the stockholders and directors, a vote of thanks was tendered him for his devotion to the interests of the company, and "for the efficient, intelligent and conscientious service he has rendered during his term of office as president." Mr. Kennard will spend the summer at Magnolia, Mass.

## NEWS OF THE WEEK

### CONSTRUCTION NOTES

**BIRMINGHAM, ALA.**—The Birmingham Railway, Light & Power Company has begun work on its line to Glen Iris.

**LITTLE ROCK, ARK.**—The City Council has granted to the Little Rock Railway & Electric Company a franchise to the streets of the North Side, across the free bridge, the work of construction to begin in thirty days.

**LITTLE ROCK, ARK.**—The City Council has passed an ordinance granting the Little Rock Electric Street Railway Company a franchise to extend its line across the free bridge over the Arkansas River and through the principal streets of Argenta, known as North Little Rock. The work is to be completed within eighteen months at an estimated cost of \$200,000.

**LOS ANGELES, CAL.**—J. W. Eddy has been granted a franchise for his proposed pavilion, observatory and incline railway, to be built in Griffith Park. Work must be begun within four months and completed in three years. A bond of \$2,000 was exacted.

**LOS ANGELES, CAL.**—Wesley Clark has secured the final passage of the franchise awarding to him the right to build an extension of the Ninth Street Electric Railway. A contract provision will give to the city 2 per cent of the earnings of the entire line after five years. A \$10,000 bond was required for the performance of the terms of the franchise.

**LOS ANGELES, CAL.**—For the sum of \$20,000 the City Council has sold to L. C. Brand, for the Los Angeles & Glendale Electric Railway Company, a franchise covering Lake Shore Boulevard, Figueroa, Sixth and other streets to the city limits on the way to Glendale, a distance of about 10 miles. Outside the city limits Mr. Brand holds a private right of way.

**LOS ANGELES, CAL.**—It is persistently rumored that the Los Angeles Traction Company proposes building an electric railway to Whittier, in competition with a Huntington line, now under construction to that place.

**LOS ANGELES, CAL.**—Surveys are being made by the Pacific Electric Railway Company from Long Beach along the seashore through Pacific City to Newport Beach. The distance is about 30 miles. It was originally announced that the line from Pacific City to the Long Beach-Los Angeles Road would branch off at Signal Hill above Long Beach, and make a cut through the lowlands for several miles before striking the beach. Now, however, the plans are to start directly from Long Beach and let the entire road run along the coast. This line is the one which is to be extended to Santa Ana and thence to Los Angeles.

**LOS ANGELES, CAL.**—Work has begun on a Huntington road that is to run between Pasadena and Monrovia, east on Colorado Street, through Lemanda Park. It is expected that the road will be in operation by Sept. 15.

**LOS ANGELES, CAL.**—The Los Angeles Railway Company has purchased a franchise on Twelfth, Stanford, Fourteenth, Griffith and other streets for \$2,500.

**LOS ANGELES, CAL.**—Beautiful station buildings will be erected by the Pacific Electric Railway Company and the Los Angeles Interurban Railway Company at all points of importance which the Huntington lines are preparing to reach. They will be of the mission style of architecture, and will cost from \$500 to \$5,000. South Pasadena, at the junction of the Monrovia and Pasadena lines, will be the first equipped. Long Beach, Monrovia and San Gabriel will follow in rapid succession.

**PETALUMA, CAL.**—Articles of incorporation have been filed by the Petaluma & Santa Rosa Railway Company, which proposes to connect Petaluma, Santa Rosa, Sebastopol and Forestville, all in Sonoma County, by a railway operated either by electricity or steam power. The capital stock of the company is fixed at \$1,000,000, of which \$40,000 has been already subscribed by the seven directors and incorporators: Frank A. Brush, Alfred D. Bowen, Thomas Archer, Francis Cutting, Charles Towne, L. T. Wagner, Alfred G. Sheath. The City Council of Petaluma has drafted an ordinance giving the Petaluma & Santa Rosa Electric Railway Company a franchise within the city of Petaluma. The franchise is made in the name of Bourke Corbett, of San Francisco.

**RIVERSIDE, CAL.**—Mr. Huntington's electric railway on Seventh Street, from the Santa Fe station to Main Street, is now in operation.

**RIVERSIDE, CAL.**—A franchise for a 10-mile trolley line from Riverside to West Riverside and to the east side of Riverside down to Victoria Avenue, has been sold to the Pacific Electric Railway Company for \$500. Work on the line will begin at once.

**SAN BERNARDINO, CAL.**—The directors of the San Bernardino Valley Traction Company have organized a company to control all the traction lines in the valley, comprising those now known as the Traction Company's lines, the electric railways of Redlands and the railway now in course of construction between San Bernardino and Highland. Organization of the new company was completed by the election of the following officers: President, H. H. Fisher, of Redlands; vice-president and general manager, A. C. Denman, Jr., of Redlands; treasurer, E. D. Roberts, of San Bernardino; secretary, W. W. Wilcox, of Cotton; auditor, C. W. A. Cartledge, of Redlands; traffic manager, K. L. Bernard, of San Bernardino. The company proposes to build a branch line to Rialto as soon as the Highland branch is completed, and to extensively improve Urbana Springs, an already popular pleasure resort.

**COLORADO SPRINGS, COL.**—The Manitou & Pike's Peak Railway Company has completed surveys and plans and secured the right of way for an extension of its line from the summit of Pike's Peak to Cripple Creek, a distance of 9 miles. The extension will cost approximately \$750,000.

**HARTFORD, CONN.**—Application has been made to the Railroad Commissioners by the Hartford Street Railway Company for an extension of its lines in this city. The Common Council has already given its consent for the extension and the hearing. The first petition asks that the Charter Oak Avenue line be extended from its terminus at Wehasset Street southerly through Huyshope Avenue over to the south line of Masseek Street. The second extension is a siding from Capitol Avenue, near Laurel Street, into the property of the Hartford Dairy Company.

**HARTFORD, CONN.**—The Manila Electric Railroad & Power Company has been organized under the laws of Connecticut, with an authorized capital stock of \$6,000,000, par value of shares \$100 each. A holding company of similar name was incorporated in New Jersey last spring, but the present company, formed under the more liberal laws of Connecticut, owns the franchise and rights in Manila. The officers and directors of the company will be announced later.

**NAUGATUCK, CONN.**—Governor Chamberlain has signed a resolution incorporating the Naugatuck Valley Electric Railway Company. The company has a franchise to build an electric railway from the terminus of the Connecticut Railway & Lighting Company's line in this borough south, through the towns of Beacon Falls and Seymour, where it will connect with the road which the Railway & Lighting Company is building between Ansonia and Seymour. The construction of this line will put Waterbury in connection by electric railway with Ansonia, Derby, New Haven and Bridgeport, and will make a continuous line through the southern half of the Naugatuck Valley. The company has an authorized maximum capitalization of \$1,000,000. The incorporators are: George A. Lewis and A. L. Dayton, of Naugatuck; A. D. Warner, of Beacon Falls, and Edmund Day and W. H. H. Wooster, of Derby. Wide powers of merger, sale, purchase and consolidation are conferred by the charter.

**REHOBOTH, DEL.**—The Commissioners of Sussex County have just granted a franchise to W. C. Lofland, proprietor of the Douglass House on the Atlantic Beach, south of the town, to build an electric railway and erect the lighting plant. The only restrictions are that the work shall be completed not later than Aug. 1, 1904, and that the fare shall not be more than 5 cents a passenger. Mr. Lofland has purchased two lots in town for the electric lighting and power house site. Ex-United States Senator Richard R. Kenney, of Delaware, will be interested with Mr. Lofland in the undertaking, and together they will incorporate a \$100,000 company. The electric railway will start at Rehoboth Bay, south of the Douglass House, with a loop in front of the hotel from King Charles Street, and run thence through Rehoboth town, immediately west of the Pennsylvania Railroad depot, to the rear of the Henlopen Hotel, thence along the ocean to Cape Henlopen and on to Lewes, which will be the northern terminus. The total distance will be 9 miles.

**ATLANTA, GA.**—The Atlanta Interurban Railway Company has been incorporated, with a capital stock of \$100,000, to build the proposed electric railway between Atlanta and Marietta. Interested in the company are Georgia Railway & Electric Company interests. The incorporators of the company are: P. S. Arkwright, G. W. Brine, T. K. Glenn, W. H. Glenn, H. N. Hurt, S. E. Simmons, S. J. Bradley, R. E. Cullinane, W. B. Stoval and F. M. Fisk.

**CHICAGO, ILL.**—The South Side Suburban Railroad Company has been incorporated, with a capital of \$50,000, to be constructed from a point in Chicago to boundaries of Cook County. Incorporators and first board of directors: C. J. Ton, C. C. Heisen, F. C. Bendle, C. R. Taylor, Gustav Nelson, all of Chicago.

**SPARTA, ILL.**—John W. Tweed and his associates, who had in contemplation the construction of an electric railway at Sparta, have abandoned the project for the present at least. The city of Sparta is unwilling to grant concessions that the company could accept.

**SPRINGFIELD, ILL.**—The articles of incorporation of the Springfield & Southwestern Railroad Company have been filed. The capital stock of the company is \$25,000. The incorporators and first board of directors are: J. W. Maunts, G. D. Chaffee, Max Kleeman, T. F. Dove, of Shelbyville, and C. Weekley, Obed; E. D. Kerr, Brunswick, and R. P. Smith, of Moweaqua, all citizens of Shelby County.

**SPRINGFIELD, ILL.**—Articles of incorporation have been taken out at Springfield by the Macomb, Mount Sterling & Beardstown Railway Company for the completion of its electric railway to pass southerly through McDonough and Schuyler Counties to Mount Sterling in Brown County, with a branch from Macomb to Beardstown. The headquarters of the road will be at Macomb. The incorporators and first board of directors are: C. V. Chandler, W. A. Compton, D. P. Pennywitt, E. I. Humpton and G. V. Chandler, all of Macomb.

**ANGOLA, IND.**—The Goshen & Indiana Traction Company, incorporated to build a line from Goshen to Angola, Ind., has changed its name to the Northern Indiana Railway Company, and filed a mortgage to the Colonial Trust Company, of Pittsburg, as trustee, to secure \$3,500,000 of fifty-year bonds.

**EVANSVILLE, IND.**—It is said to be the intention of the Evansville & Henderson Traction Company to extend its line to Mount Vernon, Ind. The promoters of the line say as soon as all the surveys are completed they will at once begin construction. They say they will have cars running into Evansville just as soon as possible.

**INDIANAPOLIS, IND.**—The Indianapolis & Martinsville and the Indianapolis & Plainfield companies announce that they have completed arrangements by which they will become coal-carrying lines. The Vermillion County coal field will be tapped, branches will be shot off to northern Clay County and to the North Vago and the South Park County fields.