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Of this issue of the Street Railway Journal, 8000 copies are printed. Total circulation for 1906 to date, 171,300 copies, an average of 8157 copies per week.

Fireproofing High-Tension Cables in Manholes

The importance of fireproofing high-tension cables in manholes has for some time been recognized in central station circles, and in view of the large number of high-potential underground installations connecting street railway power plants and sub-stations, it may not be amiss to take a leaf

from the electric lighting engineer's book and consider the matter for a moment. At first thought, it seems an almost needless precaution to spend money for protecting lead-covered cables in manholes from possible fires, but while the hazard from external sources is generally negligible, it cannot be denied that the accumulation of inflammable gases, electrolysis of cable sheaths and partial or complete short-circuits open the door to a great deal of trouble at times, even in the best regulated manholes. Leakage of illuminating gas through the earth, seepage of explosive or corrosive liquids through the ground, or even trouble at some distant point on the electrical system are by no means impossible occurrences.

In case a fire occurs in a manhole, whether in a group of high-tension or low-tension cables, the lead covering of most of the cables in the immediate vicinity of the trouble is very likely to be melted. Split clay tile covering has been successfully used for the cable under such circumstances, light angle-irons being installed to support the combined weights of cable and tile. The tile sections are cemented together, and while the cement is setting, a piece of light sheet iron, preferably galvanized, can be used to support the tiles between the angle-irons and the conduit openings. Where bends are necessary, 45-deg. tile elbows can be used without much trouble, and in cases where the curves of the cable cannot be accommodated to elbows, good protection can be assured by wrapping the cable with asbestos paper wound closely with brass tape, or some equivalent heat insulation. The cost of using clay tile upon a run of cables may easily amount to from \$5 to \$8 per cable per manhole, but the result is a construction which is about as near fireproof as is possible. Cables carrying thousands of kilowatts beneath the streets in the congested district of a city are usually important enough to justify stringent protective measures, and the cost of fireproofing the runs in the more important manholes is usually well worth while in the resulting insurance against damage and interrupted service.

The Location of the Fuse Box

A few years ago it was the custom almost invariably to locate the fuse box underneath the car, but at the present time its installation is not by any means limited to this one position. Underneath the car is a good location, so far as convenience in wiring and accessibility is concerned, but it has the great disadvantage that in wet weather serious damage is likely to result from the box and exposed parts getting wet and leaking current. In many cases, when the car steps and other parts of the platform are found to be charged, and the fuse box is located underneath the platform, the trouble will be found to be caused by a water soaked and, consequently, a leaky fuse box. The great advantage of placing the box

under the car is that all the "fire works," if any, take place at a point where the passengers are not much disturbed by them.

It is the practice of some companies to place fuse boxes on the forward platform. This is, to be sure, a convenient location and one where the box is not likely to be affected by moisture, but in the event of a dead short-circuit, which may result when lightning gets into the car, there is likely to be some commotion among the passengers. Especially is this the case if passengers are allowed to crowd on the front platform, as is customary on some roads. Several incidents are on record where people, especially women, have jumped from the car and have been painfully injured because of fright occasioned by the burning and arcing of electrical apparatus on the front platform. Outside of this objection the platform appears to be the most desirable location for the fuse box. Enclosed fuses of the cartridge type, to be sure, practically eliminate fire works of all kind, but perhaps on account of the cost of renewals they have not been adopted generally by street railway people.

Sometimes the box is placed under a seat in the interior of the car. In view of the flashing that may occur unless an enclosed fuse of the cartridge type is employed, this would appear to be a rather dangerous location. When boxes are so located they are, of course, surrounded by asbestos, but nevertheless, it is, we believe, a rather dangerous practice to put a fuse box in such a confined place. Aside from a consideration of the possibility of fire, another objection is open to this location. To replace a fuse, the motorman is compelled to disturb several of the passengers.

The abandonment of the underside of the car for the installation of the fuse box, we believe, was partly due to the imperfect design of the older type of boxes. Within the last few years boxes with the interior better protected from dampness have been placed on the market, and when these are used, if enclosed fuses are not employed, the best place for the box, everything considered, is probably under the car.

Run-Down Systems in Small Towns

It is a noticeable fact that the street railway systems of the smaller towns are not nearly as well kept up as those of the larger cities. There is, however, no good reason why the smaller systems should not be kept in good order. Frequently the reason that they are allowed to run down is that when they once get in a somewhat dilapidated condition, the receipts are just about sufficient to operate them, and the stockholders do not feel warranted in taking money out of their pockets or borrowing the amount required to rehabilitate the system. If the road in its run-down condition is paying dividends the stockholders are probably satisfied to let well enough alone and continue to draw their money at regular intervals. In either case, the stockholders do not seem to realize that to rehabilitate the system means both increased revenue and reduced maintenance expenses. When cars are dirty, ill-smelling and unpainted, and in such a run-down condition that they appear to be ready to fall to pieces at any moment, it is certain that people will not ride in them for pleasure alone. And when these cars are operated over a rough and worn out track, so that passengers are kept bouncing about in them, it is punishment to be compelled to use them, and no one is going to do so except under unavoidable circumstances. Add to these conditions unreliability of ser-

vice, resulting from break-downs of apparatus, and it is very evident that a road in such a condition will not collect all the fares that the town is ready to give.

The maintenance expenses on such a road are, of course, relatively high. To begin with, the power house machinery is usually inefficient, and a needless amount of money is put into the purchase of fuel. In addition, repairs are constantly being made to the track and overhead. The maintenance of car bodies and especially of trucks is increased by rough track, and the electrical equipment of the cars also requires constant attention and repairs. From a standpoint of earning capacity, it is, we believe, safe to make the statement that it is a bad proposition to allow a system to get in a run-down condition in the first place, or to let it remain in such a condition. Further, if a road will pay its operating expenses when everything is in a dilapidated condition, it may usually be considered certain that when improved it will more than pay expenses and the added interest on a reasonable investment necessary to put it in proper shape.

The stockholders of a run-down road that continues to pay dividends in spite of its condition should certainly have the best interests of the city deeper at heart than to let dilapidated cars continue to operate over its streets. A stranger into the city usually has his attention drawn to the cars and to the condition of the street railway system first of all. And he is likely to judge the town by these first impressions unless his stay is long enough to get acquainted with the true facts of the case. In general, therefore, there are very few instances of street railway systems in a run-down condition in which, from either a financial or a moral standpoint, the stockholders are warranted in letting such conditions continue to exist.

Routeing Cars Through a Common Point

In laying out the routes of cars the question often comes up how far is it desirable to pass the rolling stock through a common point on the system. The geography and population of the community served naturally influence the problem considerably, but in general two distinct reasons for and against common point routeing are plainly apparent. If all, or nearly all, the cars on a system pass over a certain common piece of track once or twice in every round trip, there is no doubt that in case of a breakdown the cost of the delay is likely to mount upward in a most alarming fashion. Unless the blockade is cleared within a very few minutes, complete paralysis of schedules and traffic follows in the direction of the track affected. The loss of revenue to the company and the shut-down of service available to the public cause great embarrassment in proportion to the size of the city and the time required to get things moving again.

On the other hand, the public usually prefers the common point routeing, so long as things go smoothly. Strangers in town find a great satisfaction in being directed to a certain square or street through which all local and possibly all inter-urban cars pass en route. The transfer problem, from the passenger's standpoint, is reduced to the simplest possible terms. The resident finds the common point transfer almost as convenient as the stranger, and the exchange of passengers between different lines is much simpler for the company than it is under conditions involving a multiplication of transfer points at track intersections. Doubtless the common point routeing plan increases the traffic congestion considerably in

comparison with that obtaining with separated routes, but until one reaches a population of two hundred thousand or three hundred thousand, the congestion is likely to be more in name than in fact. The frequency of cars over a single piece of track is seldom sufficient to produce much congestion until the conditions of a large city are encountered.

On the whole, the great conveniences to the public offered by common point routeing, probably offsets the disadvantages except in fairly large cities. Whether the cars are looped around a square or operated over a single track in the center of the city, it is certainly the part of wisdom to provide an alternative route of some sort through which the cars can be operated when breakdowns occur in the common track section. If nothing better can be arranged, a few cross-overs can be employed to great advantage in the main line. When a town is traversed by a high-speed interurban line it is sometimes possible to divert the interurban cars to a side street route, to the great advantage of everybody. Local cars are then less liable to slow down the time of passing through the town by getting constantly in front of the limiteds, and it is a simple matter to step across a block or two to the interurban from the local common point. It is doubtful if transfers ought to be generally given all over a town to passengers arriving by through cars, and the public convenience can scarcely be said to suffer much by the removal of the interurban to a parallel street. An incidental advantage of common point routeing is the facility with which the traffic and car movement can be watched by an inspector located in the central district. The very pulse of the system can be counted when all the cars pass a given point. The small or medium-sized city offers the best field for common point routeing.

Look After the Feeders

A roundup of the wasted energy on a railway system is not altogether easy unless made continuous, but it pays. Even on roads with generally well designed conducting systems it is not unusual to find weak spots that make a bad showing in economy. Of course, the first consideration is successful operation, and, after all, the power bill is only one item, and yet this is the very item most frequently neglected. The power house is in these days pretty carefully watched, and roads often look very sharply after cost in that quarter, but outside the power house the energy is too often left to take care of itself. If the power house cost per kw-hour suddenly rose 10 per cent there would be an investigation started at once. If, however, with the addition of more cars and the general increase of traffic the output is noticeably increased it very often happens that no inquiry as to the disposition of the extra energy is started. The losses incurred are of two distinct kinds. There may be considerable waste in the operation of the cars themselves, and there may also be increase of feeder and track losses. As to the first class the report we recently published of the operation of recording wattmeters on the Clinton, Ia., line gives a good deal of valuable information. Making all due allowances for the chances of getting experience on the part of the motormen it is clear that the silent teaching of the wattmeters was good for something like a 20 per cent saving in energy, amounting in this case to 2 kw-hours to 2.5 kw-hours per car per hour.

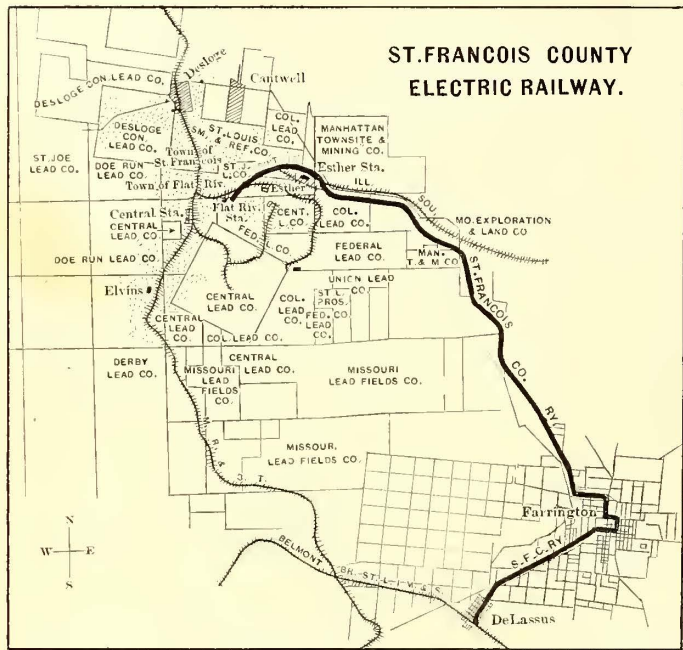
In other words, reckoning power at 1 cent per kw-hour

the meters saved more than 2 cents per car per hour of run, which far more than offsets the charges against the meters and leaves a big profit besides. Nothing is here added for the incidental saving in lessening wear and tear on the equipment. Now, as to other losses, the wattmeters give a rough estimate of the total amount but tell nothing of the distribution of losses. It is no uncommon thing to find a needless drop of 100 volts to 150 volts on a long feeder, even in these comparatively educated days. Here is another loss of one or more cents per car hour that is not only bad on its own account, but bad for the car. Year in and year out it would pay the interest and maintenance on a good deal of extra copper. The trouble often comes from building up heavy service on a line without taking due account of the feeding system. Nearly every time a system is thoroughly overhauled a lot of weak spots of this sort are discovered, but they should be found and remedied without waiting for a general house-cleaning. The bonds are often defective and responsible for considerable loss, but that is another and a long story. For practical purposes the point is to get after the places that show low efficiency of transmission, and to keep after them until they are remedied. For this, frequent inspection is necessary. Many roads, particularly the larger city roads, get it, but the very roads that need it most, the smaller ones where the cost of power is relatively high, are the ones most frequently neglected.

It is, in fact, the smaller roads that need most critical and careful engineering. They have relatively higher expenses and less margin of traffic to cover losses. From power house to car they require to be watched, not only for obvious losses due to bad bonds and insufficient feeders, but for casual losses of traffic due to lack of judgment in operation. It is to the feeding system, however, that we wish particularly here to direct attention. An increase of 10 per cent in the cost of power is not infrequent enough to make the difference between profitable and unprofitable operation. Distances are apt to be rather long, and toward the distant end of the line is the place to look for trouble. We have known of losses of 20 per cent, and even more in such situations, going on steadily, and sometimes pushing the power house voltage to a point not to be recommended for the equipment. When the summer traffic comes on and extra cars begin to run, the trouble increases. Too often the weak spot in the feeding system is the very one to which extra cars are run, and in this case the mere loss of energy is often far less than the inconvenience it causes. Voltage inspection is quite the usual thing on a good many lines, but there are too many sins of omission left still in this particular. Another point too often forgotten is the relation of schedule to the distribution of current. Even so obvious a precaution as keeping cars from taking the grades all together is disregarded with shocking frequency. Neglect to tie lines together into a network, when it might be done with comparative ease, is still another thing that causes needless and sometimes serious loss of conducting capacity. It is not every road, even, that has a clear map showing the complete distribution of feeders and kept strictly up to date. The whole story is that leaks not obvious at a glance are apt to get neglected in every business. In electric railroading, however, it should be the special business of somebody to look out for the very things we are here discussing, and to see that the faults are remedied at the earliest possible moment.

THE ST. FRANCOIS COUNTY ELECTRIC RAILWAY

The peculiar location of the St. Francois County Electric Railway, of Farmington, Mo., together with a consideration of its earning capacity, makes it well worthy of attention.



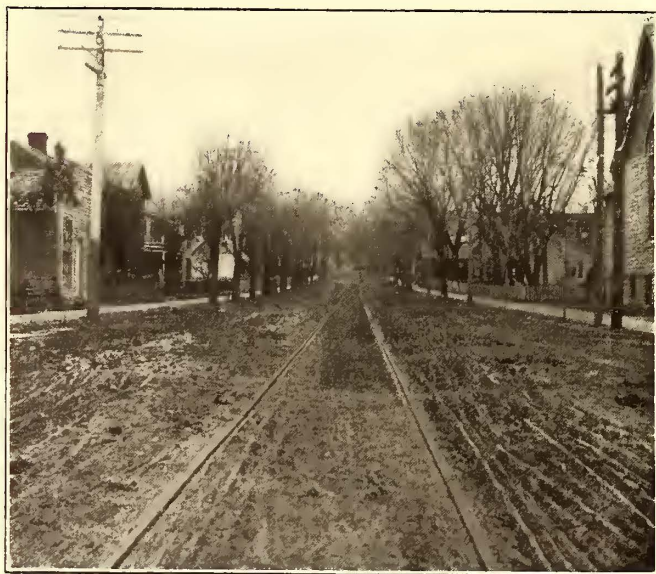
TERRITORY TRAVERSED BY THE ST. FRANCOIS COUNTY ELECTRIC RAILWAY

Farmington is the county seat of St. Francois County, and is located about ninety miles south of St. Louis. The town is surrounded on three sides by steam railways, yet it is three miles distant from the nearest point on any of them. The accompanying map shows the relative position of the railways, as well as the location of the electric line. It may be

interchange with the Illinois Southern Railroad, and Flat River, 1¼ miles distant at the junction of the Southern Railway with the Mississippi River and Bonne Terre Railway. Flat River is in the lead district of eastern Missouri, and surrounding it is a population of about 20,000 people. The district is said to be the largest lead producing territory in the world. The National Lead Company, the Federal Lead Company, the Desloge Consolidated Lead Company, the St. Louis Smelting & Refining Company and other large corporations all have rich mines in the region, and the investments of several of the corporations run far up into millions of dollars. There are no lead mines in the immediate vicinity of Farmington, but the town is the basis of supplies for all of the region in which the mines are located, and its importance to the district is augmented by the fact that it is the county seat.

PASSENGER TRAFFIC

Practically all of the passenger traffic of the steam roads to and from Farmington is carried by the electric line. The greatest passenger revenue, however, is derived from local people traveling from the terminal towns to Farmington. Farmington is a comparatively old town, and not being in the vicinity of the mines, it has a more quiet and refined atmosphere about it, and has greater social, professional, and commercial advantages than the purely mining towns. For this reason many mine operators and others whose business is in the mining region make Farmington their home, and travel to and from their work over the line. There are also numerous schools in Farmington, which are attended by those living in the mining towns. The courts hold four terms each year, and these sessions are the means of drawing many people from Flat River and the surrounding mining region to the town. Litigation, which is considerable, and the general settlement of estates, county court settlements, and other court proceedings usually necessitate the attendance of many people from the lead district. Quite a little travel is caused by the presence of the State Hospital for the Insane, which is



VIEW IN FARMINGTON



A TANGENT BETWEEN FARMINGTON AND FLAT RIVER, SHOWING HEAVY BALLAST

seen that the electric line connects the town with all three of the steam roads, and it may be added that the revenue derived from freight traffic is largely in connection with the steam roads. The southern terminus of the road is De Lassus, a town of about 1500 people, on the St. Louis Iron Mountain & Southern Railroad, and the road might be said to have two northern termini, Esther, a small station, a point of

located on the road between De Lassus and Farmington, and contains 400 inmates. The attendants make frequent trips to and from Farmington, and many visitors from the steam roads are carried to and from De Lassus.

The development of the mining industry is resulting in a rapid increase in population of the regions from which passenger traffic is obtained. Elvins, a town which in 1900 had

600 people, now has 3000. At Owl Creek, $4\frac{1}{2}$ miles distant from the line, where two years ago there was a population of 100, there are now 5000 people. During the first year of operation of the road (1905) there was very little travel purely for pleasure. However, ground has been leased between the power house and Esther upon which a pleasure ground and park will be established, and, as a large percentage of the people are miners and of a money-spending class, it is believed that the park will be the source of considerable revenue.

FREIGHT TRAFFIC

As the electric line is the only connection with the steam roads, practically all the freight into and out of Farmington is carried over it. The receipts from freight at the present time amount to about 30 per cent of the gross receipts. The freight is of a miscellaneous character, consisting of coal, agricultural implements, dry goods, grain, building material and in general such commodities as are consumed in a small town and farming district, and such as are required by the lead mines. The road handles car-load lots on its own account, and these are billed through to and from St. Louis and other points. It acts only as a carrier for open local shipments, however. This class of freight is received and billed out by a freight agent maintained at Farmington jointly by the Frisco System and the Illinois Southern Railroad. Most of it is received at the freight station in Farmington. Several of the larger shippers, however, have private switches



REVERSE CURVE BETWEEN FARMINGTON AND THE POWER HOUSE

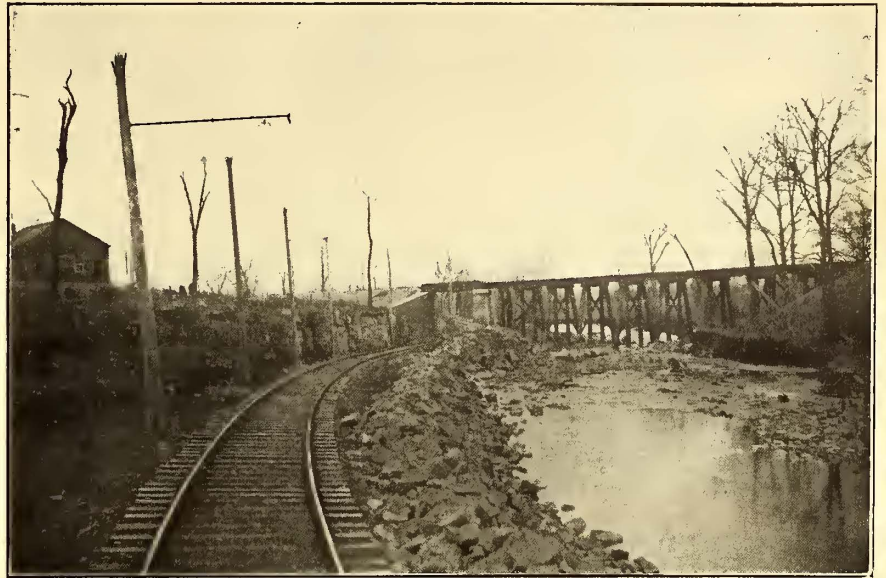
and contemplated additional construction through the town provides for several other private sidings.

THE LINE AND ROADBED

The line has a total length of $11\frac{1}{2}$ miles, of which 9 miles is between Farmington and Flat River. It traverses a rather hilly country, which in order to avoid heavy grades made necessary numerous curves. These, however, are not sharp and, in fact, with the exception of a few in Farmington, are such as to permit trains to be operated around them at full speed. The maximum grade on the line is in Farmington

and is 3.12 degrees. Between Esther and Flat River, 13-10 miles, cars are operated over the tracks of the Illinois Southern Railroad, a yearly rental being paid for the use of the tracks.

The track of the electric line is constructed of 60-lb. rails. No trestles of any considerable size were required in the



CROSSING UNDER THE ILLINOIS SOUTHERN RAILWAY

building of the road. The frequent small streams are crossed by means of 15-ft. bridge spans, which are of standard steam road construction, and are supported by rock buttresses, as shown in one of the illustrations. The outside rail of the track is elevated on all curves, as in steam road practice. At the top of a grade, on an 8-deg. curve, this rail has a $4\frac{1}{2}$ -in.



A 15-FT. SPAN WITH STONE BUTTRESSES

elevation, and where such a curve occurs at the bottom of a grade, the elevation is $5\frac{1}{2}$ ins. In general, it may be said that the track is in excellent condition, and this is due largely to the fact that General Manager A. J. Zwart, previous to his identification with the electric line, was engaged in steam road track work, and has made a special study of track construction.

Practically the whole line is ballasted with "chatts," or tailings from lead mines. This is akin to flint in its nature, and has been crushed in the mills to about the size of pea coal. It makes an excellent ballast, and several miles of the

road ballasted with it have for almost a year had no repair work done upon them whatever. Some of the road was ballasted under rather trying difficulties. The track was laid in the fall of 1904, on a fresh dump. The first rain to fall upon it froze, and made a solid roadbed throughout the winter. When the spring came, however, the roadbed became very

switchboard. Two 600,000 circ. mil feeders leave the station, one going in either direction, and continuing within about one and one-half miles from the end of the line at one terminus and three-quarters of a mile at the other terminus. The feeders follow the car line, with the exception of a short distance in Farmington, where they cut across a few blocks, and thereby avoid a long detour. The repair shop, containing two tracks, is built of corrugated iron, and is located close to the power house.



POWER HOUSE, WITH REPAIR SHOPS ON THE LEFT

soft, and in order to keep the cars on the track it was necessary to ballast the track with the roadbed in this condition.

On all the private right-of-way bracket construction is employed to support the oo-round trolley wire. The poles are 30 ft. in length, with 6-in. tops, and are placed 110 ft. apart. A single cross-arm, immediately above the bracket, carries telephone wires and a feeder cable. Through Farmington telephone poles on one side of the street are used jointly to carry the span wires. Over the tracks of the Illinois Southern, between Flat River and Esther, the trolley wire is 22 ft. above the rail. In ordinary construction, however, it is but 16 ft. high. There are no crossings with steam roads. The line does, however, pass under the Illinois Southern Railroad at Esther, as is shown in one of the illustrations.

The power house and repair shops are located about two miles from Farmington, on the Flat River portion of the line, this location having been chosen because it is about an equal distance from the terminals. The power house is a brick structure containing two rooms. In the boiler room is installed three fire-tube boilers, in connection with which a Hoppes feed-water heater is used.

Water supply is obtained from an artesian well sunk through the boiler room floor to a depth of 400 ft. This is provided with a deep well pump, which forces the water into a 40,000 gallon tank built on a wooden structure near the power house. Under tests, the well has withstood all efforts to exhaust it. To provide for emergency, quite a large supply of coal is kept on hand in bins built outside, near the boiler room.

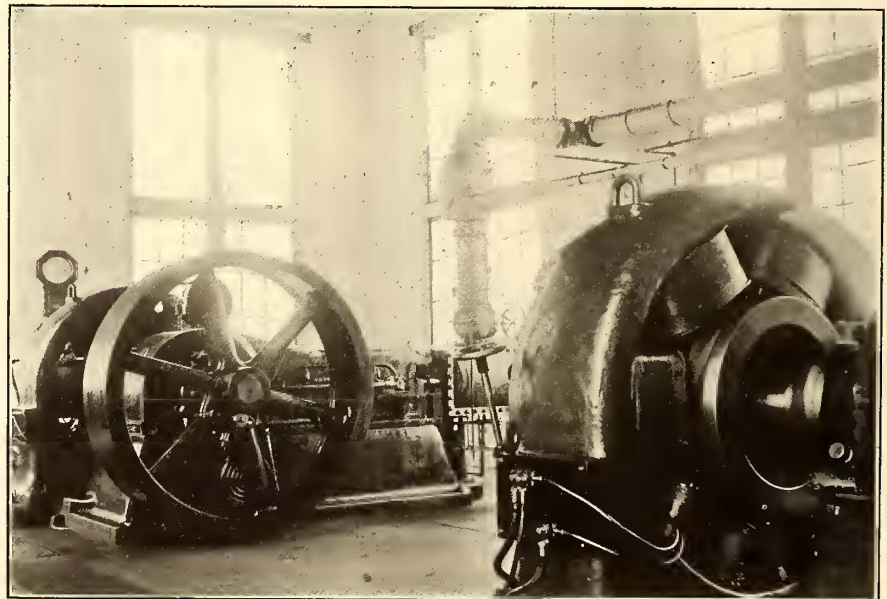
Power is supplied by two 150-kw 550-volt Western Electric generators, direct connected to simple non-condensing Chuse engines. A switchboard, consisting of two-machine and two-feeder panels, is located near the wall between the machines. The lightning arresters are placed on the wall behind the

THE ROLLING STOCK

The system is operated with two passenger and one freight or express car. One of the passenger cars is 49 ft. 8 ins. in length over the bumpers, and is of the St. Louis Car Company steel bottom semi-convertible type. The remaining one is 48 ft. 2 ins. in length. Both are provided with Peter Smith hot water heaters and cross seats covered with rattan. They are equipped with GE No. 70 motors, K-28-A controllers and Christensen straight-air brakes. The express car is provided with four GE 57 motors and two K-14 controllers. As it is employed to haul railway freight cars, it is provided with automatic brakes and M. C.

B. automatic couplers. With a gear ratio of 16 to 71, the car pulls trains of three loaded coal cars, each of 66,000 lbs. capacity, over a 2½ per cent grade without difficulty. It is, however, the intention to reduce the gear ratio.

Practically no trouble has been experienced with the electrical equipment since the road was put in operation. On its first trip an armature of the freight car was burned out through carelessness, but other than this there have been no



GENERATING UNITS IN THE POWER HOUSE

armature troubles of any description. Under the present system one passenger car shows 34,800 miles, and another passenger car has a record of 42,000 miles without any renewal of armature bearings. The freight motor, with a mileage of 27,000, however, has had two pairs of bearings renewed. All motor bearings are provided with oil lubrication, oil being used in the grease boxes of the motors on the freight car. Bearings are inspected and oiled on the car every second day, while the passenger cars are gone over once

each week. The absence of trouble with the electrical equipment is due in a great measure to the method employed to prevent over-feeding by the motormen. The scheduled time is rigidly adhered to, and this enables the engineer at the power house, by noting ammeter readings, to accurately designate a careless motorman. When a line breaker goes out record is sent to the general manager, together with the time and cause. This policy tends to check careless feeding by the motormen.

The schedule of passenger cars is so arranged that all steam road trains are met. This necessitates their leaving terminals as well as Farmington at irregular intervals, and makes impossible the usual hourly schedule on interurban lines. Between Farmington and Flat River there are ten trains daily, the first leaving Farmington at 6:15 a. m., the last one arriving at 10:10 p. m. Seven trains are run daily between De Lassus and Farmington. Other trains are operated between the State Hospital and the power house. When trains operate on the tracks of the steam road between Esther and Flat River they are subject to the rules of the standard code for steam roads. Standard time is given the railway company every morning, and all train crews are required to have watches fulfilling steam road requirements. The watches are inspected weekly and are examined quarterly. With few exceptions cars are operated at all times under rules of the standard code. No car, except under special order, has the right-of-way over another. The office must be called and an order obtained to proceed beyond a meeting point when opposite cars are more than three minutes late. When a car leaves a terminal 5 minutes late, it must call the office and receive orders. The freight train operates as an extra, and is always under orders.

The regular schedule requires a passenger car mileage of 260 car miles per day, although there is a growing demand for extras for special parties.

OPERATING FEATURES

The regular fare between terminals is 30 cents. Between Flat River and Farmington the one-way fare is 25 cents, or 40 cents for the round trip, the return trip to be made on date of sale. A 25-ride ticket, limited to six months, is sold for \$4.50, and one for 50 rides for \$8.50. A charge of \$8 is made for a 54-ride ticket with a 30-day limit, while a 46-ride school ticket with the same limit is sold for \$5.25. As the distance between Farmington and Flat River is 9 miles, these fares are somewhat in excess of those usually charged on electric roads.

It is interesting to note the number of men necessary to operate a road of this size. The force is usually composed of one assistant manager, one express clerk and extra conductor, four power house men, two passenger conductors, two passenger motormen, one freight crew, composed of two men, two track and one extra car house man, who also serves as an extra motorman. This gives a total of fifteen men, exclusive of the general manager.

At the present time the road is being operated for 55 per cent of the gross receipts. This in itself is an excellent showing, and it is a somewhat remarkable one when it is considered that the road has been in operation but little more than a year. Every indication points to a continued increase in passenger travel, as well as freight traffic, and it is reasonable to presume that the ratio of operating expenses to gross receipts will be decreased when the fact is taken into consideration that a very decided car mileage may be operated without any very general increase in power house and car house expenses. The impression gained from a study of the road is that the field of the electric railway is not limited to lines

operating in large cities or out from them, but if properly managed good return for capital invested may be obtained by what might be termed isolated installations.

STREET RAILWAY SITUATION IN SAN FRANCISCO

(By Our Own Correspondent.)

At a meeting of the Board of Supervision of San Francisco, on May 14, permission was granted the United Railroads to erect poles and wires on Market Street, Sutter Street and all other streets where the grades do not make the operation of electric cars impossible. The granting of this permission means much for San Francisco. It means the rehabilitation of the city's transportation system with the least possible delay. It means that cars will be running within thirty days over cable lines which could not be reconstructed and put into operation as cable lines within a year. Anticipating this action by the Board of Supervisors, President Calhoun has perfected every arrangement to convert the various cable roads into trolley lines immediately.

The conversion of the cable roads into electric lines will involve much labor and expense. On Sutter Street, for instance, the gauge will have to be reduced from 4 ft. 11½ ins. to 4 ft. 8½ ins. At the same time the tracks will have to be shifted so as to afford more clearance for passing cars. This work will be carried out on the line described in the *STREET RAILWAY JOURNAL* for May 5, 1906. On the Clay, Washington and Jackson Street lines the gage will have to be widened. Haight and McAllister streets can be converted into trolley lines merely by the erection of poles and wires, and the overhead electrical equipment will be installed as soon as it arrives from the East.

The ordinance passed by the Supervisors settles the question of the future character of street railroads in San Francisco probably for a long time to come. It means the passing of the cable road and the abandonment of the scheme for underground conduits in Market and Sutter streets. By the adoption of the ordinance the temporary permits under which the United Railroads had been operating electric cars on Market Street were made permanent. The only cable lines that will remain in San Francisco when the United Railroads concludes its task, will be those on the hilly streets where the grades are too steep for the operation of electric cars, and those not embraced in the United Railroads' system.

The transportation conditions continue to improve daily. On Sunday, May 13, the United Railroads found it necessary to put into service practically every electric car, large and small, in its possession in order to handle the Sunday throng of sightseers. It was the company's banner day since the fire.

The Mission Street lines are now in complete operation to the Ferry, and this has greatly relieved the congestion on Market Street. The United Railroads will play an important part, together with the Ocean Shore and the steam roads, in the work of cleaning the burned district. It has laid considerable track on the south side of Market Street and more will be put in use for handling cars filled with brick and other debris. The United Railroads has generously agreed to clean Market Street, from curb to curb, without cost to the city.

A commissary department has been established by the company for the purpose of furnishing groceries and provisions to the company's employees at actual cost. Thomas Finigan, assistant purchasing agent of the company, has been placed in charge of the commissary department, and has laid in a large supply of staple groceries, including butter, eggs, tea, coffee, sugar, potatoes, flour, canned meats, canned vegetables, canned fruit, also fresh milk and bread, while fresh

meats may be added. The commissary department's main depot has been established at the Turk and Fillmore streets car house, from which supplies will be distributed to the other car houses as they are needed to meet the demands of the men.

For years past the United Railroads has been making a large donation for band concerts in Golden Gate Park. The question of whether the company should continue its contributions to the concert fund was submitted to President Patrick Calhoun and he unhesitatingly ordered that the regular contributions be continued. The first Park concert since the fire was accordingly given at Golden Gate Park on Sunday, May 13.

TESTS OF AN INTERPOLE RAILWAY MOTOR

BY G. HERBERT CONDUCT

In the STREET RAILWAY JOURNAL for April 21, the writer presented a series of speed-time and distance diagrams showing the possibilities in railway work of the interpole design of electric railway motor, and stated that the Electro Dynamic Company, of Bayonne, N. J., has in process of design a complete line of motors of this kind. Since the publication of this article a number of tests have been made

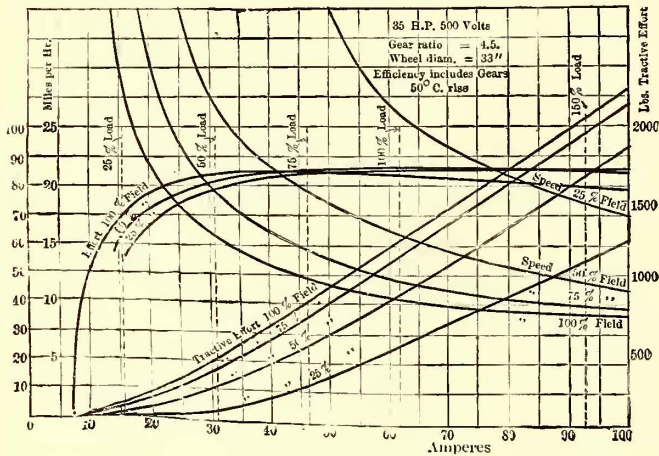


FIG. 1.—CHARACTERISTIC CURVES OF INTERPOLE RAILWAY MOTOR

of an interpole motor for railway work with very satisfactory results. The motor was overloaded more than 300 per cent and there were no signs of sparking or flashing at the brushes. The value of this characteristic in railway service is of the utmost importance, as the work is intermittent and often motors of great capacity are employed merely to surmount some excessive grade, or for quick acceleration. With the interpole motor the limiting factor is not commutation, as with the ordinary motor, but is the heating. As the extra heating of the motors can be readily taken care of by forced draught, it follows that a motor of much smaller size may be used for a given service, or a far greater power can be furnished by a motor of a given size. This last feature is of the utmost importance. A smaller motor for a given power gives greater clearance from the ground. This is a factor of great importance in suburban and heavy electric railway work, because the limited space underneath the car precludes, with the ordinary design, the use of motors having more than a comparatively small capacity.

With commutator troubles practically eliminated, with the size of the motor per horse power reduced and with its ability for operating with weak fields and at a wide range in voltages, the interpole motor is the most practicable design for

trunk line conditions. The ideal method is to equip each car with powerful motors so as to obtain the maximum speed with high voltages (2000 to 3000) upon the trunk lines and to divert the same cars on to city or branch tracks when they reach their destination. In the city the same motors and the same controllers can be used. Under these conditions, the traveler, instead of leaving the car at the railway station, a mile or more from his hotel or the center of the town, will ride from the city system in one town to the city system in another, and thus comfortably and easily be landed at his hotel or doorstep. It was considered a great improvement when baggage could be checked from the traveler's house to its final destination, but how much greater is the importance

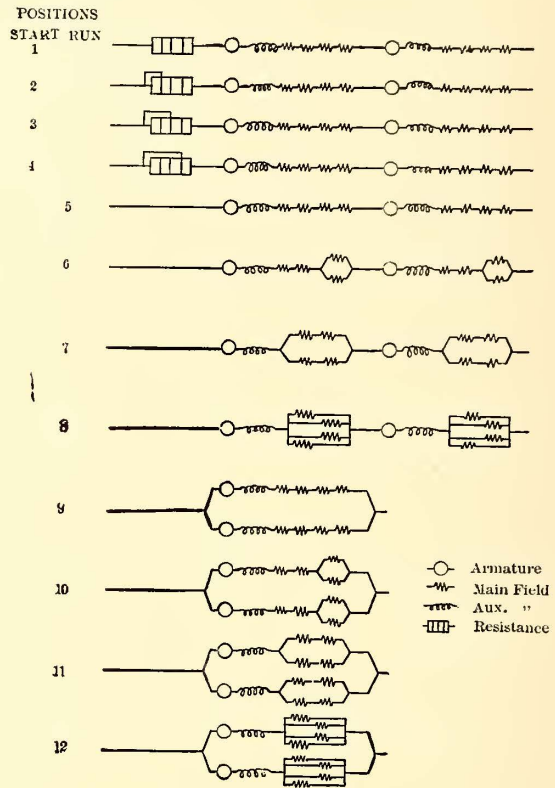


FIG. 2.—SERIES PARALLEL CONTROL FOR INTERPOLE MOTOR WITH EIGHT RUNNING POSITIONS

of being able to pass from one's own home to the final end of the journey, not only without change, but at the highest speed. The combination of the multiple-unit system with the interpole motor makes this commercially possible.

The accompanying characteristic curves of a 35-hp interpole motor in this connection cannot fail to be of interest, as giving the very remarkable performance of this motor when operated under weak field conditions. On account of the absence of commutator troubles, the field of the interpole motor, as stated, can be weakened to almost any extent, thus delivering high speeds, and at the same time the motor can be run at excessive overloads. Both of these advantages can be secured with a high degree of efficiency, as shown by the curves in Fig. 1. It will be noted, that this efficiency includes gears. The motor from which these curves were taken has a weight of less than 1500 lbs.

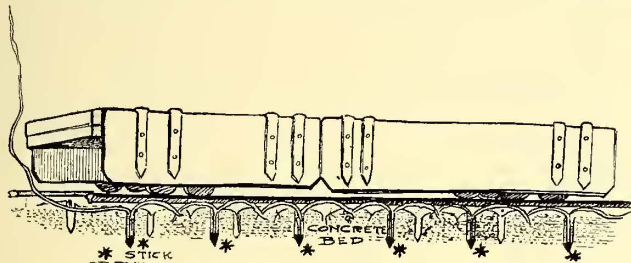
In Fig. 2 is shown one of the various possibilities of control of the interpole railway motor. This is a series-parallel system in which full use is made of the increased speeds obtained by weakening the fields of the motors. After starting up in series with resistance, the motors are brought into the running series position (No. 5), and from this point on have an almost indefinite number of efficient running positions,

in this case eight, which may be obtained without the use of any resistance. A great improvement in economy of current consumption when compared with the ordinary type of railway motor will thus be secured.

Recent developments have demonstrated that the interpole motor, as used in railway work, has not yet reached its final stage and some surprising results may be anticipated.

◆◆◆
WRECKING OLD CABLE ROAD IN ST. LOUIS

A unique method has been adopted by the management of the United Railways Company, of St. Louis, to remove the concrete, in which the old cable conduit on Olive Street was laid, quickly and with as little inconvenience as possible to the traveling public. It is accomplished by blowing the conduit up with dynamite. Each blast contains twelve cartridges, weighing one-tenth of a pound each and filled with 40 per cent dynamite. The work is now in progress, and extends over the entire Olive Street line, from Boyle Avenue to Fourteenth Street. One track is being blown up at a



“COVER” CAR TO PREVENT DAMAGE FROM EXPLOSION

time. The east bound track is now being removed, and the cars come downtown over another route. The dynamiting is not permitted to interfere with the movement of the cars on the west bound track.

The problem of dynamiting the great beds of concrete, either during business hours or at night, was a hard one for the managing and engineering departments of the railway.



CLEARING AWAY THE DEBRIS AFTER AN EXPLOSION

The question was simplified by the fact that the concrete for each track was separate, and if the jar of the dynamite was distributed so as not to disturb the adjoining track, the most important part of the plan, from a traffic standpoint, was solved.

It is done by sending a pneumatic drilling machine over

the road to drill the holes in which the charges are placed. The drill was supplied with air from a motor compressor on the construction car.

The roadmaster organized six crews, of about 50 men each, a day and a night crew for each section. Most of the men are laborers, engaged with pick and shovel in throwing the debris to one side after the blast, and carrying the old rail and



VIEW ON OLIVE STREET, TAKEN DURING EXPLOSION

the new. About a dozen from each gang do the blasting. Flying debris are kept from doing any damage to buildings by a “cover” car, which is an ordinary flat or platform car covered with 6-in. oak ties, with curtains of oak suspended on hinges, so as to include effectually all space beneath the car.

After the cartridges are in place the “cover” car, propelled by an old passenger car, is stopped over the 10 ft. of track containing the blast. The motor-man of the passenger car, into which the man who sets off the blast goes when it is all ready, gets a signal from the gang foreman, when everybody has been sent away from the immediate vicinity and the west bound cars stopped a block away. The blast is then fired. It is estimated that the three gangs, working day and night, will blow out about twenty blocks of single track in each twenty-four hours.

The company will use the old yokes for cast welding purposes. As they are cast iron, they come out broken and for the most part in sizes which can be put in the cupola. In some cases window glass of a poor quality has been cracked by the explosions, but no panes have been broken so as to cause falling pieces. The cover car has effectually prevented any flying pieces of concrete.

It is proposed to lay the new track with 9-in. rail on ties, instead of the 4½-in. rail now on the cable yokes.

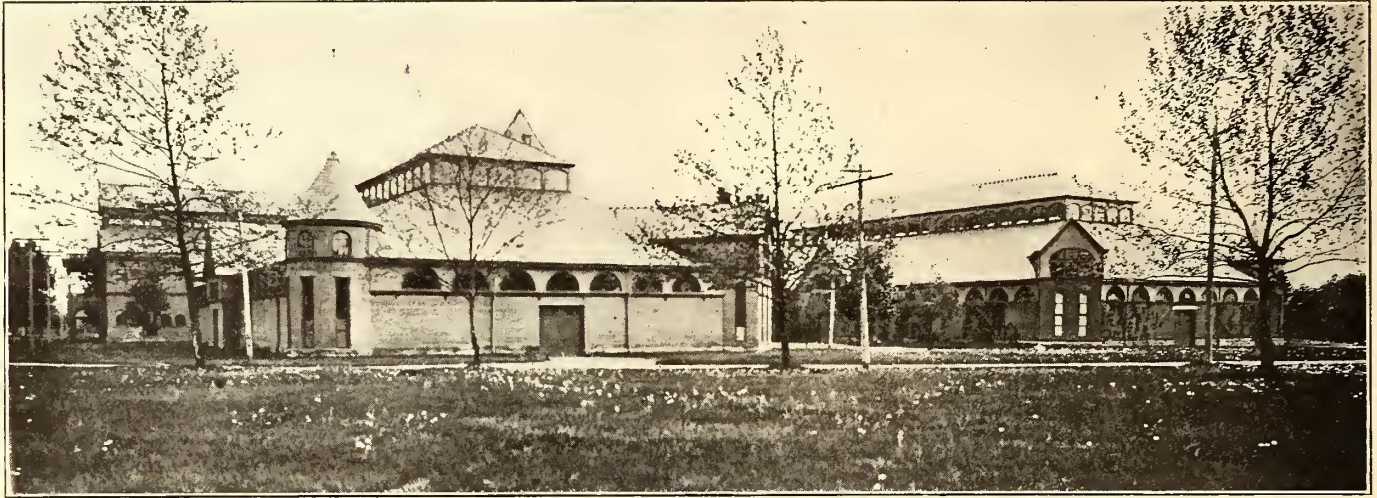
◆◆◆
E. Schondube, of Mexico City, has secured the contract for the electric street railway to be built there by the Compañia Industrial de Guadalajara, the French Light & Power Company, of Guadalajara.

THE COLUMBUS CONVENTION

In the last issue of the STREET RAILWAY JOURNAL a short account was published of the preliminary plans for the Columbus convention, and the selection of five of the buildings at the State Fair Grounds for the meeting and exhibit halls. Two views of this group of buildings are presented herewith, together with a map of the City of Columbus, showing the

tion of Traffic. Discussion on these reports will follow.

The morning of Thursday, Oct. 18, as announced in the last issue, will be an "interurban" meeting, and the following papers and reports of standing committees have provisionally been decided upon: Report of Committee on Heavy Electric Railroads; paper on "Electric Railways as Feeders to Steam Trunk Lines;" paper on "Electric Railways in Sparsely Settled Communities;" paper on "Interurban Limited



END VIEW OF STATE FAIR BUILDINGS, WHERE CONVENTION WILL BE HELD:

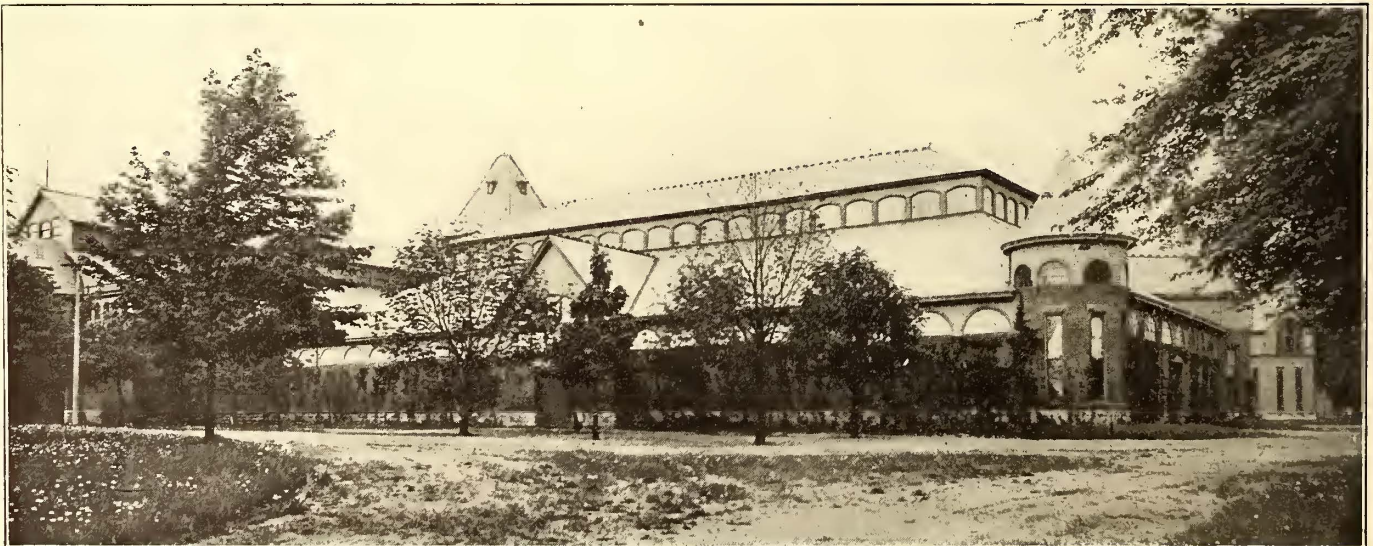
location of the Fair Grounds and several of the principal hotels.

The program for the convention of the American Street and Interurban Railway Association and a list of papers has practically been decided upon.

The first session is to be held on the morning of Wednesday, Oct. 17. After the roll call and address of welcome, the president will deliver his annual address, which will be followed by the reports of the Executive Committee and secre-

Trains;" paper on "Interurban Freight and Express;" paper on "Tickets and Rates;" paper or discussion on "City, Suburban, Interurban and Railroad Traffic."

On Thursday afternoon, the session will be devoted to the subject of employees, with the following reports and papers: Report of Committee on Welfare Work; report of Committee on Rules; paper on "Y. M. C. A. Branches;" paper on "Instruction of Train Men;" paper on "Discipline of Train Men;" paper on "Uniforms and Badges."



SIDE VIEW OF STATE FAIR BUILDINGS, COLUMBUS

tary and treasurer. Accounts of the work done during the past year by, and the future plans of, the affiliated and allied associations will then be presented by the presidents of the four associations. It is thought that this will occupy the time from 10 a. m. to 1 p. m.

The afternoon of Wednesday, Oct. 17, will be devoted to the reports of the following standing committees: Membership; Compensation for Carrying Mail; Subjects; Car Wiring; Standardization of Equipment; Insurance, and Promo-

The session Friday morning will be an executive session, and Friday afternoon will be devoted to a report of the Nominating Committee, election of officers and unfinished business. The banquet will be held Thursday evening at the Southern Hotel.

It has been decided to print in advance of the meeting all of the papers and reports of committees. The former will be presented at the meeting in abstract only, and the speakers will be limited to a certain length of time, say five minutes,

in which to outline their papers and bring out the principal points in connection with them. The object of this plan is to give as much time to the discussion as possible, and an attempt will be made to make preliminary arrangements by which certain members will agree to open the discussion or otherwise contribute to it. Written discussions from any who are unavoidably prevented from attending the meetings will also be welcomed.

be increased if necessary. The figures, therefore, give only approximately the number of rooms available.

SCHEDULE OF ROOMS AVAILABLE IN COLUMBUS DURING CONVENTION

Name of Hotel	No. of Rooms Available	Rate	Plan
Chittenden	175	\$3.00 and upwards	American
Neil	90	1.50 "	European
Southern	175	2.50 "	American
Hartman	100	1.50 "	European



MAP OF COLUMBUS, SHOWING LOCATION OF STATE FAIR GROUNDS, PRINCIPAL HOTELS, ETC.

The convention programs of the Accountants', Engineering and Claim Agents' associations have not yet been announced, but will probably be made public soon.

THE HOTEL ACCOMMODATIONS

As Columbus is somewhat smaller in size than any city at which the association has met for several years, some doubt has been expressed as to whether the hotel facilities would be sufficient to accommodate the association. To remove this impression the Board of Trade has submitted to the secretary of the association a list of the principal hotels in Columbus, with the number of rooms available, rate and plan. As will be seen, this list shows 1143 rooms. This list does not give the capacities of the hotels, but the number of rooms which each in October can easily furnish for convention purposes. Assurances have been received, however, from the proprietors of the leading hotels that the numbers mentioned in this list can

Newell	35	1.00 and upwards	European
Vendome	30	2.00 "	American
Lincoln	40	2.00 "	American
Bryden	25	2.00 "	American
Normandie	15	2.00	American
Columbus Club	4	Private	
Hutchins' Farm	4	Private	
Davidson Hotel	40	\$2.00	American
Emerson	40	1.50	American
Star	75	1.00 and upwards	European
American	25	2.00	American
Kramer's	25	1.00 and upwards	European
Park	75	2.00 and \$2.50	American
Lenox	20	2.00	American
Dennison	20	2.00	American
Capitol	20	2.00	American
Arcade	20	2.00	American
Norwich	40	2.00	American
Lexington	10	2.00	American
Roanoke	10	2.00	American
Richelieu	20	2.00	American
Llewelyn	10	2.00	American

THE SOUTHWESTERN ELECTRIC & GAS ASSOCIATION CONVENTION

The Southwestern Electric & Gas Association held its convention, May 16, 17 and 18, at the Tremont Hotel, Galveston, Texas. There was a good attendance. Arrangements for the entertainment of the convention were well looked after by H. S. Cooper, general manager of the Galveston Electric Company, and chairman of the local committee. The first session was called to order Wednesday morning at 10:30 by President M. M. Phinney, of Dallas, the general representative for Texas of Stone & Webster. He introduced Mayor H. C. Landes, of Galveston, who read a short address of welcome. This address was responded to by W. T. Edgar, of Waco. Secretary Frank J. Duffy, of Beaumont, then read the list of applicants for membership, of which there were sixteen for active and seven for associate membership, making twenty-three in all. The active membership of the association (that is, operating companies) is now eighty-three.

President Phinney, in his address, spoke of the enterprise of Galveston, which was manifested on every side in the reconstruction and grade raising that had followed the great storm and disaster of 1900. He hoped the convention might absorb and be inspired with some of this same energy and progressive spirit. During the past year the attempt of the association to establish permanent headquarters in charge of an assistant secretary at Dallas had been defeated by the removal in turn from Dallas of both of the men appointed, so that the office was now vacant. Nevertheless, if they could get an assistant secretary who would not move away he thought it well to maintain the office. He expressed his belief that the regulation of public service corporations is a good thing if intelligently done, and if plain, simple laws are in force. Many regulating bills were introduced at each session of the legislature. The legislature naturally looked to the members of the association for information on how the proposed measures would affect their business. He advised for this purpose the formation of a legislative committee to be made up of the best posted and most experienced men in the business. The committee should be prepared to furnish absolutely accurate information on technical and business questions raised by the legislation proposed. Finally they should never lose sight of the fact that they were public service corporations and should impress this on all employees.

A nominating committee was appointed, consisting of H. S. Cooper, of Galveston; Frank J. Duffy, of Beaumont; R. B. Sticher, of Sherman, and Samuel Kahn, of San Antonio. G. C. Gum then read a paper entitled "Up-to-Date Methods of Increasing the Business of Public Service Corporations." It was devoted principally to electric lighting and gas methods.

On Wednesday afternoon the gas men had the floor for a time with a letter on "Retort House Practice," by Frederick Egner. After this a discussion of some of the Question Box queries was taken up. H. S. Cooper invited all who wished, to spend the evening at Garden Verein. This invitation was accepted by a large number.

On Thursday morning, at the opening of the session, invitations for meeting next year in San Antonio and Dallas were extended by representatives of those cities. No action was taken, as the matter is in the hands of the Executive Committee. The invitation from San Antonio was from H. M. Littell, general manager of the traction and lighting companies of San Antonio, and from the mayor and Business Men's Club, of that city. Dallas' invitation was given by Sam Hobson, of the Hobson Electric Company, of Dallas.

A paper on "What is Electricity?" was then presented by

S. J. H. White. In this paper the author took up some theories he had worked out to explain electrical phenomena.

Frank J. Duffy, manager of the Beaumont Traction Company, then read a paper on the "Relations of Public Service Employees to the Public." An abstract of the paper and discussion follows:

RELATIONS OF PUBLIC SERVICE EMPLOYEES TO THE PUBLIC

In this paper Mr. Duffy discussed the qualifications of public service employees. He said, among other things, that they should not only be intelligent, capable, and upright, but they should be industrious, of quick perception and of good judgment and capable of accommodating themselves to all classes of people, even the most unreasonable. Politeness and diplomacy should be the aim of public service employees, as the public is inclined to judge a company by the acts of its employees.

DISCUSSION ON METHODS OF DISCIPLINE

Following the paper by Frank J. Duffy, on "Relations of Public Service Employees to the Public," several Question Box questions along the same line were discussed.

H. S. Cooper made the point that it was absolutely necessary for the officers of the company to set a good example to those below them. Example counts for more than talk without the example. Among other things, the company should impress its men with its desire to be absolutely honest in all its dealings and expect its men to be the same. If the officers cannot set the example for those under them they have lost the main thing with which they can control their forces.

H. T. Edgar, of Ft. Worth, thought trainmen were in a more difficult position because there were always certain fault-finding persons to deal with that took a great deal of patience. Such persons treated the trainmen as if they were below them and made it generally disagreeable for them. On the other hand, this attitude of part of the public was partly caused by the rude class of men sometimes employed in this work.

David Daly, of Houston, spoke of an attitude on the part of employees which he had to combat, viz., that of immediately putting themselves on the defensive and attempting to justify whatever an employee of the company had done, rather than presuming that the complainant was in the right and had some real grievance.

Mr. Cooper when hiring a man, among other things, put him under the instruction of the claim agent as to the making out of accident reports and the course to pursue in case of accident. Failure to report an accident was considered a serious offense. If a man showed himself lax about any duty or rule he was put back as a student under instruction of some other good man for a time. For an old man this was considered a serious punishment, and the offender would strenuously seek to avoid a repetition of it.

W. H. Young, of Austin, had been studying the reports made by various companies to the Secretary of State, and found that Mr. Cooper's system of handling employees and accident claims was evidently successful, as he had one of the lowest accident accounts of any city, being less than 1 per cent of the gross receipts. At Austin the company had paid out 4 per cent, owing mainly to one costly accident. He had adopted the plan of paying a premium of 1 cent per hour to conductors and motormen, and as a result the company had had to pay nothing for accidents for a period of six months.

President Phinney, of Dallas, objected to this plan on the ground that it encouraged men not to make reports of accidents, but Mr. Young explained that the number of accidents reported had nothing to do with the matter. It was the amount that a man's accidents actually cost the company in

claims that reduced or wiped out his premium. There had been an increase of 100 per cent in the number of accidents reported, but a decrease in the amount paid in claims, as compared to a year ago.

Immediately after the noon meal cars were in waiting to take the whole convention party to visit the grade raising operations, and enjoy the interesting spectacle of one of the largest dredge boats in the world pumping its cargo of sand into a long pipe line and discharging it several blocks inland. The process followed was described in an article by Mr. Cooper in the *STREET RAILWAY JOURNAL* for May 12.

At 4 P. M., the party having returned to the hotel, the convention was called to order, and a paper on "Care, Maintenance and Inspection of Street Railway Rolling Stock" was read by Mr. Cooper. An abstract of the paper and discussion follows:

CARE, MAINTENANCE AND INSPECTION OF STREET RAILWAY ROLLING STOCK

Mr. Cooper's paper was a plea in favor of the greatest care in maintenance. According to the speaker, "Some build rolling stock, others buy rolling stock, but many have rolling stock thrust upon them!" and to those who are in the third class maintenance is especially important. Depreciation can best be reduced by prevention and inspection, and the author suggested five rules to prevent troubles:

First. A few practical and reasonable rules, strictly and impartially enforced.

Second. A few simple forms that trace each car and its condition from man to man, over their signatures.

Third. An equitable system of punishments, including cash reimbursement to the company, for unnecessary maintenance expense entailed on it by the neglect, disobedience or carelessness of an employee.

Fourth. A simple system of reward for suggestions toward, or results tending to, lessening of maintenance expense.

Fifth. A system of inspection that not only inspects fully, but that also criticises and suggests.

Accompanying the rules should be some system of rewards for extra exertion or care in preserving apparatus. The rewards need not be cash, in fact, they had always better be something else, if possible—a posted public notice of commendation, a temporary or permanent change to a more pleasant or more profitable run or employment, a day or two vacation with wages—any small thing to show that the company appreciates extra interest and exertion that goes to benefit maintenance. The inspection should inspect, should criticise, should suggest and should follow up its own criticisms and suggestions when they are carried out.

The employees should be trained to care for the company's property as if it was their own, and the best motormen and conductors can be appointed as trainers for the new men. Suggestions for improving the maintenance should be encouraged from the employees. The greatest expense in railway operation is for labor, and liberality in repairs and material is in the end real economy, if it makes the labor more efficient.

The manager should keep ahead of his depreciation. He should renew the bearings before they cut the axle or scrape the armature, should replace the brake-shoes before they commence to mis-shape the wheels, change a worn-out wheel before it flats and fix a commutator or brush holder before it flashes. Some managers claim that they cannot do this, as they are a week or a month behind. If this is true it indicates that maintenance is proceeding at the same speed as depreciation, and it ought not to be very difficult, with a little extra

exertion, to run even with or a little ahead of it instead of behind it.

Following Mr. Cooper's paper, Frank J. Duffy, of Beaumont, said that paint and varnish did not last nearly as long in Southern Texas as in northern cities.

Mr. Cooper found this true, and also said ash, the wood, should be avoided in cars, because of dry rot and worms. One of the commonest faults in car building was the failure to put enough lead on the joints. He aimed to repaint cars entirely every two years, and revarnish once between these times, which was about twice as often as he had found it necessary in other localities. Salt fogs were responsible for this. Green copper oxide from the trolley wheel and wire ran down the poles and ropes and helped spoil a car's appearance, in addition to the direct action of the fogs.

Mr. Daly, of Houston, had a similar experience. Cars bought last fall needed revarnishing now.

Mr. Young, of Austin, had for his principal equipment a lot of full-convertible cars. On account of accidents, when these cars were used as open cars, the company's last cars were made semi-convertible. These cars the company built itself. There had been some trouble originally from the rotting of canvas on the roofs of the cars. This fact suggested the very liberal use of paint on the canvas, and these roofs were easier to maintain. A large force of repair men is needed by any Texas company, because of the distance from manufacturing centers. To keep the force of trained men intact it could be used at odd times to build cars, a few at a time, to meet the growth of the road. It might not be feasible if a company wanted a large number of cars at once.

At the request of President Phinney, a short discussion of the relative merits of semi-convertible vs. a double equipment of car bodies for Texas was had.

Messrs. Cooper, of Galveston; Duffy, of Beaumont, and Daly, of Houston, favored fully open cars for summer. They thought people demanded the open cars.

Mr. Young, of Austin, favored the semi-convertible car.

Mr. Cooper uses two conductors on very crowded open cars.

Mr. Phinney reported fewer accidents per 100,000 passengers in Dallas with open cars than with closed.

In the evening, the Sons of Jove, an order which originated at one of the Southwestern conventions several years ago, held a grand rejuvenation, and after parading the streets in costume with the candidates for admission tied to a long rope, as is the custom of the order, initiated a number of new candidates.

Friday morning a paper was read by F. W. Yensen on "Telephone Engineering Problems," and A. W. Q. Birtwell presented a paper on "Organization and Operation of Purchasing and Supply Departments," which stirred up an animated discussion on the question of employing a regular storekeeper or stock clerk in a small company.

A letter was read from a member asking that some action be taken toward securing better insurance rates for electrically-lighted properties than on those lighted with gasoline vapor or acetylene plants. The matter was referred to the executive committee.

F. M. Lege, of the Finance Committee, reported auditing the accounts of A. E. Judge, treasurer, which showed receipts of \$1,211.93 and \$713.32 paid out, leaving a balance of \$498.61. Secretary Frank J. Duffy made his report, which showed that the active membership had increased from 65 to 83 during the past year. The Nominating Committee reported the following ticket of officers, who were elected:

President, H. S. Cooper, of Galveston; first vice-president,

J. W. McLendon, of Fayetteville, Ark.; second vice-president, J. P. Crerar, of Denison, Tex.; third vice-president, Samuel Kahn, of San Antonio; secretary, E. B. Meginnis, of Dallas; treasurer, A. E. Judge, of Tyler. Executive Committee, H. S. Cooper, J. W. McLendon, J. P. Crerar, Samuel Kahn, M. M. Phinney, H. T. Edgar, J. F. Strickland, R. B. Stitcher, F. J. Duffy, E. B. Meginnis. Finance Committee, F. M. Lege, J. J. King, W. H. Young. Advisory Committee, J. E. Farnsworth, H. M. Littell, C. W. Ford, C. H. Dunbar, E. D. Kelley, E. M. Cooper, David Daly, C. W. Kellogg, W. Burns Head.

Friday afternoon, a special boat was put at the disposal of the party, which took a trip of about four miles to the entrance to the harbor to see the work done on the jetties.

H. S. Cooper, the new president, is well known in the street railway field. He was born in Isle of Wight, Eng., in 1856, and in 1876 he became a manufacturer of agricultural machinery in the South. This connection brought him in touch with electrical enterprises, and gave him an experience that later made it possible for him to reorganize and place many unstable properties on a profitable basis. His record in this line secured for him, in 1893, the position of general manager of the Schenectady Railway Company, including the entire electric lighting, railway and power service of the city, which was then in the hands of a receiver. Under Mr. Cooper's management these properties were placed in excellent physical condition and placed on a paying basis. His next important work was with the Ithaca Railway Company, of Ithaca, N. Y., which was also rehabilitated under his management. Mr. Cooper then organized the Electrical Engineering and Development Company, of New York, and made critical reports on all kinds of electrical propositions for clients, and so added to his already wide experience. In 1904, he accepted the position of general manager of the Galveston Electric Company.

ANNUAL MEETING OF NEW YORK STATE ASSOCIATION

Announcement is made that the twenty-fourth annual meeting of the Street Railway Association of the State of New York will be held at the Grand Union Hotel, Saratoga, N. Y., on June 26 and 27. On the first day, morning and afternoon sessions will be held, and on the second day, the morning session will be called at 9:30 and will continue until the business of the convention is completed. The annual banquet will be held at the Grand Union Hotel on Tuesday evening, June 26.

A considerable portion of the business sessions will be devoted to discussions on the reports of committees. During the past year a great amount of valuable work has been performed by special working committees and the various reports to be presented include matters of vital interest. Among the topics included in the committee reports will be the following: "Standard Application Blanks and Forms for Employees;" "Mechanical Statistics;" "Interchangeable Coupon Books;" "Station Rules," and "Revision of Constitution and By-Laws." Papers will also be presented on the important subject of "Sale of Water Power," and this topic will be discussed both from the standpoint of the power companies and of the consumers. Under this head it is expected an interesting review will be made of the water power situation in New York State, together with suggestions as to the proper basis upon which to formulate contracts for power. Arrangements have been made to have present representatives from the large power companies as well as from many of the consumers, in order to discuss both sides of the matter. There

will also be presented a paper dealing with the subject of interurban railways, their development and their relation to steam roads. If time permits, a portion of one session will be devoted to an open Question Box, when opportunity will be given for asking and answering questions on practical topics.

Saratoga is the heart of a section famous for its attractive drives, walks, electric railway rides, etc., and the Entertainment Committee is arranging a series of attractive excursions and entertainments for the ladies and others during the two days of the convention.

It has been decided by the Executive Committee that no attempt will be made this year to arrange officially for exhibits of materials and supplies. The association, however, extends to representatives of manufacturing and supply houses a most cordial invitation to be present at the June meeting. Anyone desiring to make an exhibit or demonstration should make all arrangements with Messrs. Wooley & Gerrans, proprietors of the Grand Union Hotel, Saratoga, N. Y.

The Committee on Revision of Constitution and By-Laws has outlined a number of changes in the policy of the association, and it is probable that some action will be taken at the June meeting looking to the admission of associate members and of allied members. It is earnestly hoped, therefore, that companies who are not now members of the association will send representatives to the Saratoga meeting. It is stated that this invitation applies specifically to electric railway companies located in the States adjacent to New York, including particularly Pennsylvania, New Jersey, Ohio, Western Massachusetts and Connecticut, Vermont and Canada.

MOVING CABLE CONDUITS

A correspondent calls attention to the fact that a section of cable conduit in Kansas City was moved about 1900 in a very similar way to that recently done in San Francisco, and described on page 232 of the STREET RAILWAY JOURNAL for May 5. The Kansas City work, which was described in the STREET RAILWAY JOURNAL for July, 1900, page 660, involved the shifting of the double track curves at Eighth and Ninth streets with the connecting tangent tracks on Grand Avenue from a position running diagonally on Grand Avenue to the center of the street, also the rebuilding of the superstructure and the placing of new special work at the Eighth and Ninth Street ends. The curves were at the summits of steep grades and the Grand Avenue tracks about 4 ft. from their final location at each end.

The entire tracks were shifted bodily with the conduit, involving, because of the shortening of the distance, the cutting out of several feet of rails and conduit in each track. The system adopted in the execution of this work was quite similar to that adopted in San Francisco, skidding the entire mass on heavy planking by the use of heavy jacks and blocking.

The entire work was done without interruption of traffic and under the peculiar conditions of the location, as it was necessary for the grip cars to hold on to the rope and maintain speed until off of the curves and grades, unusual care was required to guard against accident to the traveling public and to those employed on the construction. Considerable interest was taken by the engineers and street railway men at the time of the execution of this contract, which was carried out by the Falk Company, of Milwaukee. W. Frank Carr, chief engineer of the Falk Company, had personal supervision of the work.

AN OPERATING DIFFICULTY IN SOUTHWEST MISSOURI

It is rather out of the ordinary for an electric railway line to employ an underground man, yet such is the case with the Southwest Missouri Electric Railway Company, operating between Carthage, Mo., and Galena, Kan. The road passes through a section thickly studded with lead and zinc mines. The ore occurs in pockets often an acre or more in area, and varying in thickness from a few feet to eighty or one hundred. To prevent miners working under the right of way of the railway company one man spends his time in inspecting the underground workings near the right of way. The necessity



CAVE IN ON THE DUNENWEG LINE OF THE SOUTHWEST MISSOURI ELECTRIC RAILWAY COMPANY

for doing so may be appreciated after noting the accompanying illustration, which shows a cave-in on the Dunenweg line operated by the company. The cave-in ground is an acre or more in area and about 60 ft. in depth. It occurred one night without previous warning. As the expense of filling up the cavity makes this out of question, the tracks will be changed to a new location entirely.

CORRESPONDENCE

TESTING ARMATURES IN THE WINDING ROOM

May 10, 1906.

EDITORS STREET RAILWAY JOURNAL:

I noticed in your April 7 issue an article signed "Armature Winder," giving some notes of armature room experience. I do not blame the writer for not giving his name, for with the conditions under which an armature winder has to work, he can hardly afford to make a public exposure of the ignorance of this foreman. I will tell of a joke that was played in our shop. In two days' time our foreman condemned six armatures, and would not let them be put in the cars. Some of them were new and some were second hand. I inspected them and could find nothing wrong, so I held them in the armature room for five or ten days. When I had an opportunity I painted them black, and sent them out on trial. The foreman lost track of them and the armatures proved satisfactory. I may have the wrong idea, still I think I am right when I say that a foreman should be a practical street railway man. A man who has dug ties out of the track, has worked two years or more in the pit and understands overhead work will make a more competent master mechanic, or foreman, than one who has simply been reading books and looking at pictures on a wall. The latter will tell the boys to put that

armature in, feed up to full speed and plug on to 5 and 9. If it doesn't stay, he will say, "You made a mistake in your connections. Try it again." But he can't tell where the trouble is.

ANOTHER ARMATURE WINDER.

LOCATION OF INTERURBAN LINES

Kansas City, Mo., May 7, 1906.

EDITORS STREET RAILWAY JOURNAL:

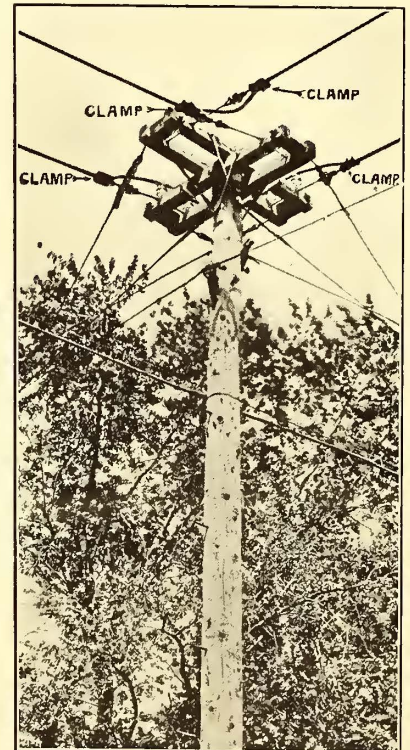
Your editorial, "Location of Interurban Lines," in the Feb. 10 issue, has just come to my notice. For more than two years our practice has been entirely in accord with the suggestions you make. Our proposed line, Kansas City to Iola, 110 miles, passes through Olathe, the county seat of Johnson County, and Ottawa, the county seat of Franklin County. Between the two terminal points it does not parallel any steam road, and will have a private right-of-way through the cities of Olathe and Ottawa. We believe it is better to put in the private right-of-way through cities at many times the cost of paving streets. By doing this we avoid many expensive annoyances incident to operating franchises through cities. It may not always be possible to do this for the entire distance within the city limits, but in most cases a private right-of-way can be had for the entire distance, and in many others for a greater portion.

HUGH A. HOLMES, PRESIDENT.

INTERESTING METHOD OF HANGING CABLES

The half-tone engraving herewith shows a pole owned by the Topeka Railway Company, of Topeka, Kan., and illustrates the method of turning a corner with two 500,000-cm cables by the use of four Kearney cable clamps. This work was done in very much less time than with the old methods of splicing the cables or using strand wire. At the same time a much neater and stronger piece of workmanship was secured.

The Kearney cable clamp is being very generally and rapidly adopted by street railway companies all over the country. It is claimed that this device saves an immense amount of time, labor and material wherever cables of from 000 up to 1,500,000 cm have to be strung. The Topeka Railway Company has used nearly a thousand Kearney cable clamps in the past two years. W. N. Matthews & Bro., 217 North Second Street, St. Louis, who also handle the sale of the well-known Stombaugh guy anchor, are the manufacturers of the Kearney cable clamp.



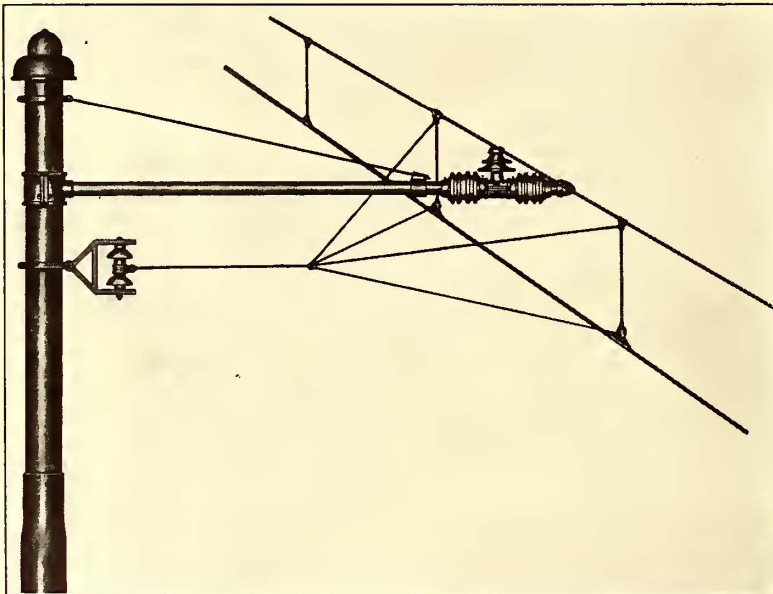
POLE AT TOPEKA, KAN., SHOWING METHOD OF TURNING CABLES AT CORNERS

NEW MATERIAL FOR CATENARY WORK

The Elmer P. Morris Company, of New York, is developing a line of material for use in connection with catenary construction, and in conjunction with the Oneida Railway Company, of Utica, which company is now electrifying the section of the West Shore Railroad between Utica and Syracuse, recently installed about 1000 ft. of overhead catenary line at Reading, Pa., for the purpose of making certain tests.

The line was supported on tubular iron poles, 48 ft. long, built in three sections, of which the lower section was 10 ins., the middle 9 ins. and the top section 8 ins. in diameter. The lower sections were "extra heavy" pipe, and the top or 8-in. section was standard weight. Each pole weighed approximately 2700 lbs. The line was built to secure as nearly as possible actual operating conditions.

The messenger wire was carried on a bracket arm by means of an insulator which was held in place by a special malleable-iron bracket pin, clamped around the bracket arm. This insulator was of well-known high-tension type, about 9 ins. high, and tested for 80,000 volts. Directly under this insulator and slipped under the bracket arm was a secondary insulator, consisting of porcelain spools, having grooves to catch the messenger wire in case the main insulator should break. This method of construction is the special improved feature on which Mr. Morris has obtained broad patents for making line construction of this character safe and positive. The advantages of this form of construction was claimed to be that at all times,



SECTION OF CATENARY CONSTRUCTION, SHOWING BRIDLE GUY AT POLE

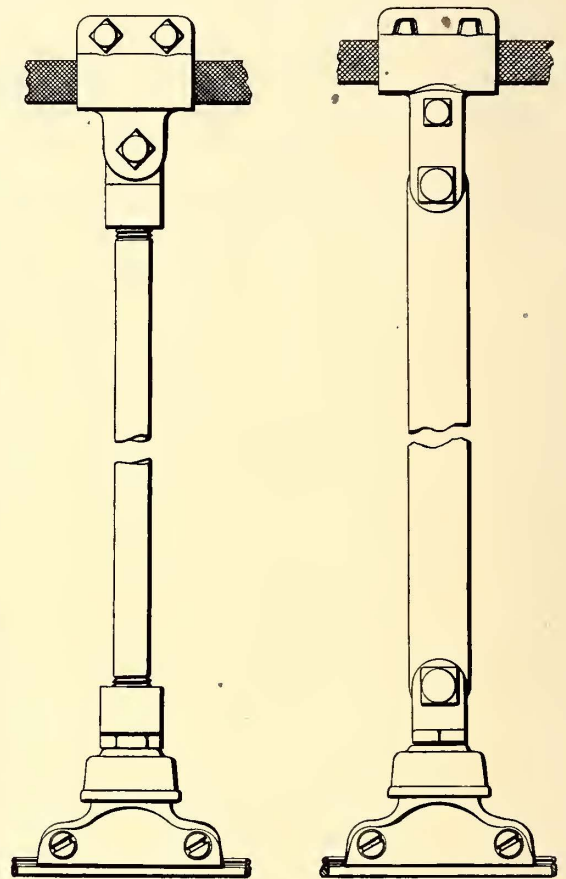
irrespective of whether the main carrying insulator was broken, no interference to the service would occur, as the secondary insulator takes care of the lines in the same manner as other methods of construction now in vogue and prevents the messenger wire from coming in contact with the arm. Another feature of this method of construction is that the messenger wire may be composed of copper cable and used as a feed wire, while with the other methods of construction it is necessary to thoroughly insulate the messenger from the trolley. The views herewith shown indicate this method of construction.

The catenary cable was composed of $\frac{5}{8}$ -in. extra heavy Siemens steel strand, covered with triple braid weather proof insulation, making a cable whose diameter was approximately $\frac{7}{8}$ in. in diameter. This was hung with a sag of 5 ft. 5 ins.

and from it was suspended a 0000 grooved trolley wire, the suspension being by means of spreaders of flat steel strips 1 in. x $\frac{1}{8}$ in., spaced 10 ft. apart, and of varying lengths to suit the catenary curve. The spreaders were attached to the trolley wire by drop forged mechanical ears and to the messenger wire by a special clamp.

In future work of this kind it is the intention to strengthen the structure by the use of a special bridle, as shown in one of the illustrations. This bridle will be built of steel rods, centering in a common ring or eye guyed to the pole by a steel rod. In heavy service a special high-tension, 80,000-volt insulator of the form shown in one of the engravings will be used for fastening the bridle guy to the pole in the manner indicated. The bridle would serve as a side guy for both messenger and catenary, and in the case of a break in the messenger wire would prevent the rupture of the line from traveling beyond the next pole.

In the Reading installation the middle pole of the structure was side guyed with 5-16-in. cable to a Miller anchor. The tests were made on this middle pole, and were as follows:



SPREADER MADE OF PIPE

SPREADER MADE OF FLAT STRAP

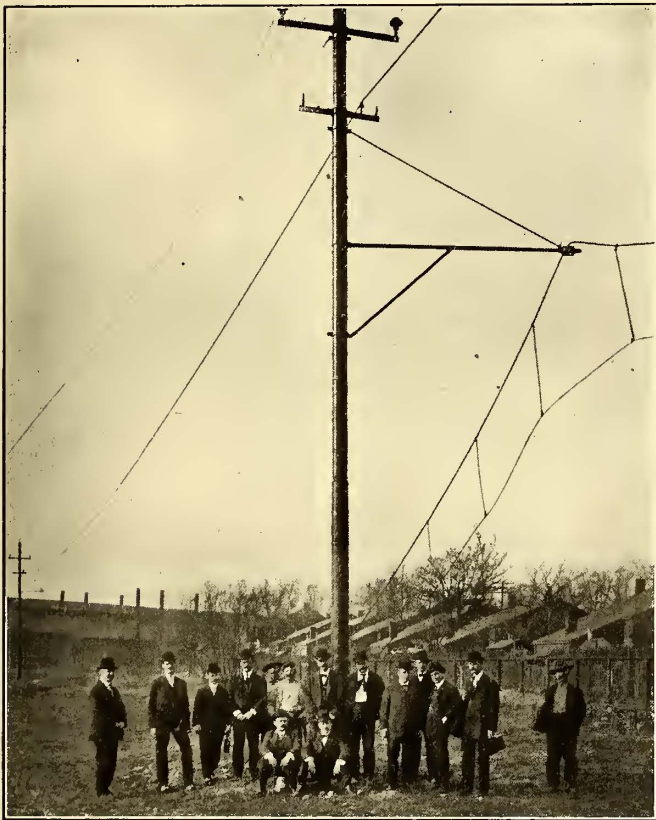
In Test No. 1, a 7-16-in. cable was attached at the top of the pole and extended in the direction opposite to the bracket, a distance of about 125 ft. to the ground, where the pull was to be made. At this point, a strain of 2050 lbs. was put on the pole, under which condition the pole was pulled considerably out of the perpendicular, due to the concrete foundation tipping. The pole itself seemed to be intact, the trouble appearing to be in the lack of resistance offered by the earth against the concrete foundation, which was approximately 3 ft. in diameter.

In Test No. 2, the pole was allowed to right itself as much as possible and was afterward pulled to its normal position. This left the original side guy tight, and a downward strain was put on the end of the bracket immediately under the catenary. The result of this, at a strain of 2000 lbs., was a perm-

anent set of about 3 ins., in the bracket, the set appearing as a bow upward between the end of the tie rod and the pole.

In Test No. 3, the trolley was cut at approximately the middle of the 350-ft. section. The trolley slacked a little and the cut ends hung only a very few inches below the original horizontal position.

In Test No. 4, the trolley wire was first cut; then the catenary itself was cut at the dead-end stub. As the wire slacked off, it wrenched the bracket on the first pole to a position 90 degs. from its original position, snapping the casting on the under brace at the time. The middle bracket acted in the same manner, except that it did not turn the full 90 degs., nor was it in any way injured. The third bracket retained its position and also retained the catenary on the insulator. There was no effect of torsion on the pole as the bracket was fastened to it by means of a split collar, and this merely turned



RESULTS OF FINAL BREAKDOWN TESTS ON CATENARY AT READING, PA.

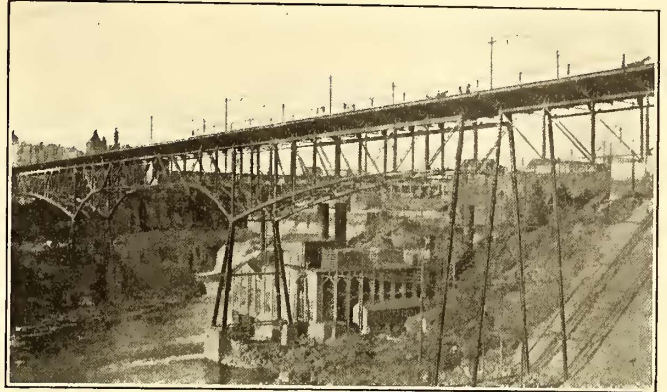
on the pole. The computed strain on the bracket, assuming the weight of the structure as 2 lbs. per foot, was approximately 5700 lbs. The entire catenary and trolley in the two full spans lay on the ground at the end of this test.

Among those present at the tests were the following: W. J. Harvie, electrical engineer of the Oneida Railway Company; C. B. Marsh, assistant bridge engineer of the New York Central & Hudson River Railroad; W. K. Archbold, of the Archbold-Brady Company; Charles H. Banghart, master mechanic of the New York & Queens County Railway Company; Elmer P. Morris, Robert Andrews, representing the Electric Railway Equipment Company; representatives of the Central Railroad of New Jersey, Pennsylvania Railroad and Reading Railway; and representatives of the technical press.

The Central Electric Railway Association has adopted a resolution of regret at the sad and untimely death of Joseph L. Breen, late general manager of The Peoples' Railway Company, of Dayton, Ohio. Mr. Breen was an active and efficient member of the association.

WASHINGTON WATER POWER COMPANY'S SYSTEM AND NEW EQUIPMENT

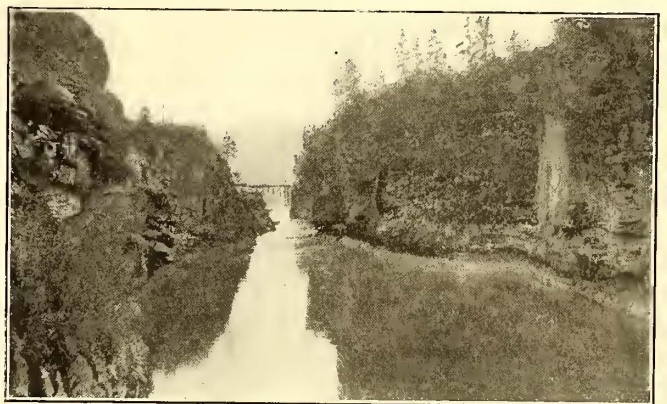
The Washington Water Power Company, of Spokane, Wash., has just received from the J. G. Brill Company twenty grooveless-post semi-convertible cars measuring 30 ft. 8 ins. over the bodies, four trailer interurban cars of the same type, 36 ft. over the bodies, and one combination passenger, smoking and baggage motor car, also having the semi-convertible



POWER HOUSE AND VIADUCT ON SPOKANE RIVER

feature. The shorter cars are mounted on trucks of the 27-F1 type and the larger cars on 27-E1½ type, also of Brill manufacture. The entire equipment consists of Brill convertible and semi-convertible cars numbering seventy-five in all.

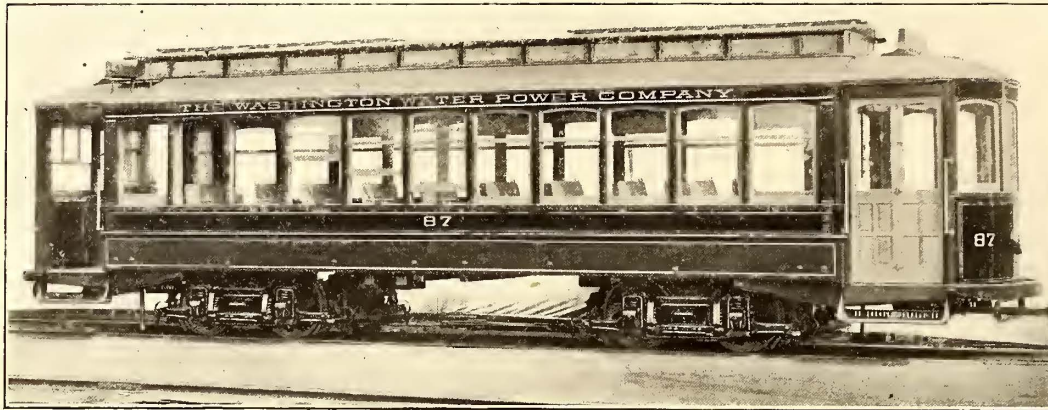
The Washington Water Power Company owns and operates the principal street railway system in Spokane, consisting of about 60 miles of track, and also a fifteen-mile line to the town of Medical Lake, for which the large cars are intended. About a year ago the Brill Company furnished three cars of practically the same type as the combination passenger, smoker and baggage shown herewith. These cars, with the new ones, will be run in trains of two cars each, and



POST FALLS, SITE OF NEW 18,000-HP POWER HOUSE OF WASHINGTON WATER POWER COMPANY

form as fine an interurban equipment as will be found anywhere in the country. When the Medical Lake line was opened a year ago, it was considered that the three combination cars would be able to take care of the traffic for some time to come, but the business increased at such a rate that a number of the large city cars were added to the regular schedule. Spokane has been for many years one of the most prosperous cities of the northwest. It is the center of a vast wheat producing section and of the mineral district of Eastern Washington. Its population numbers nearly 50,000. The railway company has a well laid out system in the city

and suburbs, and owns a large power plant situated on the Spokane River just below the Spokane Falls, from which it derives its power. This plant at present has a capacity of 13,000 hp. Another plant is being constructed at Post Falls, twenty-five miles from the city, which will have a capacity of 18,000 hp. The water is converted from three channels into a huge natural basin between cliffs of rock, and a dam is substantially built from rock blasted out of the basin, part of which was converted on the spot into cement. The company furnishes power to the other street railways in Spokane and



SEMI-CONVERTIBLE CAR FOR CITY SERVICE, WASHINGTON WATER POWER COMPANY

to several interurban lines and to the Coeur d'Alene lines. The various shops are of considerable size and all of modern construction, and a new car house, with a capacity of about 90 cars, has just been added. The heaviest traffic on the lines is to the pleasure park known as the Natatorium, owned and operated by the company, which includes swimming baths, a figure-eight roller coaster, "Ye Old Mill," circle swing and other amusements, and theatrical performances and concerts are given during the summer.

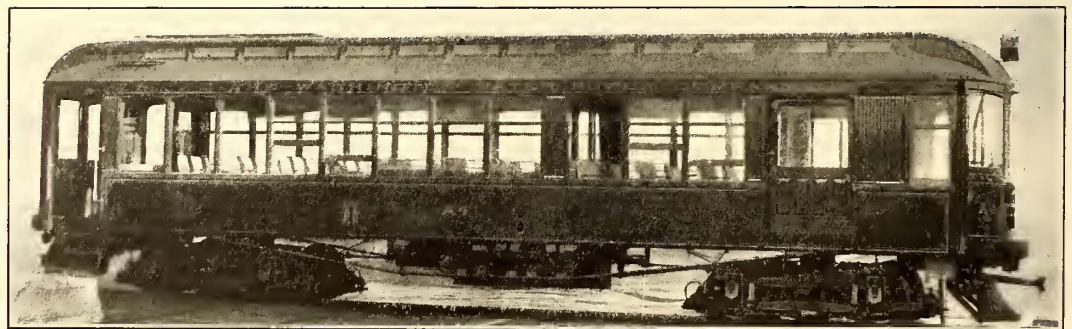
The line to Medical Lake, after leaving the city, crosses Hangman's Gulch on a high trestle and winds around a mountain up a 3-per cent grade for about five miles to a high plateau. The scenery along the route is very rugged and interesting, and fine views of the city of Spokane can be had from various points on the gradient. There are stations with platforms at the various villages and towns along the route, but most of the traffic is between the terminals. The products of a number of dairy farms are carried in the baggage compartments of the combination cars. Medical Lake takes its name from its famous curative properties. The water and the evaporated salts resulting from distillation are shipped to different parts of the country. The lake is one and a half miles long and a half mile wide, and is surrounded by an evergreen border of pine, fir and tannack. The town has a population of 2000, and includes the East Washington Hospital for the Insane, a large sanitarium and a number of hotels. An extension is proposed to Granite Lake, a few miles to the south of Medical Lake, where it is intended to establish an amusement park. The waters of the lake teem with fish and the bathing and boating facilities are excellent.

The cars for city service have the following dimensions:

Length over all, 30 ft. 8 ins., and over vestibule, 41 ft.; width over sills, including panels, 8 ft. 2½ ins.; over posts at belt, 8 ft. 6 ins.; thickness of side sills, 4 ft. x 7¾ ins.; end sills, 5¼ ins. x 6⅞ ins.; sill plates, 15 ins. x ⅞ ins., are on the inside of the side sills. The cars are finished in ash with decorated birch ceilings. The cars have seats for forty-four passengers. The truck-wheel base is 4 ft.; wheel diameter, 33 ins. The combination passenger, smoking and baggage car measures 41 ft. 8 ins. over the body, and 46 ft. 6 ins. over the vestibules; the width over sills, including sheathing, is 8 ft.

8 ins.; height from track over the trolley boards, 12 ft. 8⅞ ins.; thickness of the side sills, 4 ins. x 8¾ ins.; end sills, 5¼ ins. x 6⅞ ins., and sill plates, 15 ins. x ⅜ ins. The car has double flooring for the entire width. The straight passenger compartment seats thirty-two passengers, and the smoking compartment twelve passengers. The motor-man's compartment is separated from the baggage compartment with a

partition having sliding door. At either end of the compartment are windows with the lower sashes arranged to be raised. The central sash of the vestibule may be lowered into a pocket, while the sashes at either side are stationary. Entrances are either side of the platform at the rear end. A center door in the rear vestibule gives access to the trailer car, which is also provided with a vestibule center door. The car is intended for operation in one direction, and is provided with a pilot at the forward end. Besides the extra wide sill plates, which have been mentioned, the bottom frame includes under trusses and double-trussed needle beams. The trailer cars measure 36 ft. over the bodies and 46 ft. over forward vestibules and rear platform crown piece. The width



COMBINATION COMPARTMENT CAR, WASHINGTON WATER POWER COMPANY

over sills, including sheathing, is 8 ft. 8 ins., and the dimensions of the bottom framing are the same as the motor car. These cars seat fifty passengers. In one corner at the rear of the car is a toilet room of standard character. The toilet room is lighted with an oval window, and water tank for closet is placed under the roof and arranged to be filled from outside of roof. The rear platform is adapted to observation purposes by the enclosure of substantial railings, gates at entrances and trap doors over steps. The forward end is vestibuled to correspond with the rear end of the motor car.

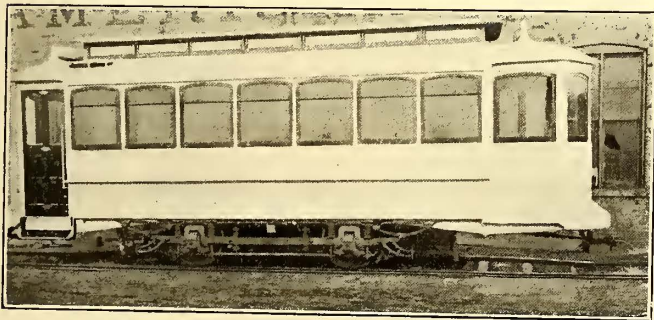
Both types of cars are finished in quartered oak, stained dark and rubbed to a dull finish, and the ceilings are also

quartered oak. Three-bar window guards are placed on the left side of the cars and extend from end to end. The cars are coupled with channel radial drawbars of Brill patented make. Other furnishings of same make include angle-iron bumpers, ratchet brake handles and "Retriever" signal bells. The cars are mounted on high-speed trucks of the Brill 27-E-1½ type with 6-ft. wheel base, 33-in. wheels and 4¾-in. axles. The trucks of the motor car are equipped with four 75-hp motors. Both city and interurban cars are furnished with seats of the Brill Company, the seats for the city cars being 36 ins. long, and those for the interurban cars, 38 ins. long. The seats are equipped with corner grab handles.

NEW EQUIPMENT FOR DUBUQUE, IOWA

The Union Electric Company, of Dubuque, Ia., which controls and operates the electric railway as well as the lighting system of that city, has recently added to its equipment some open and closed cars built by the American Car Company, and which are shown in the accompanying engravings. The company has made a number of important improvements in its railway system within the past two years, chief among them being the installation of a large new turbine plant for the combined operation of the electric railway, power and light circuits, and many special features have been incorporated which will make the plant one of the most modern in the country. This plant is situated near the Mississippi water front, in order to obtain the advantages of an abundant supply of water for condensing purposes. The rolling stock operated on the lines has been almost completely replaced within the past few years, and certain portions of the track system have been entirely rebuilt. A new car house and repair shop are also among recent additions.

The system provides for the operation normally of about twenty-five cars, the trackage of the lines (which are single

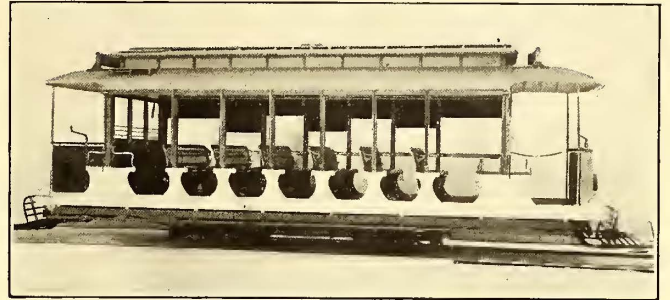


EXTERIOR CLOSED CAR FOR DUBUQUE, IA.

track) extending for about twenty miles. Among the places of interest reached by the lines are Union and Nutwood parks, both owned by the railway company; Ball Park is also easy of access by trolley. The city itself is second in size in the State, and has a population of 37,000. Four railroads connect it with Chicago, 150 miles to the west. The business portion occupies a terrace at no great height above the river and the rest of the city is picturesquely situated on the bluffs behind. As a port of delivery, railway junction and the center of the lead region of Iowa, Dubuque has an extensive and varied trade and engages in a large number of manufacturing industries. From 5,000,000 to 7,000,000 tons of ore are annually smelted in the vicinity, yielding about 70 per cent lead.

The closed cars measure 20 ft. over the body, and 29 ft. over the vestibules. The width over sills, including plates, is 6 ft. 3 ins., and over posts at belt, 7 ft. 5½ ins. The sweep of

the posts is 8 ins.; thickness of the side sills, 4¾ ins. x 7¾ ins., and center sills, 2¾ ins. x 5¾ ins.; end sills, 4 ins. x 5¾ ins. The interiors are finished in cherry with birch ceilings. The longitudinal seats are upholstered in spring cane, with the cushions in two sections. The seats have front panels with three electric heaters in each side of the car. Entrance is at one side only of the vestibuled platforms, and mutually operating double doors are in the body ends. All of the window sashes, both in the body and in the vestibule, are arranged to drop, with the exception of the small upper side sash, which is stationary. The 10-bench open cars are 20



OPEN CAR FOR DUBUQUE, IA.

ft. 11 ins. over the end post centers; 29 ft. 11 ins. over crown pieces; width over the sills, including the sill plates, 6 ft. 7¾ ins., and over the posts at seat ends, 7 ft. 4 ins.; sweep of the posts, 4 ⅜ ins.; centers of the posts, 2 ft. 8 ins. The side sills are 4¼ ins. x 7 ins., with 8-in. x 5⁄8-in. sill plates on the outside. The cross members are 2¾ ins. x 5½ ins., and the crown pieces, 3¾ ins. x 15 ins. The cars are all mounted on Brill 21-E trucks, which are made with a wheel base of 8 ft., and have 33-in. wheels and 4¼-in. axles. Two motors, 40-hp capacity, are used on each car. The cars were shipped "in



INTERIOR CLOSED CAR FOR DUBUQUE, IA.

the white." The weight of closed car and truck, without motors, is 11,000 lbs.; the open car, with truck and without motors, weighs 12,800 lbs.

It is reported that the same interests which recently purchased from Wehrner, Beit & Company, of London, control of the Mexico City Street Railway lines, has also concluded negotiations for the purchase of the street railway and lighting interests at Pueblo, and that by Jan. 1, 1907, the Mexican Light & Power Company, whose interests are closely allied with the new Canadian syndicate, will enter Pueblo with electric power from Necaxa, and at the same time, the power transmission lines of the company will be extended to Pachuca, in order to supply electric power to the mines of Pachuca, Real del Monte, Zimapan, and neighboring mining districts.

THE BACKSTROM-SMITH STEAM TURBINE

The successful testing recently of the first Backstrom-Smith turbine in the Oneida Street plant of the Milwaukee Electric Railway Company, may be taken as marking an important step in turbine engineering. This turbine operates under constant stage-pressures in varying quantities to suit varying loads from the maximum down to the minimum and is instantly available for either condensing or non-condensing work, the output of the machine remaining unchanged. Another important feature of this machine is the simplicity of its mechanism and the ingenious methods of construction, which make it at once a commercial proposition. In a general way, this turbine may be described as multi-cellular of the inflow type (independently proposed and developed by C. A. Backstrom). The general form is shown in Figs. 1 and 2. Special means are provided for direct coupling to the alternator and exciter.

In order to do for the turbine what the Corliss valve did for the reciprocating engine, this turbine, for the first time in the art, it is claimed, is provided with means for meeting the requirements of changing loads without throttling, making it nearly as economical for light loads as for the heaviest. This object is accomplished by using flexible steel bands, which are secured to the periphery of the nozzle sections and to spools or rollers (Fig. 3) mounted on a collar or ring, which has a limited rotary travel around the housing in which each turbine wheel revolves. A movement of this collar winds or unwinds the steel tape on each of the spools, uncovering or covering the series of nozzles or ports, which admit steam to the active buckets of the turbine wheels. This winding or unwinding of the steel tape is automatic, the device being so arranged that the flow of steam is always in proportion to the load, steam entering the different stages at a pre-determined and constant pressure but in varying quantities, which depend upon the number of nozzles covered or uncovered by the steel tapes. This automatic regulation is accomplished by means of a shaft running the full length of the turbine in the bottom of the housings. At proper intervals on this shaft are keyed pinions which engage corresponding teeth, cut in the ring or collar on which the several tape rollers are mounted, these rollers engaging with short racks secured to the nozzle ring

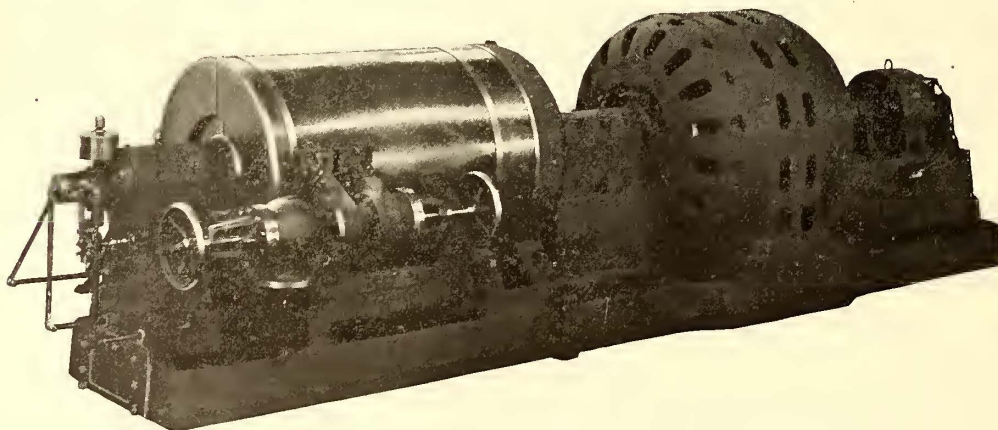


FIG. 1.—GENERAL VIEW OF BLACKSTROM-SMITH STEAM TURBINE

or housing. The minutest motion of the shaft results in winding or unwinding the tape on the rollers, thus closing or opening more or less of the nozzles. The motions of the shaft operating this ingenious cut-off mechanism are controlled by the governor shown at the left in Fig. 1. The governor controls a flow of oil under constant pressure, which, by means of a pressure cylinder and a rack and pinion, rotates the shaft in one or the other direction. The governor is dependent

upon the proper action of the lubricating mechanism, as any accident to the latter results in an automatic stopping of the turbine which insures the machine against self-destruction. In addition to this governor, with its two important functions, a safety device is provided in the shape of a safety governor controlling a butterfly valve, which closes automatically when

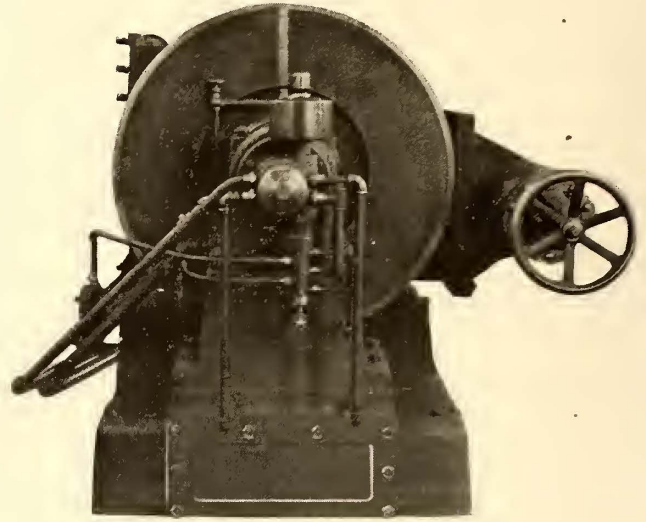


FIG. 2.—END VIEW OF TURBINE

the turbine speed reaches 5 per cent above the normal, and is otherwise inoperative.

In the size illustrated (400 kw), recently tested in the Oneida Street plant of the Milwaukee Electric Railway Company, there are ten turbine wheels or runners, the general form of which is shown in the vertical figure in Fig. 4. This figure illustrates a runner in one of the earlier stages, the bucket face of each successive wheel being wider. All the runners have an equal number of buckets of a uniform cross-section. This feature applies also to the nozzles.

It is held that superheated steam is not as essential to the economical operation of this turbine as in others. In the first place, it is claimed that there is a minimum of condensation, because of the constant pressure and temperature maintained

at all loads in all the stages of the turbine. The next contention is that all the water contained in the steam is separated from it and that this drained into the succeeding stage by automatic means, is at once in part, if not wholly, re-evaporated, thus becoming useful energy. Again, by using high-steam velocities, the surplus velocity appears in the form of superheat—which greatly reduces internal condensation and skin-friction. As an illustration, steam at 150-lbs. gage

pressure reaches the first stage of the turbine at a temperature of 366 deg. F. Any water contained in this steam (having naturally the same temperature) is separated from it, falling to the bottom of the stage chamber, from which it passes through an automatic device into the second stage, where the pressure is, say, 91 lbs. and the temperature 332 degs. F. An instantaneous evaporation naturally follows from these differences in pressures and temperatures.

A turbine of this type built and installed for use in connection with a condenser is arranged so that it may be quickly converted into an economical non-condensing type, should the condensing apparatus get out of order or become inoperative. This is done by providing an auxiliary exhaust at a point favorable for exhaust to atmosphere. This early exhaust relieves the turbine from a certain amount of back pressure which would arise from forcing a large volume of already fully expanded steam through a number of useless and idle turbine wheels, causing a considerably reduced efficiency and other unfavorable effects. The narrower opening in the housing, shown in the center of the turbine in Fig. 2, illustrates the auxiliary exhaust, while the wider opening at the end is the exhaust to the condenser. A permanent provision for operation under overload, with or without condenser, is provided through the valve shown at the right in Fig. 1. This valve may be operated by hand or it may be under direct control of the governor.



FIG. 3.—PORTION OF DEVICE FOR REGULATING STEAM SUPPLY

The builders have in operation a system by which the buckets to each of the wheels are cast in sections, all machining of these difficult and important parts being dispensed with. This is accomplished by the liberal use of finely polished, non-corrosive nickel steel to produce, in a practical way, an inexpensive and very effective casing for runner-buckets, as well as linings for nozzle openings, cast into attachable sections, as shown in Fig. 4. Assembling is facilitated by the fact that the turbine is made in independent standardised sections easily bolted to each other in erecting. The

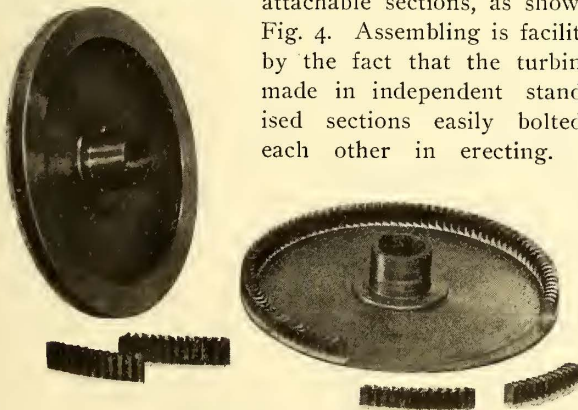


FIG. 4.—PORTIONS OF TURBINE WHEELS

usual practice of making parts in halves is not resorted to, and yet any part is readily accessible and can be easily replaced when repairs are necessary.

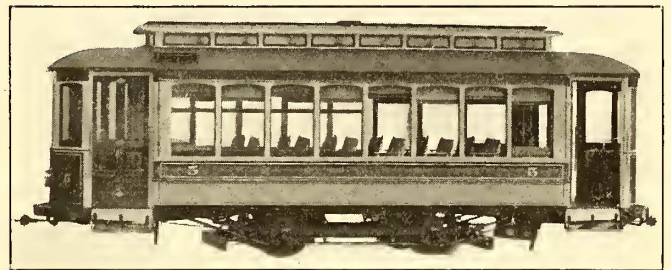
The builders are now prepared to take orders for short delivery for units not less than 400 kw nor more than 2500 kw. A new type of alternator, recently perfected by the Western Electric Company, will be used in connection with this turbine.

The Dayton & Troy, Western Ohio and Toledo Urban & Interurban lines have established through limited service from Dayton to Toledo. The distance is 162 miles, and the schedule is 5 hours and 51 minutes, and there is a limited car every two hours. This is the longest interurban run in this country, being 25 miles longer than the run from Indianapolis to Ft. Wayne, which previously held the record.

GROOVELESS-POST SEMI-CONVERTIBLE CARS FOR CHILlicothe, OHIO

Four single-truck, grooveless-post, semi-convertible cars of the Brill type, built by the G. C. Kuhlman Car Company, have lately been received by the Chillicothe Electric Railroad, Light & Power Company. Chillicothe is thirty miles directly south of Columbus, with which it is connected by the Scioto Valley Traction Company's interurban lines, as well as by steam lines. Another interurban line is planned to connect the city with Cincinnati, forty miles to the west. The city lies in a rich agricultural district and has excellent facilities for transporting products by the Baltimore & Ohio Southwestern, the Norfolk & Western and the Cincinnati, Dayton & Hamilton.

The new cars have the standard features and dimensions for this single-truck, semi-convertible type, being 20 ft. 8 ins. over the bodies and 30 ft. 1 in. over the crown pieces. The interiors are finished in cherry, with birch veneer ceilings. The incandescent lamps are placed singly at intervals under the monitor deck and along the lower ventilator rails. Push-



SEMI-CONVERTIBLE CAR FOR CHILlicothe ELECTRIC RAILROAD, LIGHT & POWER COMPANY

over seats with corner grab handles are of Brill manufacture, and other specialties of the same make include angle-iron bumpers, folding-door controllers, ratchet brake handles and radial drawbars, "Dumpit" sand boxes, "Dedenda" platform gongs and "Retriever" signal bells. The width of the cars over the posts is 8 ins., and as the walls are without window pockets they are but 2 ins. thick, leaving an interior width of 7 ft. 8 ins. to be divided between seats and aisle. The seat cushions are 35 ins. long, and the aisle 22 ins. wide. The longitudinal corner seats are 31 ins. long. The bottom frame includes 12-ins. x 3/8-in. steel plates, and the side sills are 3 3/8 ins. x 5 ins. thick; end sills 3 1/2 x 8 3/8 ins.; thickness of the corner posts, 3 3/8 ins., and the side posts, 2 3/4 ins. The cars are mounted on No. 21-E trucks, which have a wheel base of 7 ft. 6 ins., and 33-in. wheels. Two 25-hp motors are used per truck.

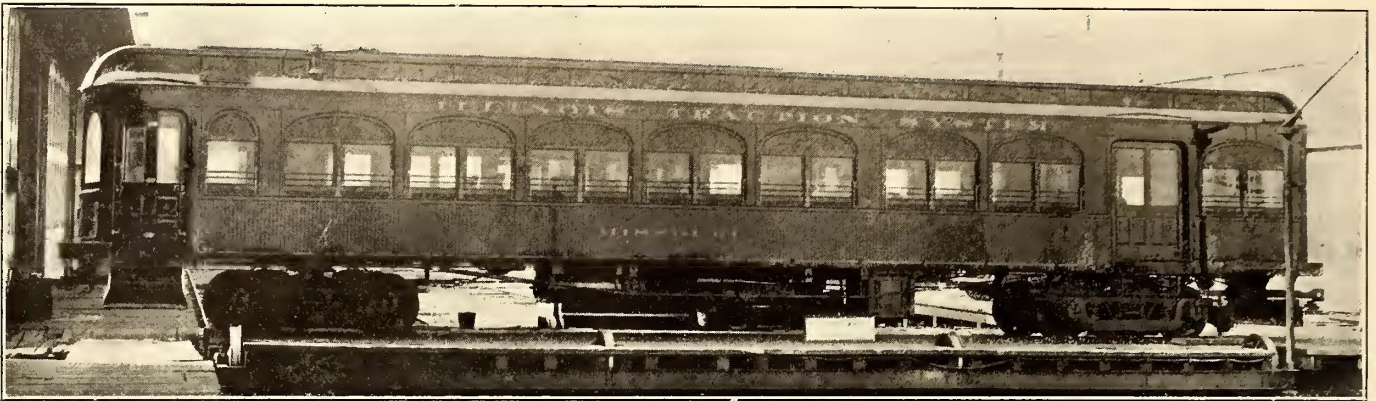
BASEBALL TROLLEY LEAGUE IN WHICH SIX CITIES ARE REPRESENTED

The Cleveland & Southwestern Baseball Trolley League has been formed for the fourth season by J. O. Wilson, general passenger agent of the Cleveland & Southwestern Traction Company, of Cleveland. Six towns touched by this system are represented. Mr. Wilson was chosen president of the league, and has the general management of its affairs. The company donates a beautiful silver cup for the winning team. It assists in the advertising, and furnishes free transportation to the players. The league has stirred up a great deal of local pride in various towns, and a great many people go from one town to another to attend the game. It is not the practice to give special rates, and special cars are seldom run, although it is frequently necessary to doublehead some of the runs.

A BUFFET CAR FOR THE ILLINOIS TRACTION SYSTEM

The St. Louis Car Company has just completed three of the most elaborate cars ever constructed for regular service on an electric railway. The cars were built for the McKinley syndicate, whose headquarters are at Danville, Ill., and will be put in service on the lines of this company, which will operate cars from Danville, Ill., to St. Louis, upon the completion of certain links of track. The three cars are named

passenger compartment behind the smoker is 24 ft. 9 ins. in length and seats thirty-two passengers. Between the main and the baggage compartments is a buffet. What would usually be termed the rear platform is rather an observation compartment, it being 7 ft. 6 ins. in length. The entrance doors are double and are provided with trap doors which close down tightly and remove all appearances of the usual platform or vestibule. The only apparatus on this end of the car is a lever brake. The observation compartment has two

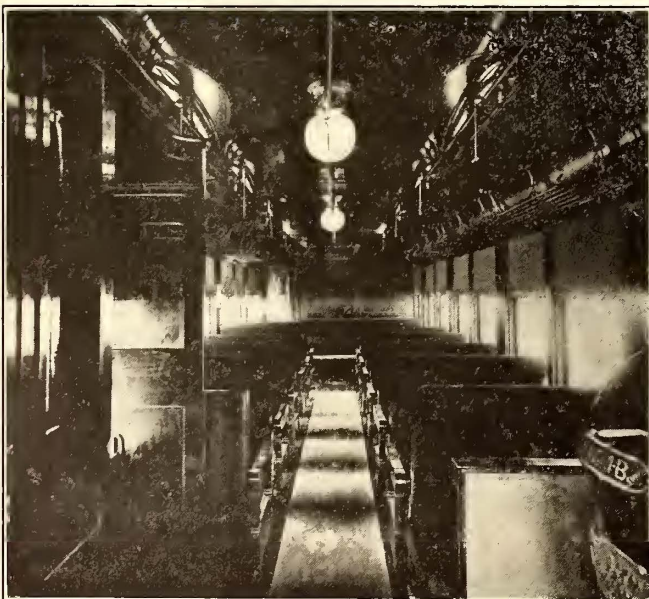


EXTERIOR BUFFET CAR FOR ILLINOIS TRACTION SYSTEM

for the States they will be operated in, Indiana, Illinois and Missouri. They are much larger than the usual type of interurban car, measuring 62 ft. 6 ins. long and 9 ft. 6 ins. wide over all, but the distinctive feature of the cars is the arrangement of the compartments in the interior and the completeness with which these are finished. The body is built on the standard steel bottom framing of the St. Louis Car Company and the sills extend clear through to the bumpers on each end, which construction gives added strength to the bottom framing. The cars are intended for operation in

leather-covered seats and wicker chairs and is heated by electricity. A large dome built in the ceiling contains in its center a large holophane globe, lighted by a cluster of incandescent lamps inside.

The fact that the door leading from the main compartment to the smoker is on one side of the car makes possible the placing of one long seat extending almost across the car against the forward partition of the main compartment. In addition to this seat, there are in the main compartment thirteen additional ones of a special design of cross seats built



MAIN PASSENGER COMPARTMENT, LOOKING TOWARD FRONT END OF CAR



REAR OF MAIN PASSENGER COMPARTMENT AND OBSERVATION COMPARTMENT BEYOND

one direction only, and are provided with controllers and motorman's cabs on but one end. The interior of each car is divided into several compartments. A baggage room and motorman's cab occupy the front portion. The location of the cab is shown in one of the illustrations. Immediately behind this is a smoking compartment 11 ft. long. The main

by the St. Louis Car Company and provided with a mahogany arm rail with inlay to correspond with the finish of the compartment. The figured blue plush with which the cushions are covered harmonizes well with the interior finish of the compartment, which is of mahogany of special selection, and inlaid with neat marquetry work. Sockets are provided in

the side finish below the arm rest for the support of card tables between the seats. The lavatory, toilet room, and the hot-water heater, which is of the Peter Smith type, are in the rear of the compartment, the heater being on the left side when facing the front of the car, and the toilet room directly opposite, while the lavatory is immediately in front of the toilet room. The lavatory is of the design usually found in Pullman cars. It is not enclosed, but is isolated somewhat by a partition. The toilet room is equipped for water, and the hopper is of the type found on the better class of steam coaches.

The smoker is finished in inlay mahogany to correspond with that of the rear compartment. Only two fixed seats are provided. These are covered with leather and are placed against the forward and rear bulkheads. The buffet in the rear of this compartment is complete in every detail. It is built across the car and measures 3 ft. 8 ins. wide and 6 ft. in length. A small window provided with a shelf permits coffee and sandwiches and other edibles to be served to people in the smoking compartment without being visible to those in other parts of the car. The buffet is provided with an Adams & Westlake urn which sets on a copper-covered table. The ice-box is of sufficient size to hold several hundred pounds of ice and drains to the under side of the car. A zinc-lined sink is also provided. All the space underneath the tables is taken up by lockers and shelves. Overhead is an annunciator connected to buttons in the different compartments of the car. Water for the buffet as well as for the lavatory and the water closet is obtained from a tank built in the car above the toilet room and filled from the outside of the car.

The motorman's cab occupies the left-hand corner of the forward or baggage compartment, from which it is separated by solid and glass partitions. Entrance to the cab is gained

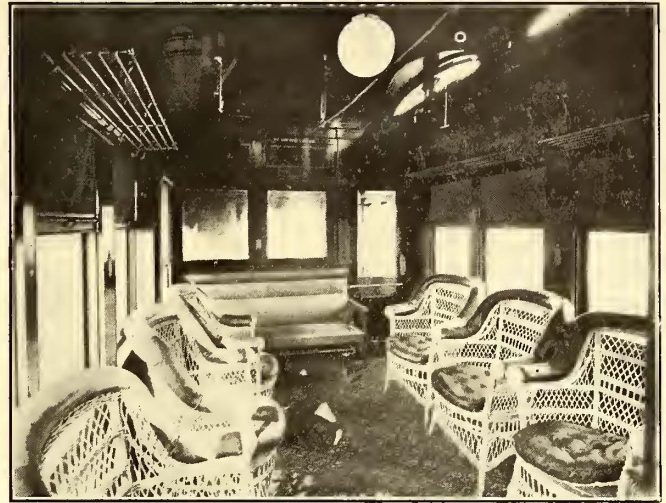


BAGGAGE COMPARTMENT, SHOWING FOLDING SEAT, HEATERS AND SMOKING ROOM BEYOND

either through a door in the side of the car or through a low opening in the partition between the cab and the smoking compartment. Communication between the cab and the rear compartment is effected by means of a speaking tube. A seat which may be swung back against the rear partition is provided for the convenience of the motorman, and electric heaters, under the control of the motorman, provide suffi-

cient heat in the cab at all times. The baggage compartment is finished in quarter sawed oak. Two permanent seats in this compartment are so built that they may be swung up against the wall when not in use or when the room becomes filled with baggage. In addition to the usual glass baggage compartment doors, a second set of doors is provided which are fitted with wire netting instead of glass.

The ceilings throughout the car are of the full empire



SMOKING COMPARTMENT FROM REAR END

type, the headlining being finished in a light blue to match the interior finish. Leaded art glass in both the upper sash of the side windows and in the upper deck sash add much to the interior appearance of the car.

Lighting is effected by means of both arc and incandescent lamps. The arc lamps, two in the main compartment and one in the smoker, are placed in the domes of the ceiling. The incandescent lamps are carried in neat electroliers on the moulding over the deck sill. In addition to the hot-water system of heating, electric heaters are also provided. These can be used when the car is only slightly chilly and will often avoid the necessity of building a fire in the heater. The fuses and switches for all of the electrical apparatus are located on a slate switchboard in a cabinet immediately behind the motorman. The board is wired from the back side and swinging doors opening into the baggage compartment permit access to the rear of the board and to the wiring. The car is equipped with General Electric type-M control, Christensen air compressor, and a pilot of the locomotive type.

General Superintendent E. P. Shaw, Jr., has contributed liberally to the uniforming and equipping of a baseball team made up of employees of the Boston & Worcester Street Railway.

During the year ending March 3, 1906, the Brooklyn Rapid Transit Employees' Benefit Association paid out more than \$22,000 to members or their families in benefits. During 1905, 525 members received benefits amounting to \$14,777. Of this amount \$7,050 was paid to the families of forty-seven members who had died. These figures do not adequately represent the protection afforded by the association's medical provisions, for 525 members amounted to only 25 per cent of the number of those given free medical treatment by the association's physician during the year. The association had on hand on March 31, 1906, more than \$25,000 in cash to meet its obligations.

FINANCIAL INTELLIGENCE

WALL STREET, May 23, 1906.

The Money Market

Increasing ease characterized the money market in all the branches during the past week, rates for both call and time loans ruling substantially below those prevailing at the end of last week. The improvement was due largely to the extremely light demand for funds from stock commission houses, resulting from an inactive and lower stock market, rather than to any pressure of funds by the local banks. As a matter of fact, the local institutions were not disposed to offer with as much freedom as heretofore, but the offerings from other sources were sufficient to meet all requirements. The resources of the New York City banks have been materially strengthened by the influx of funds from the interior, and the movement in this direction will assume much larger proportions in the near future. Indications point to the early return of a large portion of the money recently sent to San Francisco. The banks at the principal interior points have already received substantial amounts from the Pacific Coast, and it is expected that the return shipments to New York next week will be heavy. Foreign exchange continues firm, thus preventing a resumption of gold imports. The amount of gold received from Europe during the week amounted to about \$3,250,000, making the total arrivals to date \$41,037,806, and leaving \$5,175,000 yet to come. The European money markets have ruled easier. The Imperial Bank of Germany's discount rate, which has ruled at 5 per cent since the beginning of the year, has been reduced to 4½ per cent, and a reduction in the Bank of England rate to 3½ per cent is expected in the near future. At the close all indications point to a continued easy market. About the only factor in the situation at the present time that is likely to result in a disturbance in rates is the payment for the \$50,000,000 Pennsylvania notes on the 29th, but as the moneys received on this account will be redeposited in the banks immediately, little uneasiness is felt on this score. The bank statement published on last Saturday showed an increase in loans of \$15,071,600, and an increase in deposits of \$12,276,500. Cash increased \$303,800, but as the reserve required was \$3,069,125 more than in the preceding week, the surplus reserve was reduced \$2,765,325. The surplus is now \$10,129,275, as compared with \$8,219,975 in 1905, \$13,004,275 in 1904, \$9,222,725 in 1903, \$14,301,450 in 1902, \$21,888,975 in 1901, and \$16,555,225 in 1900.

Money on call loaned at 5 and 2½ per cent, the average rate for the week being about 3¼ per cent. Rates for time money ruled about ¼ per cent lower as follows: Thirty and sixty days 4 per cent, three and four months 4½ per cent, four and six months 4¾ per cent, and over the year maturities at 5 per cent.

The Stock Market

The course of the stock market during the past week was rather irregular, and the volume of business showed a considerable diminution from that recently transacted; in a word, the speculation was quite uninteresting, yet withal the market acted in a perfectly normal manner, considering the recent severe shake-down, which it is now thoroughly appreciated was wholly unwarranted, and the subsequent sharp recovery. In a few exceptional instances pronounced strength was developed, but this was the result more of special than of general causes. Amalgamated Copper, for instance, moved up considerably at one time, in response to the reports of unprecedented large earnings by the company; National Lead improved on the resumption of common stock dividends; Union Pacific made a substantial gain on prospects of an increased dividend in the not distant future; American Smelting & Refining did likewise, and from a similar cause; American Locomotive improved materially on reports that a dividend had been, or was about to be, declared, and Lackawanna scored a big rise to 550, thereby establishing a new high record. In the vast majority of instances, however, fluctuations in prices were of an uncertain character, due chiefly to the fact that the professional operators were disposed to take a somewhat gloomy view of the situation, even though underlying sentiment was unquestionably optimistic. That this should be so is perfectly

natural, as all the dark clouds that have lately hung over the stock market have become dissipated, and the outlook for the general share speculation appears to be very bright. Monetary conditions have vastly improved, the great iron and steel manufacturers report record-breaking earnings, receipts of the railroads, as a class, continue on a high plane, and crop prospects are at least fairly encouraging, notwithstanding recent exaggerated reports of lack of moisture in the winter wheat belt, which resulted in a sharp up-turn in the price of that cereal at one time during the week. These reports, together with the announcement from Paris that the Pennsylvania Railroad had concluded another loan there, tended to unsettle the general stock market a little at the end, but there was a noticeable lack of liquidation, and practically all of the selling came from professional traders, who are disgruntled on account of their recent experiences in the market and are seizing upon every possible opportunity to recoup their losses. Taken in its entirety, the market may now be described as being in a waiting attitude, from which position it does not seem likely to emerge until it has received some fresh impetus. Possibly the adjournment of Congress, which is expected to take place before long, may supply this.

The local traction stocks followed the same general course as did the balance of the market, and for the most part were dull. Toward the close of the week considerable selling of Brooklyn Rapid Transit was indulged in, on the announcement that a suit will be instituted compelling the company to reduce its fares to Coney Island to 5 cents. Meanwhile, the earnings of that company are continually piling up in a manner that suggests the possibility that present short sellers of the stock may some day be brought up with a round turn, more especially if the proposed suit against the company fails of its purpose, as is more than likely.

Philadelphia

A somewhat larger volume of business was transacted in the local traction shares during the past week, and while prices at times displayed some irregularity, the net changes in most instances were confined to fractional limits. Philadelphia Rapid Transit was the active feature, upwards of 4000 shares changing hands at from 26¾ to 25¾. The buying on the way down was considered good. Little interest was manifest in the shares of the Philadelphia Company. Small lots of the free common stock sold at prices ranging from 50¾ to 50¼, and the preferred changed hands at from 49 to 49½. The receipts, representing 1600 shares, sold at 33¾. Consolidated Traction of New Jersey displayed considerable strength, the price rising a full point to 82¼, on the purchase of a few hundred shares. Fairmount Park Transportation was strong, about 300 shares being transferred at prices ranging from 17 to 18½. American Railways moved up ½ to 52, and Railways General sold at 67⅞ and 7. Other transactions included odd lots of Philadelphia Traction at 99 and 98½, Union Traction at 63½ and 63¼, and United Companies of New Jersey at 263½ to 262½.

Chicago

The progress of the negotiations looking to a settlement of the Chicago traction controversy, and the expectations of a full agreement in the near future, resulted in a decided improvement in the shares of the various street railways during the past week. Not only was the dealings considerably larger, but they were accompanied by sharp advances in prices. North Chicago rose from 32 to 40 without a reaction, upwards of 800 shares changing hands in the advance, while more than 1000 shares of West Chicago sold at from 28 to 36. Chicago City Railway stock was traded in for the first time in several weeks, several small lots selling at 155 and 160, an advance of 10 points over the last recorded sales. Union Traction preferred sold at 12½. The elevated issues were also more animated. South Side sold at from 94 to 95 for about 800 shares. Metropolitan Elevated, after selling at 28, dropped to 27, but rallied later to 27½, while the preferred brought 68 for 100 shares. Chicago & Oak Park common sold at 6¼, and the preferred at 23⅞. Northwestern Elevated brought 25½ for a lot of 100 shares.

Other Traction Securities

Dealings in the United Railway issues at Baltimore assumed much larger proportions during the past week, and prices for both the stocks and the bonds rose sharply. Interest centered largely in the free incomes, nearly \$400,000 of which were traded in at prices ranging from 71 $\frac{7}{8}$ to 74 $\frac{1}{4}$, the final transaction taking place at 73 $\frac{1}{2}$. The certificates representing income bonds deposited advanced from 71 to 73, on the purchase of about 115,000. The 4 per cent bonds were comparatively quiet but firm, about \$50,000 of them changing hands at 91 $\frac{3}{4}$ and 92 $\frac{1}{4}$. Both the free and deposited stocks ruled fractionally higher, the first named selling at 16 and 16 $\frac{3}{8}$ for about 1000 shares, while about 2500 shares of the latter brought prices ranging from 16 $\frac{7}{8}$ to 16 $\frac{1}{2}$. Other issues were quiet but firm. Washington City & Suburban 5s were somewhat higher, sales taking place at 105 $\frac{1}{2}$. City & Suburban 5s sold at 113, and Norfolk Railway & Light 5s brought 99 $\frac{1}{2}$; Charleston Electric 5s sold at 95. The Boston market was dull and price movements were erratic. Boston Elevated, after an advance from 154 to 155, dropped to 153 on light sales, and Massachusetts Electric, after a decline of 1 $\frac{1}{4}$ points to 17 $\frac{1}{4}$, advanced to 19. Small lots of the preferred stock sold at 65 $\frac{1}{2}$ and 66. Other sales included Boston & Worcester common at 36, West End common at 98 and 98 $\frac{1}{2}$, and West End preferred at 113. Interborough receipts were entirely neglected in the New York curb market. New Orleans Railway common developed some strength, 700 shares selling at 34 $\frac{1}{4}$ to 33 $\frac{1}{2}$. Public Service Corporation 5 per cent notes sold at 95 $\frac{3}{4}$ for \$10,000.

There seems to be no limit to the bull movement of Cincinnati, Newport & Covington at Cincinnati. Last week it advanced from 71 to 71 $\frac{1}{4}$ on sales of about 1800 shares, and the early part of this week there was another raid which carried the price up to 76, on sales of about 1700 shares. A remarkable feature of this movement was that the preferred stock showed a decline from 98 to 97 $\frac{1}{2}$. Toledo Railways & Light had an upward movement on a report that the property is to be merged with the Detroit United. The advance was from 31 $\frac{3}{4}$ to 33 $\frac{5}{8}$. Cincinnati Street Railway was inactive at 144. Detroit United showed a decline of 2 $\frac{1}{2}$ points for the week, common selling at 96 $\frac{1}{2}$. Columbus Railway preferred gained 2 $\frac{1}{2}$ points to 112. Cincinnati, Dayton & Toledo sold at 26 $\frac{3}{4}$.

Northern Ohio Traction & Light suffered a fractional decline in Cleveland from 33 $\frac{1}{8}$ to 32 $\frac{1}{2}$, in spite of the declaration of a 2 per cent dividend last week. Cleveland Electric Railway is showing new strength. A number of small lots sold as high as 79 $\frac{1}{2}$, and one lot of 5000 shares was bid for at 78, but the offer was not taken. Cleveland & Southwestern common advanced from 15 $\frac{3}{4}$ to 16 $\frac{1}{8}$. This property is showing gains in earnings at the rate of nearly \$300 per day for May, and there is good prospects that dividends on preferred stock will be renewed this fall. Lake Shore Electric made a gain from 16 $\frac{1}{4}$ to 16 $\frac{5}{8}$ on news of improved earnings. Western Ohio receipts sold at 16, and Aurora, Elgin & Chicago at 35. Bidders are offering 106 for Washington, Baltimore & Annapolis underwriting, and there was a sale of second mortgage bonds of this company at 35.

The small holders of Toledo & Western at Cleveland and Toledo are not looking with much favor upon the offer made by W. J. Hayes, of Cleveland, to buy the controlling interest in this property at \$15 per share. The stock sold in Toledo last week at an advance from 16 to 17 $\frac{1}{8}$, and brokers are advising holders not to sell at the price offered. The optional offer of 15 made by the firm mentioned has been extended to May 31.

Security Quotations

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

	May 16	May 23
American Railways	51 $\frac{1}{2}$	51 $\frac{3}{4}$
Boston Elevated	154	a154 $\frac{1}{2}$
Brooklyn Rapid Transit	83 $\frac{3}{4}$	81 $\frac{3}{8}$
Chicago City	150	160
Chicago Union Traction (common)	4	3 $\frac{7}{8}$
Chicago Union Traction (preferred).....	12 $\frac{5}{8}$	11 $\frac{1}{2}$
Cleveland Electric	78	81
Consolidated Traction of New Jersey.....	80	81
Detroit United	95	94

Interborough Rapid Transit receipts.....	231	226
Interborough-Metropolitan Co. (common), W. I.....	53 $\frac{3}{4}$	50 $\frac{1}{4}$
Interborough-Metropolitan Co. (preferred), W. I.....	86 $\frac{1}{4}$	84
Interborough-Metropolitan Co. 4 $\frac{1}{2}$ s, W. I.....	—	—
International Traction (common)	38 $\frac{1}{4}$	40 $\frac{1}{2}$
International Traction (preferred), 4s.....	72	74
Manhattan Railway	153	152
Massachusetts Elec. Cos. (common).....	18	19 $\frac{1}{2}$
Massachusetts Elec. Cos. (preferred).....	64	68
Metropolitan Elevated, Chicago (common).....	27 $\frac{1}{2}$	26
Metropolitan Elevated, Chicago (preferred).....	68	66
Metropolitan Street	115	112
Metropolitan Securities	74 $\frac{3}{4}$	—
New Orleans Railways (common).....	32	32
New Orleans Railways (preferred).....	80	80
New Orleans Railways, 4 $\frac{1}{2}$ s.....	86	—
North American	96 $\frac{1}{4}$	96 $\frac{1}{4}$
North Jersey Street Railway	27	27
Philadelphia Company (common).....	50 $\frac{3}{4}$	50 $\frac{1}{8}$
Philadelphia Rapid Transit	26 $\frac{1}{2}$	25 $\frac{1}{4}$
Philadelphia Traction	99	98 $\frac{1}{2}$
Public Service Corporation 5 per cent notes.....	94	95 $\frac{1}{2}$
Public Service Corporation certificates.....	70	71
South Side Elevated (Chicago).....	91	94
Third Avenue	130	130
Twin City, Minneapolis (common).....	117	116
Union Traction (Philadelphia).....	62 $\frac{3}{4}$	63
West End (common)	98	98
West End (preferred)	113 $\frac{1}{2}$	113

W. I., when issued. a Asked.

Metals

The "Iron Age" estimates that 600,000 tons of steel rails have now been definitely closed for next year, and that nearly 300,000 tons in addition will be carried over from this year. The foundry pig iron market is easy under continued inaction. The billet market is working into a freer condition, more steel being available. Attention is still converging in the bar situation. Large contracts are impending, and the question is one of terms.

Copper metal continues strong, but prices are unchanged at 18 $\frac{3}{4}$ to 18 $\frac{7}{8}$ c. for spot Lake, 18 $\frac{3}{8}$ to 18 $\frac{5}{8}$ c. for electrolytic, and 18 $\frac{1}{4}$ to 18 $\frac{3}{8}$ c. for castings.

DAMAGE TO OCEAN SHORE RAILROAD

The Ocean Shore Railroad, which is building a double-track electric railway from San Francisco to Santa Cruz, suffered damage to the extent of about \$40,000 from the recent earthquake. The damage was confined to a landslide that destroyed about 4000 ft. of roadbed. Between the end of the Ocean Highway and Mussel Rock the route of the Ocean Shore road lies along the side of a precipitous bluff for a distance of 2 miles, and C. E. Loss, who has the contract for building the line, had about 4000 ft. of roadbed, cut out of the side hill by means of a steam shovel, completed at the time of the earthquake.

The formation of the ground in this neighborhood is of a loose and unstable character, consisting of soft earth and decomposed rock, and above the cut made by the grading forces an immense amount of material was loosened by the temblor and slid down the hillside toward the ocean, obliterating all trace of the Ocean Shore's roadbed. C. E. Loss says that the work of restoring the roadbed will involve the removal of an immense amount of material, and an additional steam shovel will shortly be put on the work. The clearing of the hillside, he estimates, will cost about \$40,000. At other places along the route of the Ocean Shore embankments and fills were settled somewhat by the earthquake, but this is only calculated to make the embankments more solid. Grades can be restored by putting in more material.

"The earthquake's path of greatest activity seems to have run through the neighborhood of Mussel Rock," said Mr. Loss, "and from Mussel Rock it seems to have shot off at an abrupt angle toward the Santa Cruz mountains, which fact explains why the Ocean Shore road, which lies quite close to the ocean, suffered no appreciable damage south of Mussel Rock. It is a curious circumstance that whereas the eminences in San Francisco suffered less from the shock than the low places, further down the coast, and particularly in the Santa Cruz mountains, the high places experienced the greatest effect from the earthquake. The coast country below Mussel Rock was not disturbed to any noticeable extent."

THE WESTERN NEW YORK-PENNSYLVANIA MERGER

The holdings of the Cleveland security holders of the Buffalo, Dunkirk & Western Railway have been formally transferred to the syndicate headed by Joseph E. Mayer and W. F. Sheehan, of Buffalo, and Kuhn, Loeb & Company, of New York. As has been stated in these columns, the syndicate has acquired control of the Buffalo & Hamburg, the Erie Rapid Transit Company, the Lake Erie Traction Company, the Jamestown, Chautauqua & Lake Erie (steam) in addition to the Buffalo, Dunkirk & Western, embracing all the lines between Buffalo and Erie. These are to be merged into one company which will be capitalized with \$2,500,000 5 per cent preferred stock and \$5,000,000 common stock and a bonded indebtedness of \$7,000,000. Joseph B. Mayer, of Buffalo, will have charge of the completion of the Buffalo, Dunkirk & Western between Buffalo and Dunkirk. It is learned from an apparently authoritative source that the new owners are acting for the New York Central Railroad in this transaction.

STREET RAILWAY SERVICE IN CHICAGO TO BE IMPROVED IMMEDIATELY

The refusal of the United States Supreme Court to grant a rehearing of the ninety-nine-year case, upon which a decision was given out against the Chicago street railway companies, March 12, as already announced in the *STREET RAILWAY JOURNAL*, has opened up the way for bringing about the immediate improvement in street railway service in Chicago and, incidentally, the lowering of the three tunnels under the river as ordered by the Secretary of War at Washington. Upon receipt of the news of the refusal to grant the rehearing, Mayor Dunne lost no time in arranging for meetings of the city authorities and the representatives of the street railway companies. The present plan is to electrify the cable systems at once, using the old rolling stock until a general agreement has been reached between the city and the companies. General Counsel W. W. Gurley, of the Union Traction Company, and T. E. Mitten, president of the Chicago City Railway Company, have agreed to reconstruct their lines and to operate them on the basis of an indeterminate license for future operation, as proposed in Mayor Dunne's recent letter to Chairman Werno, of the local transportation committee of the City Council, provided the details of the arrangement are satisfactory.

A plan for equipping with electricity the West Side and North Side cable lines immediately and lowering by means of new roofs the La Salle, Washington and Van Buren Street tunnels to a depth of 26 ft. below low-water level has been blocked out. It provides for electrifying the lines using the Washington Street tunnel first, and to have the work completed within sixty days. Within five months from the end of the sixty days the tops are to be removed from the tunnel. For the La Salle Street tunnel lines it is proposed to give ninety days in which to electrify and six months thereafter for lowering.

The lines using the Van Buren Street tunnel are to be electrified within ninety days, and the right is to be given to start trolley cars over the line as soon as it is electrified. The question of the time in which this tunnel shall be lowered is left entirely to the companies, inasmuch as they are under the direct orders of the Secretary of War on this bore, which they own. The companies are to pay the entire cost of putting in the new roofs and concreting, but if the city takes over the property for use by itself or by somebody else, the company will be repaid the actual cost of the work. The Commissioner of Public Works is to supervise the work and approve the bill.

At any time the city wishes the ordinance is to be revoked. The city may use the trolley poles for electric lighting, if it wishes. As compensation for trolleyizing its West and North Side lines, the company is to pay the city \$25,000 a year in equal monthly installments. This sum will be a clear addition to the income from car licenses, for which the company now pays about \$75,000 a year. All feeder wires east and south of the river are to be underground. Any or all of the provisions of the ordinance are to be subject to repeal or revision by the City Council at any time.

According to General Counsel Gurley, of the Chicago Union Traction Company, all the street railway interests concerned in the lowering of the tunnels have agreed to these general plans and an ordinance embodying them will be submitted to the City Council. Every indication points to an immediate substitution of the cable cars by those electrically operated, and an early improvement in the service in all other respects.

ROCHESTER-LOCKPORT ROAD TO BE BUILT BY J. G. WHITE & COMPANY

Arrangements have been completed whereby J. G. White & Company, of New York, will build a high grade interurban railway between Rochester and Lockport, generally paralleling the lines of the New York Central Railroad. The contract calls for an expenditure of \$2,000,000 and the syndicate behind the project is represented by Frederic Nichols, E. R. Wood and Sir Henry M. Pellatt, all of Toronto, who are connected also with the Ontario Power Company.

Under the terms of the contract J. G. White & Company will grade 54 miles for double-track road, though only a single track will be laid at first, the second track being added when the traffic warrants further expenditure. The contract includes also all the overhead work, the building of five sub-stations with the electrical equipment, the construction of repair shops and car houses and the supply of all rolling stock. The track construction will be heavy and the gradients will be so restricted as to permit the maintenance of high speed. The rolling stock will be of the standard design for interurban service, and will include express cars, passenger cars, and snow plows. Power will be supplied by the Ontario Power Company at 60,000 volts pressure, which will be reduced to the standard working pressure for direct-current railway service. The transmission line is the only portion of the electrical equipment which is not included in the contract, that being supplied by the Ontario Power Company to the sub-stations. The bridge structures, of which there will be a considerable number, will be of steel and concrete. There will be no grade crossings.

From Rochester west to Brockport, a distance of 16 miles, including the towns of Spencerport and Adams Basin, the electric road will exactly parallel the main line of the New York Central on the north side. About 2½ miles west of Rochester the lines of the Buffalo, Rochester & Pittsburg will be bridged, and again ¾ of a mile further west there will be a bridge over the Barge Canal. From this point westward for a distance of more than 40 miles the electric railway will lie between the Barge Canal and the tracks of the Central. At Holley, 4½ miles west of Brockport, there will be a bridge over Sandy Creek. A short distance west of Holley there will be a deviation of about ¾ of a mile from the tracks of the Central, but the gap is closed again before reaching Albion, 9 miles further west. West of Albion the tracks of the Central break slightly to the southward and proceed direct through Medina. The electric road will run almost due west from Albion for 6 miles, to include the town of Knowlesville, which is only 1 mile north of the Central tracks. From Knowlesville the direction of the interurban will be slightly more southerly into Medina. The main construction offices of J. G. White & Company will be established at Medina. The right of way of the interurban will be adjacent to that of the Central for 7 miles west of Medina, passing through the town of Middleport; 2 miles west of Middleport the electric road will cross the tracks of the Central at a small angle on a long bridge. This is the only crossing of the New York Central tracks, and from this point west into Lockport, a distance of 9 miles, the interurban lies to the south of the route of the Central. Work will be commenced immediately.

BROOKLYN COMPANY AND BRIDGE ENGINEER AGREE ON TRANSIT PLAN

The suggestion made by Bridge Commissioner Stevenson, of a double-decker elevated structure from the Brooklyn Bridge to Delancey Street, in Manhattan, and a single elevated road on that thoroughfare to the Williamsburg Bridge, meets with the approval of the Brooklyn Rapid Transit. It is, in fact, a revival of the plan put forward by Borough President Littleton, when in office, except that Mr. Littleton's scheme contemplated the erection of a complementary loop in Brooklyn. In relation to the project, President Winter, of the Brooklyn Rapid Transit, has said:

"I am not fully informed regarding the Commissioner's latest plan, but in so far as it rests on an elevated connection between the bridges, it is on the right track. The only way to cure the bridge terminal nuisance is to kill it. After a good deal of study of this alleged problem, I have been able to see no other way of quite accomplishing it save by an elevated connection, and by this way, on right lines, it would be easily done. If the plan presented by President Littleton's committee a year and a half ago had been adopted, it would have been now in operation and the anomalous elevated bridge terminal half forgotten."

AN IMPORTANT SOUTHERN PROJECT WITH THOMAS TAGGART OF INDIANAPOLIS AS PRESIDENT

The Lakeview Traction Company, capitalized at \$100,000, Thomas Taggart, of Indiana, president, proposes to build an electric railway from Memphis, Tenn., to Clarksdale, Miss., about 75 miles south, in the heart of the Mississippi delta. The survey as proposed will parallel the Yazoo & Mississippi Valley Railroad. The engineering department expects to effect a traffic arrangement with the Memphis Street Railway Company for entrance to the heart of this city. It is proposed to carry both freight and passengers. The vice-president of the company is Henry Craft, who is resident agent. C. P. Farnsworth, W. A. Percy, R. F. Tate, M. Rosch and Walter Goodman are stockholders. The capitalization is not indicative of the amount to be expended.

INCREASE IN WAGES AT MILWAUKEE

John I. Beggs, president and general manager of the Milwaukee Electric Railway & Light Company, has caused to be posted in all the stations of the company notices informing conductors and motormen of all lines, city as well as interurban, that their wages had been increased 1 cent an hour, beginning May 1. The announcement came as a welcome surprise to the men, as no intimation of an increase had been given by the management. Like that of Jan. 1 last, when the wages of men employed with the company for a term of ten years or more were raised, the advance was also voluntary on the part of the company, and in conformity with its policy of increasing wages as the earnings permit. Last January those who had been in the service of the company ten years received an increase of 1 cent an hour. Between 200 and 300 men profited by the advance. The announcement just made includes these men again, so that they have received an advance of 2 cents an hour in less than six months.

Men entering the employ of the company as motormen and conductors under the new order will receive 19 cents an hour. At the completion of the first year's service they will receive 20 cents. Another increase of 1 cent will be paid at the beginning of their third year. During the fourth and fifth year 22 cents an hour will be paid, and beginning with the sixth, and until the completion of the tenth year, 23 cents an hour will be the rate. Men employed as conductors or motormen longer than ten years will receive 24 cents an hour.

In addition to this the company maintains a strict civil service. Men who are found efficient in minor capacities are promoted to better positions as vacancies occur or new openings are made. The same holds good of boys who enter the service of the company as messengers.

BUFFALO SOUTHERN PASSES TO NEW INTERESTS

Control of the Buffalo Southern Railway Company, which operates the Buffalo, Hamburg & Aurora Electric Railway and Buffalo, Gardenville & Ebenezer Electric Railway, connecting Buffalo, Orchard Park, Armour and Hamburg and Buffalo and Ebenezer and Gardenville, has passed into the hands of new interests, it is announced.

G. Tracy Rogers, of Binghamton, president of the company, and the directors representing his interests and the Fidelity Trust Company have resigned, and in their place Alonzo C. Mather, of Chicago, and directors in sympathy with him have been elected. Those who resigned were Mr. Rogers, president; Edward M. Mills, secretary; Franklin D. Locke, Louis L. Babcock and Myron S. Hall. Messrs. Mather, H. M. Greer, of Buffalo; Malon G. Taylor, of Reading, Pa.; Fridolin Thoma, of Buffalo, and William L. Marcy, of Buffalo, were elected directors in their place. The other directors are: D. N. Rumsey, of East Aurora, who was treasurer and remains in that office; L. B. Seibert, of Coudersport, Pa., who remains as vice-president; H. C. Lein, of Ebenezer; Daniel W. Allen, of Buffalo; Asher B. Emery, of East Aurora, and F. L. Andrews, of Coudersport. J. B. Rumsey, of Oswayo, Pa., will become general manager in place of U. L. Upson. It is said the new management in the near future will extend the road to East Aurora and make other improvements. At a meeting of the directors no president was elected, but Mr. Greer was elected secretary. The treasurer and vice-president were re-elected.

DEPARTMENT OF ELECTRICAL ENGINEERING AT CORNELL

The trustees of Cornell University have recently assigned to the department of electrical engineering of Sibley College the major portion of Franklin Hall, now occupied by the department of physics. The latter department is now moving into commodious quarters in the new Rockefeller Hall of Physics, just completed. The electrical engineering department will thus be supplied with new quarters for conducting various lines of work. The electrical engineering laboratory will continue to occupy a part of the main building of Sibley College, as Franklin Hall does not contain sufficient floor space to accommodate all of the apparatus. The electric railway section will, however, be moved to Franklin Hall. This will contain a full line of railway motors, manual and multiple-unit control systems, trucks, air brake equipment and all other devices necessary for instruction in this line of work.

Franklin Hall, after the remodeling which will be necessary this summer, will contain large designing and lecture rooms, a number of smaller recitation rooms and offices, and the telephone and railway laboratories. It is understood that the new arrangement will only be temporary, and the enlargement of the main Sibley College buildings will be an urgent necessity if the present rate of growth continues.

TRACTION DEVELOPMENT IN TEXAS

Considerable attention is being given to the building of interurban electric railways and the installation of electric light and power plants in Texas at this time. In the matter of electric railways, this is particularly true. Several lines are proposed to be built out of Dallas to neighboring towns. Some of these enterprises have progressed to a point where their consummation seems to be assured. McKinney, Sherman and other prosperous towns of that section are to be connected by electric lines. It is stated that the Northern Texas Traction Company, which owns and operates the electric line between Fort Worth and Dallas, has in view a number of important extensions to embrace several suburban towns in its system. The building of an electric railway between Fort Worth and Mineral Wells is being promoted. Projects are also on foot to give Waxahachie, Greenville, Cleburne and other towns electric railway connection with Dallas.

The construction of an interurban electric railway between Temple and Marlin is proposed by a Pennsylvania syndicate which is interested in other similar enterprises. It is estimated that the cost of building the road, including its equipment, will be approximately \$1,000,000. The promoters are asking that a bonus of \$300,000 in money and stock be subscribed by the people of the two terminal towns and by land owners along the right of way. A considerable part of the required amount has been already raised, and the prospects for the early building of the road are said to be bright.

R. A. Reese, of San Antonio, is acting as the representative of syndicate of Eastern men who contemplate building an interurban electric railway between Austin and San Antonio, a distance of 80 miles. Mr. Reese says that the financing of the project is assured if the people along the proposed route will give their aid in the matter of donating the right of way of the road. It is expected that the project will soon assume definite shape.

The firm of William Gallatin, Carroll & Company, of New York, has been investigating the situation with the view of financing the building of an interurban electric railway between Austin and Lockhart, a distance of about 30 miles. The engineer, Thos. Moore, has had active charge of the preliminary work.

The building of an electric railway to run from Georgetown to Briggs, by way of Florence, a distance of 22 miles, is under consideration. The right of way for the proposed road is being secured and bonuses raised in aid of the project.

The building of an interurban electric railway between Houston and Galveston, a distance of 51 miles, has been on foot for several years, and now seems to be assured. Considerable progress has been made in the preliminary work, preparatory to actual construction. It is stated that the road will cross Galveston Bay upon the new causeway that is to be constructed by a company which was recently organized for that purpose. The surveys for the proposed road have been made and the right of way and franchises secured.

It is announced that the right of way and liberal bonuses for an electric railway that is to be built between Taylor and Giddings, a distance of about 30 miles, have been secured and that the construction of the road will be soon commenced.

STONE & WEBSTER ACQUIRE MORE SOUTHERN PROPERTIES

Stone & Webster, of Boston, have acquired the entire electric railway and lighting systems of Pensacola, Fla., through the purchase of all the securities of the Pensacola Electric Terminal Railway Company and the Escambia County Light & Power Company. A new company, under the management of Stone & Webster, will be organized to operate these systems. The details of capitalization are not yet formulated. The railroad system now includes about 12 miles of track operated by electricity and 7 miles by steam power. It is proposed to convert at once this latter line to electricity, thus giving a through line to the government Fort Barrancas and the navy yard and military post. The new company will be financed so as to provide amply for putting the entire property in first-class operating condition, and for extending the system to meet the requirements of the growing population.

DINNER TO MEMBERS OF INVESTIGATING COMMITTEE OF THE NATIONAL CIVIC FEDERATION

A dinner was given at the Park Avenue Hotel, New York, Monday evening, May 21, by the New York Civic Federation to the members of the investigating committee of the National Civic Federation's commission on public ownership, who sailed Tuesday, May 22, to study conditions in Europe. There were about 120 at the dinner. Oscar S. Straus presided. Among the members of the investigating committee, who were the guests at the dinner, were the following:

Melville E. Ingalls, Big Four Railroad, Cincinnati, Ohio; Frank J. Goodnow, Columbia University, New York; Walton Clark, third vice-president the United Gas Improvement Company, Philadelphia, Pa.; John H. Gray, Northwestern University, Evanston, Ill.; William J. Clark, foreign manager General Electric Company, New York; Frank Parsons, president National Public Ownership League, Boston, Mass.; John R. Commons, University of Wisconsin, Madison, Wis.; F. J. McNulty, president International Brotherhood of Electrical Workers, Washington, D. C.; Albert E. Winchester, general superintendent City of South Norwalk Electric Works, South Norwalk, Conn.; Charles L. Edgar, president of the Edison Electric & Illuminating Company, Boston, Mass.

UTAH PROPERTIES REPORTED SOLD

It was announced at Salt Lake May 17 that the principal holdings of the Mormon Church in the Utah Light & Railway Company are to be taken over by a \$25,000,000 corporation, composed of English and American capitalists. The new company, it is said, will also acquire the Ogden Street Railway. It will be known as the Inter-Mountain Consolidated Railroad Company, and the board of directors will include H. H. Vreeland, of New York City. Simultaneously, the announcement was made that the Salt Lake & Los Angeles Railroad, another church property, has been sold to a local syndicate for \$500,000.

THE ELSBERG BILL SIGNED

The Elsberg Rapid Transit bill was signed by Governor Higgins, of New York, Tuesday, May 16. The bill briefly provides for the advertising for contracts separately for constructing, equipping and operating future subways, and the granting of contracts separately for any part of the procedure, unless the Board of Estimate deems it wise to let the contracts jointly, in which case the Rapid Transit Commission is empowered to use its discretion.

The city under this new law may if necessary build its future subways, equip them and, if after that no bidder for the operating franchise is obtainable on advantageous terms, operate them also. If the bidder for operation equips the road at his own expense he may operate it for twenty years, with privilege of renewing his contract for an additional twenty, a possible term of forty years instead of seventy-five granted under the old law, while if the city equips the new subway, the contractor for operation may have only a ten-year term with a ten-year renewal.

Full provision is made for the construction of pipe galleries for gas and water mains and other conduits in all future subways.

The Rapid Transit Commission may grant no more perpetual franchises, and the character of that body itself is changed in the provision that hereafter vacancies will be filled by the Mayor instead of by the commission itself. Under the power thus delegated to him, Mayor McClellan, as noted elsewhere in this issue, has appointed L. C. Ledyard to the commission.

NATURAL GAS AT SHREVEPORT, LA.

On May 2 the Shreveport Traction Company began the use of natural gas under five horizontal return tubular boilers of 150-hp each, in its local plant at Shreveport. It is estimated that the monthly consumption of gas will approximate 7,000,000 cu. ft. The company uses a boiler gas regulator, which keeps steam at about 120 lbs. pressure, allowing a variation of less than 2 per cent, regardless of load. Forty Quinlan burners were installed to each boiler. The steam plant also consists of a Hamilton-Corliss twin engine of 900 hp, direct-connected to a GE 500 kw, 575-volt railway generator, and two Harrisburg simple engines each of 300 hp, belted to 150 kw GE 575-volt generators. The latter plant is for reserve purposes.

PORT CHESTER COMPANY GETS RIGHTS

The New York & Port Chester Railroad Company has obtained from the Board of Estimate and Apportionment the right to cross certain streets and avenues in the Bronx above or below grade and to construct and operate an electric railway from the Willis Avenue bridge to the city line. The company acquired franchises to run its railroad through eight towns in Westchester County three years ago. It is to be a four-track third-rail road, having a length of 25 miles, with a terminal at Port Chester. The route is to be entirely on property owned by the company.

By the terms of the franchise the company is to pay the city \$8,000 a year for the first five years, \$13,000 a year for the next five years, and \$35,000 a year for the next fifteen years, at the end of which time the company can get a renewal of the franchise for another twenty-five years on a revaluation. In addition, the company must pay 5 4-10 cents a lin. ft. a year for its trackage in the Bronx for the first five years, 7 7-10 cents a ft. for the next five years and 29 cents a ft. for the rest of the rest of the time the franchise runs.

It is provided also that the company must deposit \$100,000 with the Controller as a guarantee that it will spend at least \$1,000,000 in work on the railroads within five years. The company binds itself also not to sell or mortgage its property to another railway company. It is bound to run not less than sixty trains daily in each direction after the road is in operation, and to give a 5-cent fare within the city limits.

William C. Gotshall, president, promoter and chief engineer of the railroad, said this week that work on the road would begin in earnest about Aug. 1, and that the road would be in operation within three years. Five contractors are to have the task of building the road, each contractor having a stretch of 5 miles to cover. The estimated cost of the railroad and its equipment is \$19,500,000.

Mr. Gotshall says that Charles D. Barney & Company, Edwin Gould, the Morris family, which owns Morris Park; C. D. Simpson, John B. McDonald and a group of Pittsburg steel men are all back of the enterprise. John B. McDonald, who was the contractor for the subway, will have a hand in directing the operations of the sub-contractors. Mr. Gotshall also has announced that the syndicate to finance the Port Chester road is also planning to build a branch line from New Rochelle to White Plains, and that the syndicate is also to be a bidder for the franchise for the proposed subway in Third Avenue, in Manhattan. In that connection Mr. Gotshall is reported to have said:

"We have estimated that the subway in Third Avenue, to extend to the Battery, will cost \$32,000,000, and that its equipment will cost \$18,800,000 in addition. We have been in correspondence on the subject with the Rapid Transit Commission for some time, and we shall be ready to build the subway, equip it and operate it on better terms, we think, than can be offered by other bidder. We could then have a rapid transit line all the way from the Battery into Connecticut. Part of the plan is to have a quick freight service by which the big department stores of the city could deliver parcels in Westchester County and Connecticut within a few hours after the purchases were made. Express cars would be run on sidings at depots convenient to the stores, loaded in the daytime and sent over the line before the evening rush hour began."

DEALING WITH THE ROWDY

With the inauguration on Decoration Day of the summer schedule to the beaches and the pleasure resorts will come again the trials of dealing with that class of passengers prone to create disturbances to the general discomfiture of the orderly and respectable pleasure seeker. No one locality is free from this disturbing element. Indeed, the hoodlum seems to increase directly as the number of passengers. Naturally, therefore, a company like the Brooklyn Rapid Transit, touching more places of amusement and carrying more pleasure seekers than any other company in the world, drawn from a motley, cosmopolitan throng, is confronted with this problem in an aggravated form. This year even more elaborate precautions have been taken to preserve order than ever before. With the placing in use of the summer schedule on May 12 in Brooklyn, Deputy Police Commissioner O'Keefe and Borough Inspector Cross took unusual precautions. In addition, the company now has more special officers on its cars than ever before, and in a short time will have completed its arrangements for a regular police station of its own at Culver Park, the summer headquarters of the company's police force. Regular blotters will be kept, there will be two desk sergeants and outwardly there will be little or nothing to show that it is not a station house of an ordinary city precinct. As a matter of fact, there really is practically no difference, except that the duties of the men stationed at Culver Park are more limited than those of the city police. But their authority is the same. The special officers of the traction company take the same oath as the policemen of New York, before the same man and are subject in the same way to the discipline of the Police Commissioner and his deputies. The discipline, however, is really more severe for the special officers. Though they cannot be fined, since the company, and not the city, pays them, they are not protected by Civil Service rules, and there is nothing to prevent the trial commissioner from dismissing them whenever he sees fit.

A. I. E. E. MEETING AT MILWAUKEE

The twenty-third annual convention of the American Institute of Electrical Engineers will be held at Milwaukee May 28 to June 1, with headquarters at the Hotel Pfister and sessions in the Public Service Building on Sycamore Street. The program is as follows:

Monday, May 28.—Address of welcome. Address, President Schuyler Skaats Wheeler. "Repulsion Induction Motor," by Maurice Milch. "Comparison of Two and Three-Phase Motors," by Bradley McCormick. "Direct-Current Motor Design as Influenced by the Interpole," by Charles H. Bedell.

Tuesday, May 29.—"Experiences with Lightning and Static Strains on 33,000-volt Transmission Systems," by Farley Osgood. "Cell-Type Lightning Arrester," by Prof. E. E. F. Creighton. "Protective Apparatus for Lightning and Static Strains," by H. C. Wirt. Standardization Rules. The proposed revision of the existing standardization rules will be reported for discussion by the committee on standardization. "Short-Circuit and Ground Currents in Alternating-Current Systems," by Chas. P. Steinmetz. "The Self-Synchronizing of Alternators," by Prof. Morgan Brooks.

Wednesday, May 30.—"Magnetic Properties of Electrolytic Iron," by Prof. Chas. F. Burgess and A. Hoyt Taylor. "Measurement of Temperature by Electrical Means," by Edwin F. Northrup. "The Educational Value of an Electric Test Car," by Prof. Thomas M. Gardner. "The Art of Inventing," by Edwin J. Prindle. "Shunt and Compound-Wound Converters for Railway Work," by W. L. Waters.

Thursday, May 31.—"Electrical Connections for Power Houses," by David B. Rushmore. "Economies Derivable from the Use of Relatively Small Water Powers of Low Head in the Middle West," by Prof. Dugald C. Jackson. "Oscillations and Surges Against Ground in Alternating-Current Systems," by Chas. P. Steinmetz. "Some Fundamental Characteristics of Mercury Vapor Apparatus," by Percy H. Thomas. "Safety Devices for Steam Engines, Turbines and Motors," by Charles M. Heminway. "Some Notes on the Lighting of Churches," by Edwin R. Weeks.

The local committee is Messrs. John I. Beggs, chairman; W. E. Dodds, W. F. Johnson, H. H. Cutler and C. W. Burkett, who have arranged a program of entertainment, etc.

PLANS FOR AN IMPORTANT PLEASURE RESORT AT OTTAWA BEACH, OHIO

The Toledo Railways & Light Company, which is back of the Ottawa Beach & Southern Railway, is planning to make Ottawa Beach one of the finest resorts on the great lakes. The company owns 1200 ft. of lake frontage and several hundred acres of adjoining land, and it is having plans prepared for improvements which, it is stated, will involve an outlay of about \$300,000. A large amusement pavilion will be erected this year, as will also a number of bath houses, providing bathing facilities for 500 people. The property is said to have one of the finest natural bathing beaches on the lakes. The grounds are to be laid into a magnificent park, and the marshes on the water front are to be dredged and lagoons formed so that canoes may paddle the whole length of the lake frontage, a distance of about 2 miles. The lagoons are to be crossed at intervals with rustic bridges, and some of the best known landscape architects have been secured to lay out the ground. No liquor is to be sold on the grounds, the company having decided to make the park as inviting as possible to ladies and children, and will encourage picnics to hold their outings here. The beach is 17 miles from the city and the new line will cover the distance in 45 minutes. It will be the nearest bathing beach to the city, and there is no doubt that it will be immensely popular with Toledo people. Next spring a large summer hotel and a number of cottages will be erected. It was planned to build this this year, but the project has been postponed owing to the fact that the new interurban road will not be open for traffic until July 1, at which time the park will be thrown open to the public.

MEETING OF TOLEDO AND DAYTON TRAFFIC REPRESENTATIVES

A meeting of traffic representatives of roads operating out of Toledo and Dayton was held at Bowling Green, Ohio, May 14. The following gentlemen were present: Erwin Fullerton and J. W. Parker, of the Detroit United Railway Company, of Detroit; C. T. Chapman and T. C. Franklin, of the Toledo & Western Railway, of Toledo; H. C. Young, of the Lake Shore Electric Railway, of Norwalk; C. M. Hawley, of the Toledo, Port Clinton & Lakeside Railway, of Toledo; W. L. Smith, of the Toledo Urban & Interurban Railway, of Findlay; C. C. Collins and R. H. Carpenter, of the Western Ohio Railway, of Lima; E. C. Spring, of the Dayton, Covington & Piqua Traction Company, of West Milton, and R. Baker, of the Dayton & Western Traction Company, of Dayton.

The matter of adding additional coupons to the interline tickets to take care of the city fare in Toledo was discussed, resulting in no agreement among the companies to add the coupon. The Detroit United Railway is at present printing tickets with this additional coupon, thus getting three reports from the conductor, one for the Detroit city fare, one for the interurban line between the terminals out of Detroit and Toledo, and one for the Toledo city fare. The company is arranging to place additional coupons on all its different forms of tickets to provide for city fares, and wanted the other companies to do likewise. The other roads, however, preferred to follow the plan at present in use, having the tickets read direct to the center of the city and making a monthly settlement with the city companies. The Toledo, Port Clinton & Lakeside Railway has the other arrangement, but this is a requirement of the contract between it and the Lake Shore Electric Railway. As soon as the new line is built so that cars can be operated to the Toledo city limits independently, it is the intention to discontinue the use of the additional coupon.

The matter of charging for baggage was brought up, and the Detroit United agreed to accept 25 cents per trunk, which will cover the transportation over any of its lines from Toledo north, and the present arrangement on the lines south of Toledo to remain in force, this being 25 cents per trunk, the company checking the trunk retaining the 25 cents. This makes a total charge of 50 cents, for example, for transportation of a trunk from Dayton to the northern part of Michigan. The Lake Shore Electric Railway has always checked trunks free, and thought it would be detrimental to its interests to make a charge for trunks.

THE DENVER ELECTION

At the election in Denver on Tuesday, May 15, the main issue was whether the city should grant public service franchises or try municipal ownership. Both Republicans and Democrats indorsed franchise extension. The Municipal Ownership party put up an independent ticket, which was supported by Senator Patterson and his two newspapers. Six franchises were voted on. Three related to terminals of steam railways. Two were light and street railway franchises for existing corporations that offered definite compensation. The sixth was for a new traction company. During the campaign there was published a letter from Senator Patterson's chief lieutenant, the president of the Municipal Ownership League, asking a Chicago bank to finance the "reform" campaign. In return the bank was to get a share of the profits accruing from the sale of the franchise sought to the old traction company.

The tramway company twenty-year franchise carried by a majority of 365 in a taxpayers' vote of nearly 16,000. The gas company franchise carried by 590. The amendment to the city charter to compel rate reduction carried by nearly 3000 majority, but its effect is somewhat doubtful in view of the fact that the combined Democratic and Republican machines elected fourteen out of sixteen Aldermen and all three Supervisors. Other propositions voted upon follow:

For the purchase by the city of an electric street lighting plant. Carried.

Franchise to permit the Moffat road to enter Union station. Carried.

Franchise for the Union Pacific Railway on wholesale business street. Defeated.

Park improvement bonds. Defeated.

Denver terminal franchise, to permit the entry into the city of an interurban electric line not constructed. Defeated.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED MAY 15, 1906

820,407. Electric Railway; John A. Garey, Tarkio, Mo. App. filed May 23, 1905. Provides a current collector for underground conduit railways that may be readily shifted from one side of the plover to the other in accordance with the direction in which the car is traveling. An air blast is also provided for cleaning the conduit in advance of the shoe.

820,411. Railway Signaling System; Henry W. Griffin, New York, N. Y. App. filed Jan. 18, 1905. A block signal system of the overlap type adapted to display danger and caution signals. The track rails are divided into insulated sections charged with direct-current potential, and polarized relays are included for securing the overlap feature.

820,412. Railway Signal System; Henry W. Griffin, New York, N. Y. App. filed Jan. 31, 1905. Modifications of the above.

820,413. Railway Signaling System; Henry W. Griffin, New York, N. Y. App. filed Feb. 28, 1905. Further modifications.

820,423. Trolley for Overhead Trolley Systems; Ezra F. Landis, La Salle, N. Y. App. filed Feb. 20, 1905. The trolley wheel is completely housed in the harp, except for a slot in the top where the wheel engages the wire, and at this point a pair of spring arms are arranged to normally close over the wire.

820,440. Trolley Pole; Robert P. Rever, Newark, N. J. App. filed Feb. 18, 1905. To secure flexibility of the pole a hinge-joint is incorporated therein and the pole held in alinement by a spring sleeve.

820,481. Trolley; Jacob R. Deily, Philadelphia, Pa. App. filed Sept. 5, 1905. Two trolley wheels mounted at either end of a short wheel-frame pivoted in the trolley harp.

820,488. Electric Railway; John A. Garey, Tarkio, Mo. App. filed May 25, 1905. Third-rail supports including hollow cross-ties arranged at intervals and means carried by the car for forcing dirt from the conduit into such cross-ties, from which the accumulation may be withdrawn at intervals.

820,529. Automatic Train-Reporting System; Elmer E. Steiner, Knightstown, Ind. App. filed July 10, 1905. Tappets are provided in the roadbed adapted to be engaged by specially constructed shoes carried by the train. The latter has a plurality of projecting lugs spaced in a special and predetermined way for each train so as to give a distinctive signal when passing over the tappets.

820,539. Railway; Alpheus H. Wood, Ann Arbor, Mich. App. filed Sept. 11, 1905. An inclined bearer fixed at a point along the roadway operates to raise a shoe or tappet depending from the train which serves to operate an electric switch on the car.

820,584. Trolley Pole Controller; Joseph F. Mackin, Columbus, Ohio. App. filed Aug. 21, 1905. Pneumatic means for controlling the trolley pole, consisting of a sleeve and rod so arranged that when their relative motion is slow they do not bind, but in case of a quick relative movement, the sleeve binds and a valve is opened which admits air to retrieve the pole.

820,607. Car Fender; Frank Seeley, New York, N. Y. App. filed Dec. 8, 1905. A horizontal platform suspended from the car and having a backward and downward movement whereby the fender throughout its whole extent is brought down near the pavement in a plane parallel with the surface of the street by impact with the person struck.

820,705. Composition for Filled Brake-Shoes and Process of Manufacture; Warner R. Crowell, Boston, Mass. App. filed Sept. 11, 1905. A composition containing comminuted iron, comminuted steel and sal-ammoniac.

820,733. Street Railway Car Fender; John Post, Philadelphia, Pa. App. filed Nov. 29, 1905. A car fender having its surface composed of inflatable cushions connected together for simultaneous inflation.

820,805. Amusement Device; William F. Mangles, New York, N. Y. App. filed March 21, 1905. Comprises an inclined surface having rising projections, and a car adapted to travel down the said surface and to bump against the projections, to change the course of the car, the car having means to turn on a central axis.

PERSONAL MENTION

MR. ROBERT GRINNELL has been promoted to be superintendent of employment of the Chicago City Railway Company.

MR. THOMAS BLAKELY has been promoted to be superintendent of transportation of the Chicago City Railway Company.

MR. HORACE ANDREWS, president of the Cleveland Electric Railway Company, who is now in Europe, has just purchased a large German racing machine in which he will tour through lower France and Italy during the next few weeks.

MR. E. RITCHEY, who has been employed by the Mansfield Railway, Light & Power Company, of Mansfield, Ohio, for the past eleven years, has been appointed superintendent of transportation of that company, in charge of motormen and conductors.

MR. LEWIS CASS LEDYARD, of the law firm of Carter, Ledyard & Milburn, of New York, has been appointed a member of the Rapid Transit Commission of New York by Mayor McClellan, to succeed Mr. John Claffin, resigned, because of the new law requiring commissioners to be residents of New York City. Mr. Ledyard is fifty-five years old, and a graduate of Harvard University.

MR. RICHARD T. LAFFAN, former general manager of the Worcester Consolidated Street Railway, who went to Manila in 1902 to install the first electric railway, power and light plant ever operated in the Philippine Islands, is on his way to this country. Mr. Laffan will spend about six months here and then will return to the Philippines to resume his duties as general manager of the Manila Electric Railway & Light Company.

MR. GEORGE F. FABER has recently resigned his position as superintendent of the Columbus, Delaware & Marion Railway (Marion division) to accept the position as superintendent of the Elgin & Belvidere Electric Railway, of Elgin, Ill., a high-speed interurban line, which will be in operation about July 1. Mr. Faber previously was superintendent of two of the old Appleyard lines in Ohio, and his services with these properties was highly commendable.

MR. J. F. PORTER, who has assumed the management of the consolidated public utilities of the Moline, Davenport and Rock Island for the syndicate represented by J. G. White & Company, of New York, has been associated with the undertakings of the operating department of that company for a number of years. As president of the public service system of Alton, Ill., he has completed since 1893 an organization which controls practically all of the electric railway, lighting and gas properties in Alton and adjoining towns, and he goes to Davenport with the prestige thus established as an operating executive. Mr. Porter is a technical graduate, and before allying himself with the J. G. White & Company interests he was associated with the Edison Company, of Chicago, the Edison United Electric Manufacturing Company and the Railway Specialty Company, of New York.