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Running by Signals

It is generally believed to be the primary function of a block signal to give an indication of safety, of caution or of danger to the approaching car or train. It then remains for the motor-man or the engineer to perform three important and necessary duties: First, to see the signal; second, to interpret its meaning correctly, and third, to obey the instruction given by it. Assuming for the sake of simplicity that the signal is automatically displayed it appears that the three important functions just named are dependent upon human agency. That human agency is not always infallible has been shown by so many disastrous accidents that it did not need the recent rear-end collision between a standing local and a following express train near Westfield, N. J., in which more than a score of persons lost their lives, to drive the lesson home.

The question now naturally arises whether the system of signalling, when it has displayed the stop signal, has done all that should be expected of it, and whether there is any known way to render the human element less liable to err. If reports are true the signals approaching the point of the Westfield collision worked properly and displayed all the warning signals usually considered necessary to protect the standing local train from a rear-end collision. There was not only the stop signal properly displayed, but also the caution signal three-quarters of a mile in advance of the stop signal. Whether the engineer on the following express train saw these signals,

whether he saw them but failed to interpret correctly their meaning, or whether he saw them and interpreted correctly their meaning, but failed to be governed by them we do not know. The fact remains, as all accounts agree, that the caution and stop signals were properly displayed and the engineer ran past them under full speed into almost certain death.

Owing to the inability of the general public to comprehend practical operating conditions, the occurrence of accidents of the kind just mentioned are usually followed by a popular demand for remedies which are not always the ones best adapted to the situation. The fact that these remedies are exceedingly expensive in maintenance and operation, would not be considered if they could be depended upon to insure greater safety in operation. Just at present there is a demand that the railroads place two engineers on each engine, one of them to do nothing but watch for signals. This second man would be likely to conclude that his was a secondary, if not an entirely useless, duty because the man at the throttle was also watching the signals, and upon him was the responsibility for action. The usual objections to a divided responsibility, and which have recently been discussed in these columns, seem to apply in this case with peculiar force. So stringent are the present regulations on most railroads that no one but the men actually in charge of the train are permitted to ride on engines except by special permit. The particular reason for this is the fear that the presence of another person might draw the attention of the engineer and fireman from their duties. The transition from the proposed plan of two engineers on each engine to that of two motormen in the cab of every electric high-speed train is but a short step. In fact the demand for two motormen on electric elevated trains in New York has already been heard, and it is likely to be made again when the subway operation begins. The tendency of the public mind upon these subjects is, therefore, plainly evident and must be taken into account.

The thing which the public is seeking seems to be something that will absolutely prevent a train or car running past a danger signal. What shall that something be? Shall it be two engineers or two motormen in the cab; shall it take the form of a derailing switch which will absolutely stop the train opposite the danger signal; shall it be an apparatus that will invariably set the air brakes at the stop signal, or shall it be some other expedient as yet unknown? There are well-known instances in steam railroad practice where, with one or more experienced employees beside the engineer and fireman on the engine, the stop signal has been disregarded and all on the engine carried to certain disaster and death. The lesson has been learned by sad experience that their own safety is often not sufficient incentive to inspire among men ordinary and necessary vigilance. It is considered dangerous practice to have many facing point switches in the main line track because, in most cases, a derailment might be as disastrous as a collision. In Chicago several years ago an apparatus was tried on the elevated roads by which the air brakes were set in the emergency application at the stop signal. We understand

that the apparatus was frequently out of order, and because it could not be depended on was finally discarded. An improved apparatus of the same kind was installed on the Boston elevated and subway lines, and is still in use. The natural conservatism of railroad officers in matters of safety has thus far prevented the more extensive adoption of any kind of apparatus that is likely to be frequently out of order and give false indications. Many superintendents claim that the use of such an apparatus which teaches the runner to depend upon the machine and relax his own vigilance is wrong in principle. Yet it is said, to the credit of the apparatus used in Boston, that in one case where the motorman fainted the trigger at the stop signal did its work and brought the train to a standstill.

In view of the tremendous rapid transit developments now taking place, or about to take place, in and around New York, Chicago, Boston and other large cities in which high speed with maximum density of traffic are the distinguishing features, the lesson conveyed by the Westfield and other similar accidents ought not to be entirely lost upon those who are planning the safe and rapid movement of a great city's teeming millions. An accident of the Westfield kind, with the crowded trains of a city road, would naturally be much more appalling in its consequence. We grant that the problem to be solved is difficult, but this is only a greater reason why it should engage earnest attention.

The Waterbury Situation

For the second time in six months a New England city is the scene of disorder, bloodshed and rioting, growing out of the strike of motormen and conductors of the local street railway company, and the State officials have been obliged to step in and proclaim martial law in order to protect the lives and property of the community. This is certainly a deplorable condition of affairs, especially in staid old New England, where law and order should reign supreme if anywhere in the country. Had the disturbances and lawlessness of Waterbury been reported from a Western mining camp, a cattle ranch, or even a coal field, a convenient excuse might be found in the explanation that the population was largely composed of illiterate foreigners, who were unacquainted with American institutions, and had not yet become accustomed to the ways of the country and the legal means at hand to redress industrial grievances. But we must look elsewhere for an explanation of the conditions which make possible the enactment of scenes such as have recently occurred in Waterbury.

The entire number of street railway employees engaged in this strike, eighty altogether, is ridiculously small in comparison with the amount of discomfort they have caused the rest of the community and the injury they have inflicted upon the person and property of those who have opposed them. Back of this movement, however, is concentrated the power and influence of trade unionism, for it was really the desire of labor agitators to control the situation in Waterbury that led to the present conflict. This is plainly shown by the fact that the pretext upon which the strike was originally ordered—the discharge of two men for drunkenness—has been abandoned by the union, yet the strike continues with no immediate prospect of settlement. The strikers disclaim responsibility for all acts of violence, but they are willing to take advantage of the reign of terror which has been instituted for the purpose of coercing the company into submitting to their demands. In this respect the situation strongly resembles that which prevailed in England prior to the verdict against the Amalgamated

Society of Railway Servants for conspiracy in ordering a strike against the Taff Vale Railway Company in August, 1900. This action was brought to recover damages caused by a strike which had been brought about by the defendants. The case was tried in the King's Bench Division last December, and the judge who presided charged the jury that the evidence was overwhelming against the defendants, and showed that they had conspired by unlawful means to molest and injure the plaintiffs in their business. In boycotting cases in this country the conspirators are, as a rule, elusive; criminal responsibility is often evaded by secrecy and perjury, and justice miscarries because of the practical difficulty of bringing home to particular individuals the responsibility for offences of which they are known to be guilty. This sort of evasion was scored by the English jurist in his charge to the jury. He criticised the subtle intricacies of the defendant's case as the perpetual shuffling of cards and the continual production, after the manner of an experienced conjuror, of the card of non-responsibility, which was contrary to common law, common sense and justice.

It is contended, and it may be true, that under American laws it is practically impossible to hold labor unions or their representatives responsible for such outbreaks as that at Waterbury, but it is high time that something was done to change this, and the sooner some provision, such as that recently proposed in the Connecticut Legislature, is enacted, the better it will be for the entire community. The labor leaders have opposed the idea of having their organizations incorporated, as this would fix responsibility upon the officers and members for lawlessness committed at their instigation, even though it might not be done by them personally. It would certainly have a restraining influence upon them, and enable employers to enforce agreements when they have "recognized the union."

Country Platforms on Interurbans

The country platform on an interurban line may not be a great revenue producer, and the amount of income from a platform in a year may be very small, but it would seem that if it is worth maintaining at all it should be made comfortable enough so that it will attract what possible patronage there is, and it should be provided with signal devices which will prevent annoying delays because of running by passengers at night, and the possible missing of passengers entirely, through inability of the motorman to see occupants of the platform. The present arc headlights used on interurban roads leave much to be desired. The wandering of the arc around the carbon tips so changes the focus that at times a dense black shadow will obscure the motorman's vision of a platform or stopping place which he may be approaching. If he misses the prospective passenger entirely, as he may if going at high speed, it takes that passenger a long time to forget the experience. If the motorman does see the prospective passenger it may only be when so near the platform that he cannot stop in time, and must run by and back up, all of which means a loss of time and expense to the company in other ways. On the other hand, if cars are compelled to run so slowly when approaching a platform which is in a shadow that they can stop in time it seriously cuts down the schedule.

On some of the higher speed interurban roads it is sometimes not easy even in the daytime to see a passenger on a country platform in time to make a comfortable stop. A car running 60 miles an hour covers so much ground in a second

that the motorman must see far ahead in order to make stops at country platforms.

The simple solution of the matter is to have some kind of a recognized signal provided at the platform. A small semaphore blade is cheaply put up and can be seen from a distance. This semaphore blade can be weighted so that it will ordinarily stand in clear position, and will be in stop position only when held so by the prospective passenger when he sees the car approaching. In connection with this semaphore a night signal, consisting of incandescent lamps, can be used. When such a signal is provided the passenger is assured that he will be picked up, and that there will be no danger of the motorman not seeing him, and the motorman will have the assurance that he is not in danger of running by passengers at every country platform he passes. The common practice to depend upon the headlight on the motor car to reveal passengers on platforms is not by any means a satisfactory one, especially with the high speeds that are now common on interurban roads. In fact, it is a relic of street railway practice, carried into interurban work, which should be abandoned, along with some other street railway customs, when the conditions cease to be those of a street railway.

There is also an increasing sentiment among interurban operators that more comforts and conveniences should be provided at country platforms. It is, of course, not feasible to maintain a warmed and lighted station at all times, but a shelter from the coldest winds can be erected at slight expense, and in connection with the signal lights a light can be provided in this shelter so that a passenger, when holding the signal to stop position and waiting for a car, can have light to read by. Some interurban roads have some or all of the improvements outlined on their country platforms, but many do not; and it is a matter worth considering whether such details as these would not pay when catering to rural traffic.

Safety Precautions in Power Houses

The recent curious accident at Niagara Falls in which fire robbed the plant temporarily of much of its output and caused no small inconvenience to consumers ought to be taken as a lesson in cautious construction. It is always the unexpected that happens, and in high-tension stations the results of accidents in themselves by no means of great gravity are often surprisingly serious. Witness the famous deflagrated cat in one of our metropolitan power plants and many another equally curious instance. A couple of years ago a tame crow flew into a rope drive in a lighting station, and half a city was in darkness for the rest of the evening. Only a few days since a broken steam pipe shut down a large proportion of the Boston street lights, and we might go on for a column or two citing similar instances. The power stations affected are generally well planned and provided with all the ordinary safeguards against accident, but the attack comes from some totally unexpected quarter; and the station is suddenly put out of service, to the great annoyance of everybody concerned. The moral is that, in large stations particularly it is sometimes wise to take precautions which seem abnormal and needless under ordinary conditions. As experience accumulates new and hitherto unrecognized sources of danger appear, and they should be heeded, particularly when so many eggs are put in one basket as the present fashion dictates.

The bursting steam pipe or breaking flange has now been in evidence a sufficient number of times to warrant and demand a special reckoning. The modern power house, with its stately

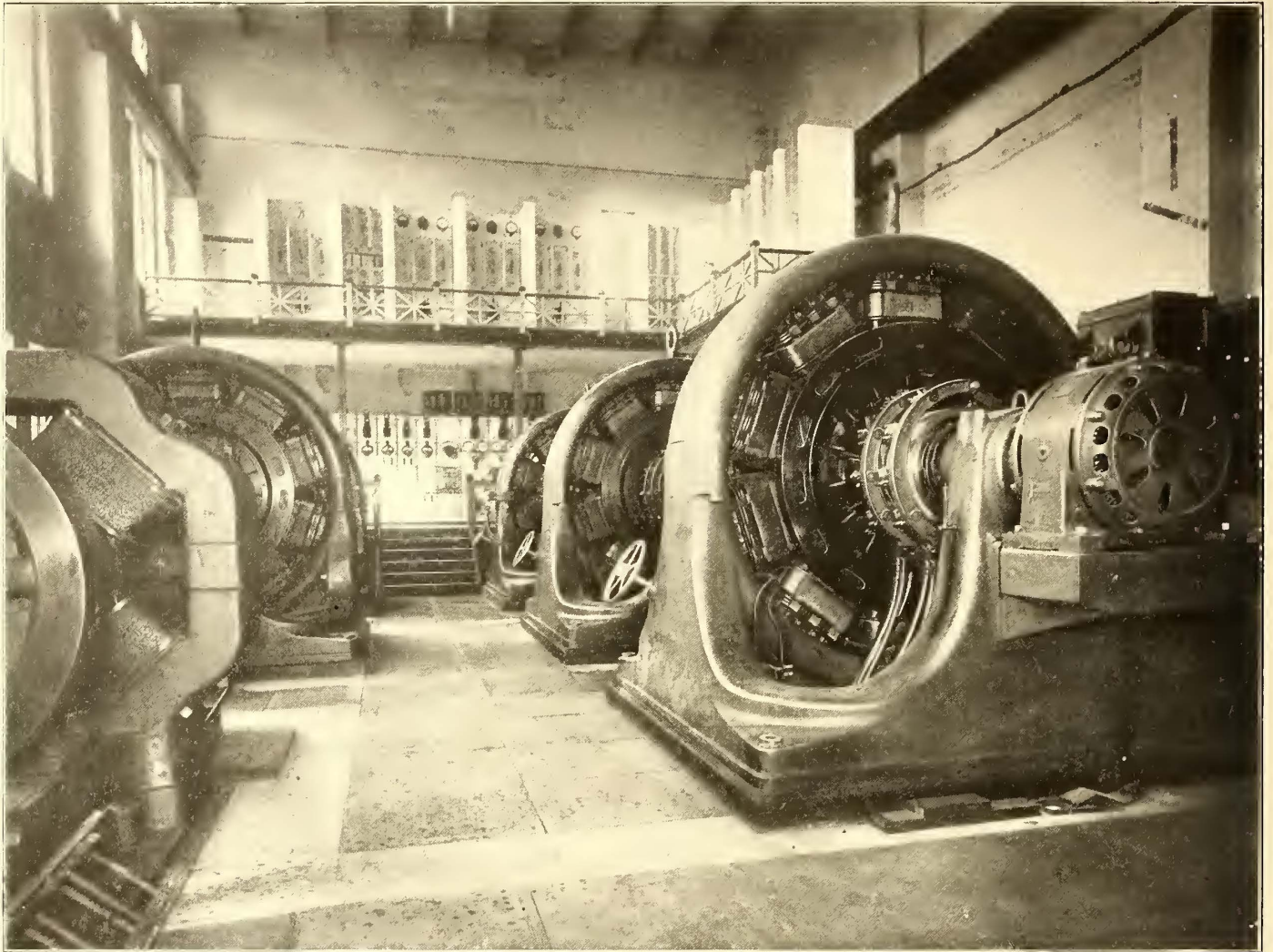
row of colossal direct-coupled units, is peculiarly liable to suffer from this cause. The piping is generally of the best, but at some unexpected time and from some unforeseen cause a break occurs, and a shut down follows. A 2000-hp unit requires piping considerably larger than a goose quill, and when it gives way there is no time to stroll leisurely around and repair damages. Very likely the piping may be in duplicate, but there is confusion for a while in spite of the best efforts of everybody to right matters. It is one of the characteristic dangers of large stations. We have often intimated that power stations of more moderate size are sometimes desirable, and it is certainly true that in the matter of immunity from accident two or three good sized stations are better than one enormous one. However this may be, big power stations require special precautions to prevent just such accidents as have occurred. Electrically the case is much the same. Granted that the units are so connected that an accident to one will not shut down the others the distribution lines in the station and the switchboard connections should be planned with similar caution. It is absurd so to arrange a switchboard, for sake of symmetry or compactness, that a blunder at that one point may put all the generators out of service. There has been of late a wise tendency to put big high-tension switches and the like in special fireproof compartments, but there are few stations in which one cannot find more than one point at which a slight accident would involve the whole output of the plant. Sometimes the designer of the station gets the concealed wiring bee in his bonnet, and puts most or all of the cables into a single compact subway, where, if one goes, it takes all the others with it.

Of course cables are generally safe, but in these days of high voltage alternating-work insulation may break down in spite of the best construction, and if it does the doctrine of general cussedness assures us that it will do so at the precise point where it can involve the maximum number of cables. It is a good, safe rule to keep high-tension cables well apart and in plain sight until they get out of the station. Another weak point in many stations is the absence of safety devices near the generators, giving every opportunity for a short circuit inside all the switches. In these days of automatically operated switches the switch itself can be put anywhere without disarranging the operating switchboard, and it seems to us like taking long chances to leave a long stretch of connections between the machine and the nearest means of cutting it out. And, incidentally, we would like to see a list of the stations burned or seriously damaged through the failure of lightning arresters or their improper location. We have seen stations built within a few years in which the arresters and their lines all centered in a wooden wire tower not big enough to swing a Manx cat in. The lightning arrester at best is a thing of uncertain character, that works about as often as a walking delegate. It should be put, like him, in a secure and isolated spot, where it can be watched. Incendiary in its tendencies, it should be kept away from inflammable material of every kind. Particularly, station designers should realize the extreme difficulty of securing really fireproof construction. Given such heat as is furnished by a big arc and few materials can be trusted. The walls of a station are safe enough, but the floor and interior fittings are easily attacked. The bigger the station the greater care is necessary in all sorts of safety precautions, and while we do not wish to be alarmists it is a fact that many stations supposed to be planned with special regard to security have weak points at which a small cause would produce disastrous results.

IMPROVED POWER FACILITIES FOR THE BROOKLYN RAPID TRANSIT COMPANY

A year ago last October there appeared in the STREET RAILWAY JOURNAL an extended article by C. E. Roehl, engineer of

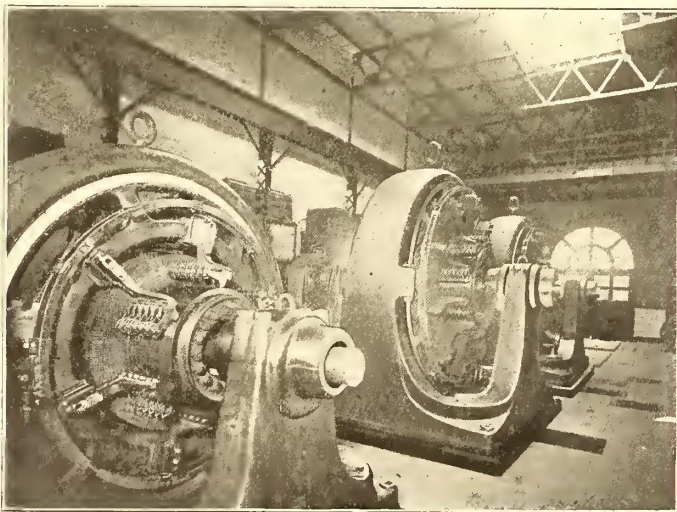
were given. Since the writing of this article the sub-stations which are to be used in connection with the high-tension transmission from the new power station have been practically completed, and the railway now is awaiting the installation of the generators in the power station when the system of high-tension



INTERIOR OF THE HALSEY SUB-STATION

power and electrical transmission, on the proposed power distribution scheme of the Brooklyn Rapid Transit Company. In

mains, rotary converters, sub-stations, etc., can be put into operation immediately. In the meantime the supply of direct cur-



INTERIOR OF TOMPKINS SUB-STATION



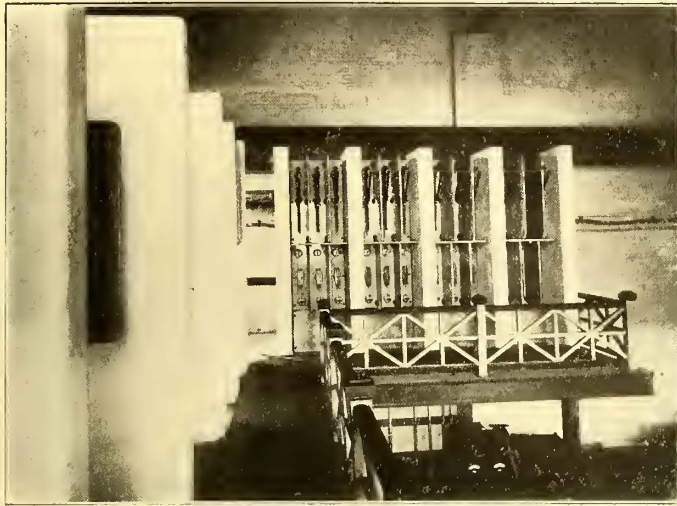
INTERIOR OF CONEY ISLAND SUB-STATION

this article the direct-current power stations which are now in use were described and illustrated and the plans for the new Third Avenue power station, now rapidly nearing completion,

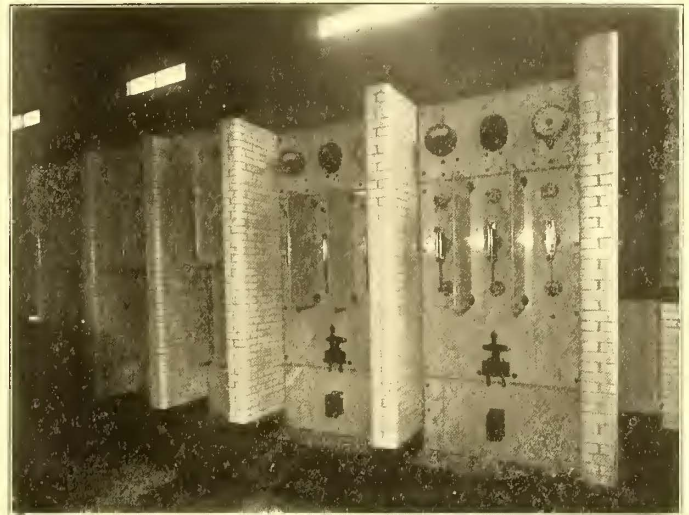
rent taken from the present generating stations distributed throughout the city is being supplemented by direct current from the sub-stations. The Brooklyn Edison Company is sup-

plying to the railway company all the high-tension alternating current that it can spare. The voltage in the high-tension

kw; Coney Island sub-station, 3000 kw. Mention should also be made in this connection of two 1000-kw rotaries which



HIGH-TENSION BOARD OF HALSEY SUB-STATION



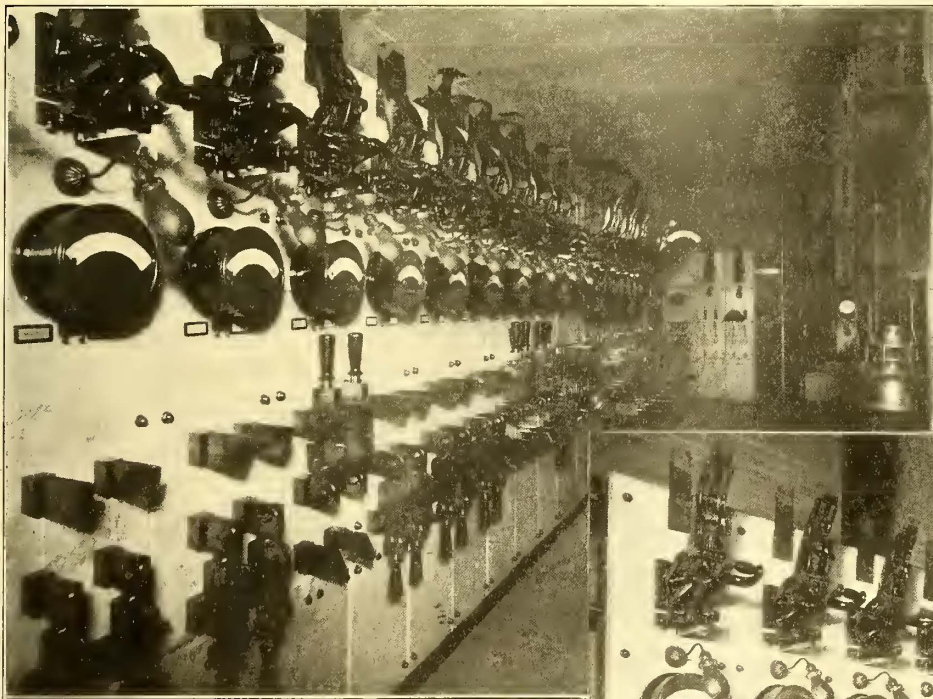
HIGH-TENSION BOARD, TOMPKINS STATION

mains of both railway and lighting companies is 6600 volts, so that an interchange of power will always be easy of accomplishment.

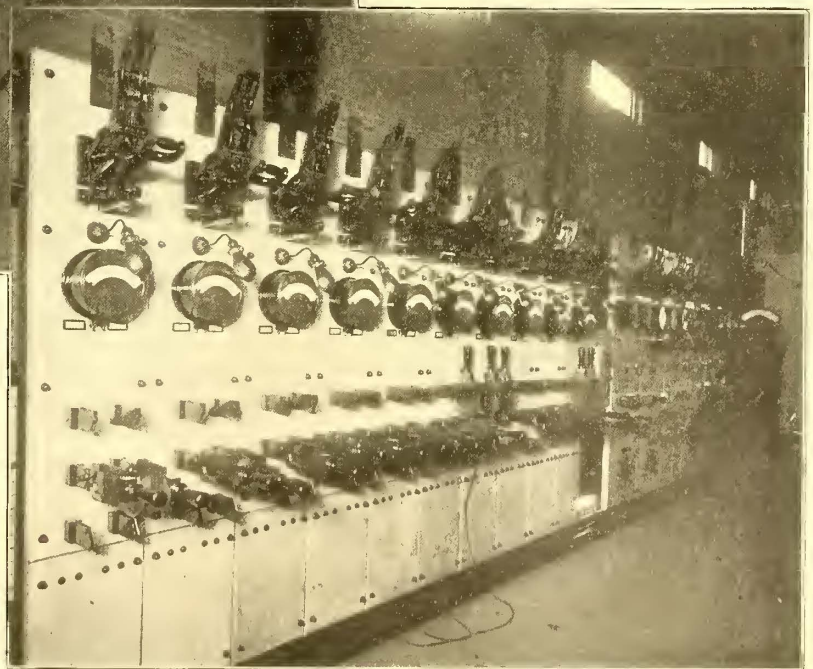
are to be installed at the Fifty-Second Street power station in Bay Ridge. The foundations for these machines are already built and the switchboard apparatus has been installed. By

using these rotaries at night it will be possible to shut down the entire steam plant of the station at that time, while during the day the excess direct-current power from the generators there can be transformed and distributed to other sections of the city on the high-tension mains. The introduction of only 2000 kw in rotaries at this point will, therefore, greatly increase the flexibility of the system.

The erection and equipping of the sub-stations and power station have been in charge of Mr. Roehl, and have



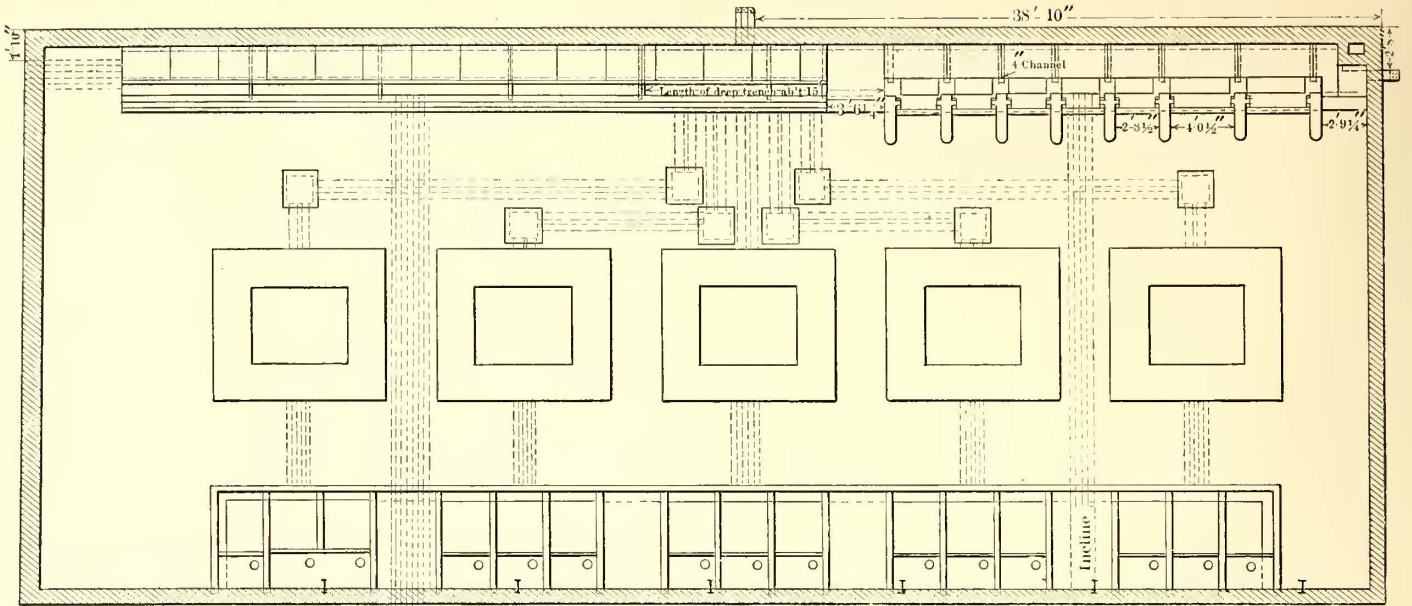
The accompanying illustrations show plans and interior views of four of the principal sub-stations, namely, the Tompkins sub-station, located at Tompkins Avenue and Fulton Street, which serves the central portion of the system; the Halsey sub-station, which serves the eastern district; the Essex sub-station, which furnishes power to the East New York district, and the Coney Island sub-station, which takes care of the large summer excursion business in that direction. There will be a fifth sub-station in Flatbush, which has not yet been commenced. This station will be near the Brighton Beach line and will supply power to the district now supplied by the Thirty-Ninth Street power station. The total proposed rotary capacity of the sub-stations is as follows: Essex sub-station, 2000 kw; Tompkins sub-station, 3500 kw; Halsey sub-station, 7000



DIRECT-CURRENT SWITCHBOARDS, HALSEY AND CONEY ISLAND SUB-STATIONS

been under the personal supervision of his assistant, C. B. Martin. In the construction a number of interesting engineering details have been introduced, of which a brief

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PLAN OF CONEY ISLAND SUB-STATION

Street Railway Journal

description should be given. Plans are shown of the Tompkins, Coney Island and Essex sub-stations, from

tension switchboard to the transformers, from the transformers to the rotaries, and from the rotaries to the direct-current switchboard, is all done by conduits placed in the floor. These conduits are made of ordinary 6-in. drain pipe in a number of



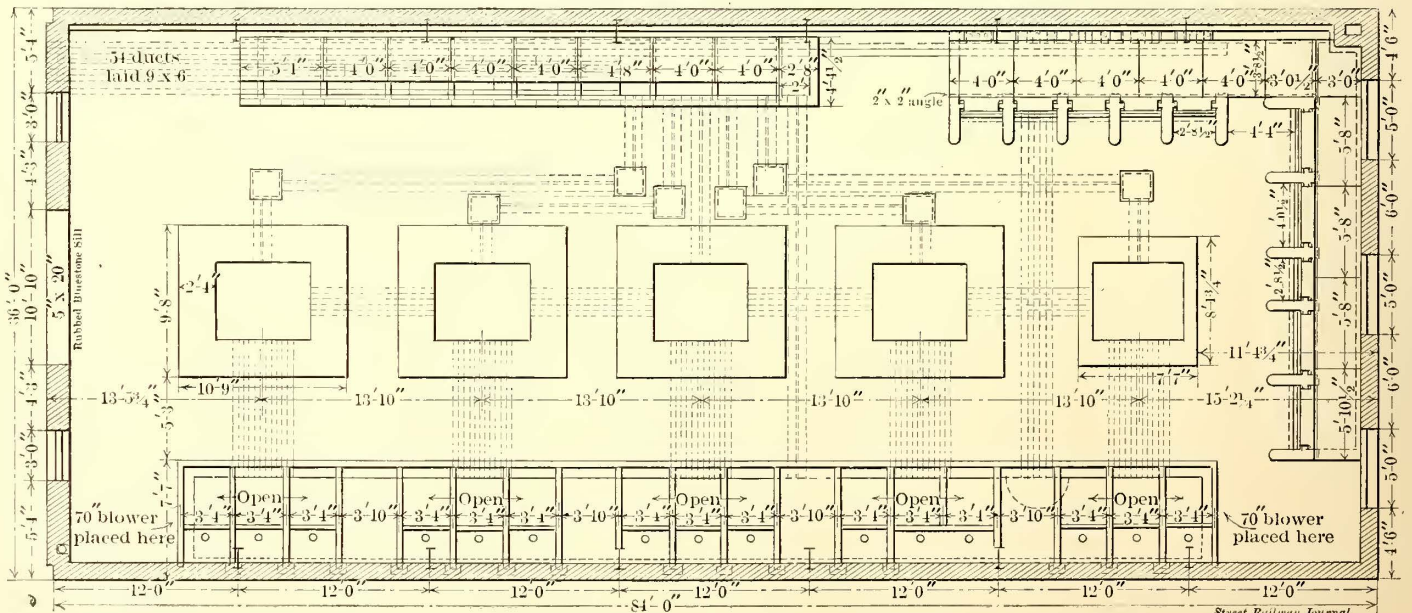
TOMPKINS SUB-STATION



HALSEY SUB-STATION

which it will be seen that a general scheme of arrangement has been carried out in all. The wiring from the high-

cases, though some of the work has been done with the standard clay sectional conduit. The switchboard arrangement on



PLAN OF TOMPKINS SUB-STATION

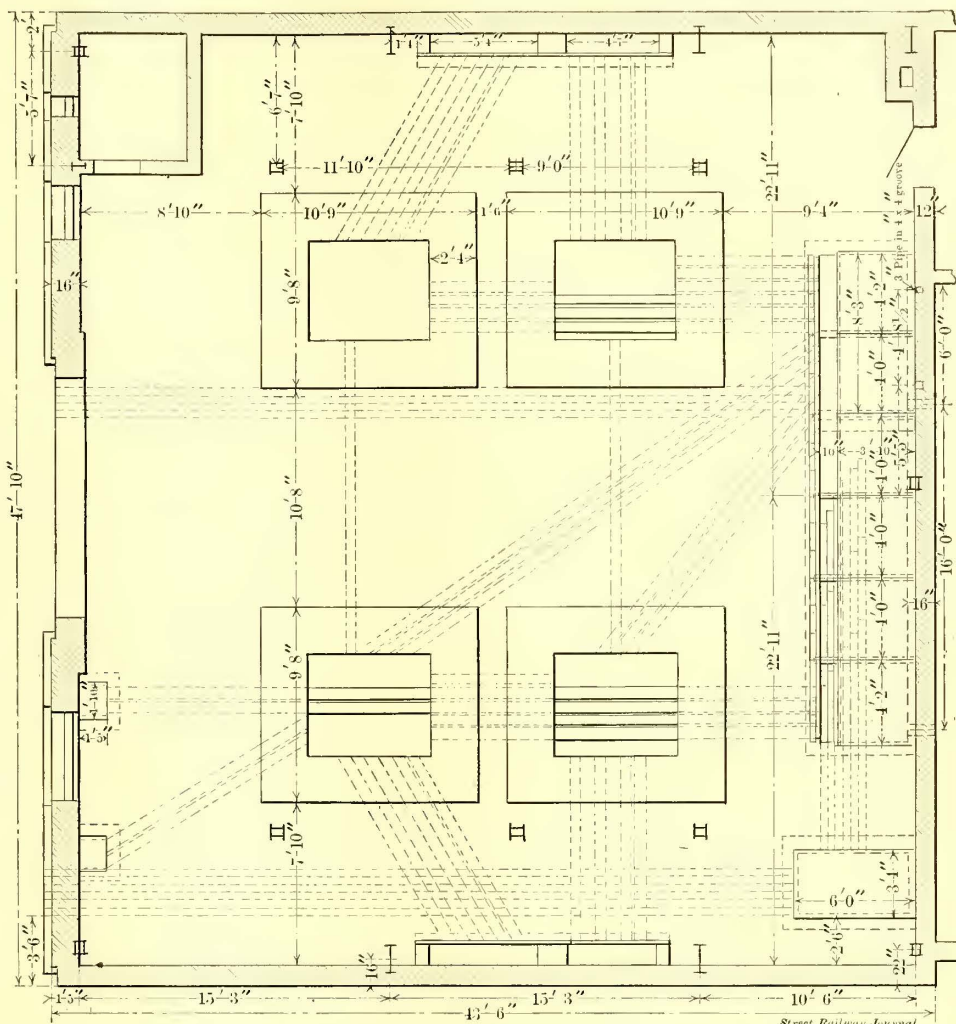
Street Railway Journal

the direct-current side is all of Westinghouse standard switch-board practice, with the circuit breaker at the top of the panels, the ammeter just below, with electric illuminating lamp above it, and the switches at a convenient level for the operator.

On the feeder switchboards a "hospital" bus is connected to the lower switch contact, those of the main bus being on the upper contacts. The circuit breaker at the top of panel is placed in the circuit between the upper switch contacts and the main bus, and as there are generally two feeders to each panel protects two feeder circuits in parallel. In case of trouble on either feeder, therefore, the circuit breaker comes out. Should the trouble continue the feeder switch on that circuit is thrown down to the "hospital" bus, which is connected to the main bus by an auxiliary circuit breaker, and which, thus, localizes the trouble in the station to a single feeder. Any imperfect action of the circuit breakers on the main bus may, of course, be readily investigated and repaired by throwing down the switches on that panel to the "hospital" bus. The circuit breakers are of the carbon-break type, and have given so little trouble that this last use of the "hospital" bus is seldom found necessary. The high-tension boards are formed of stalls containing three-phase operating apparatus. It will be seen from the photographs reproduced herewith that the one at Tompkins sub-station is made of glazed brick. The high-tension switchboard at the Halsey sub-station, which is placed upon a gallery over the direct-current board, is made of hollow firebrick covered with plaster having a Winsor finish, which, while not giving as handsome an effect as the glazed brick, is decidedly lighter.

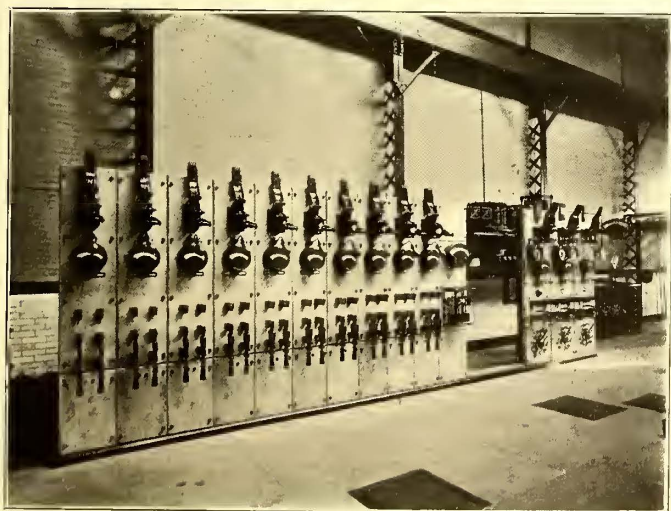
All the transformers and rotary converters in the sub-stations

in one of the company's power stations a year or two ago, and which have been rewound for this service. In the view of the interior given on the first page of this article, this booster can be seen on the left, while on the right is shown the method

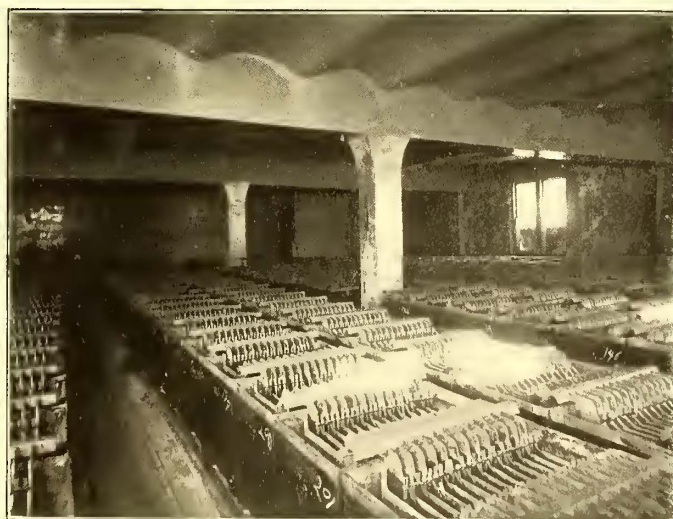


PLAN OF ESSEX SUB-STATION

of starting the rotaries by means of an induction motor. Throughout the entire system the rotaries are started in this manner. The Essex sub-station consists of a combined storage



DIRECT-CURRENT BOARD, TOMPKINS SUB-STATION



STORAGE BATTERY, ESSEX SUB-STATION

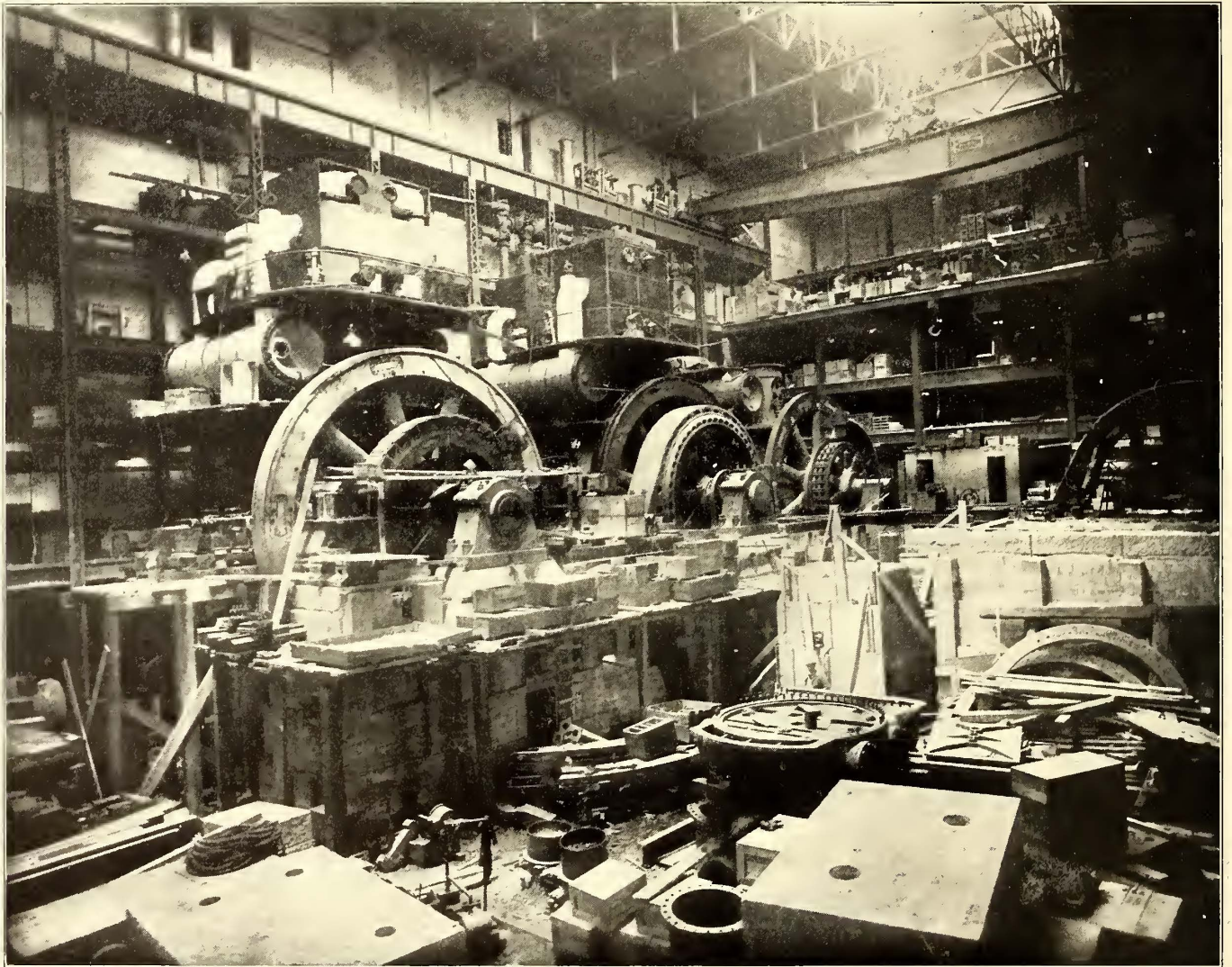
as well as the switchboard apparatus was furnished by the Westinghouse Electric & Manufacturing Company, of Pittsburg, Pa. The Halsey sub-station equipment consists of five 1000-kw rotaries. This station also contains a booster made from two direct-current generators that were saved from a fire

battery and rotary converter station. In the plans shown only the rotary room is given, the storage battery rooms being immediately behind, the rear part of the building consisting of two stories, both being occupied by the batteries. These are Chloride Accumulators, supplied by the Electric Storage Bat-

tery Company, of Philadelphia, and a view of one of the battery rooms is shown. The present capacity of the Essex battery is 2000-amp. hours. There has been installed one rotary converter of 1000-kw capacity, and there is accommodation for three other rotaries. The Tompkins sub-station contains two 1000-kw rotaries and one 500-kw rotary. The Coney Island sub-station is already equipped with its full complement of 3000 kw, containing one 1000-kw rotary and four 500-kw rotaries. This station is a very important one, although it serves a territory upon which only the summer traffic is heavy. It has been the custom to help out this part of the road by means of a portable storage battery, contained on old ele-

ment, have been ordered, and the station is expected to be running before next winter.

A temporary sub-station has recently been constructed near the site of the permanent Bridge sub-station. It consists of a wooden building about 30 ft. x 50 ft. The walls are covered on the inside with asbestos board and the roof is of tin. This sub-station has been built during the last few weeks, and will receive high-tension current from the Edison Illuminating Company, which until recently was not available. The railway has been buying all the power it could get from the lighting company for many months, and this temporary sub-station will be used to handle any that may be set at liberty by the operation



INTERIOR OF NEW STATION. THREE MACHINES NEARLY COMPLETED

vated cars, which could be moved from one part of the system to another, being used at East New York during the winter and at Coney Island during the summer. These cells have now been permanently placed at the Essex sub-station, as the completion of the Coney Island rotary sub-station has given sufficient current supply to this section of the system. It is the intention of the company to move a part of these rotaries to other sub-stations during the winter months to take care of the car-heater load. This will keep the equipment in use throughout the year and relieve the road from paying fixed charges on idle machines.

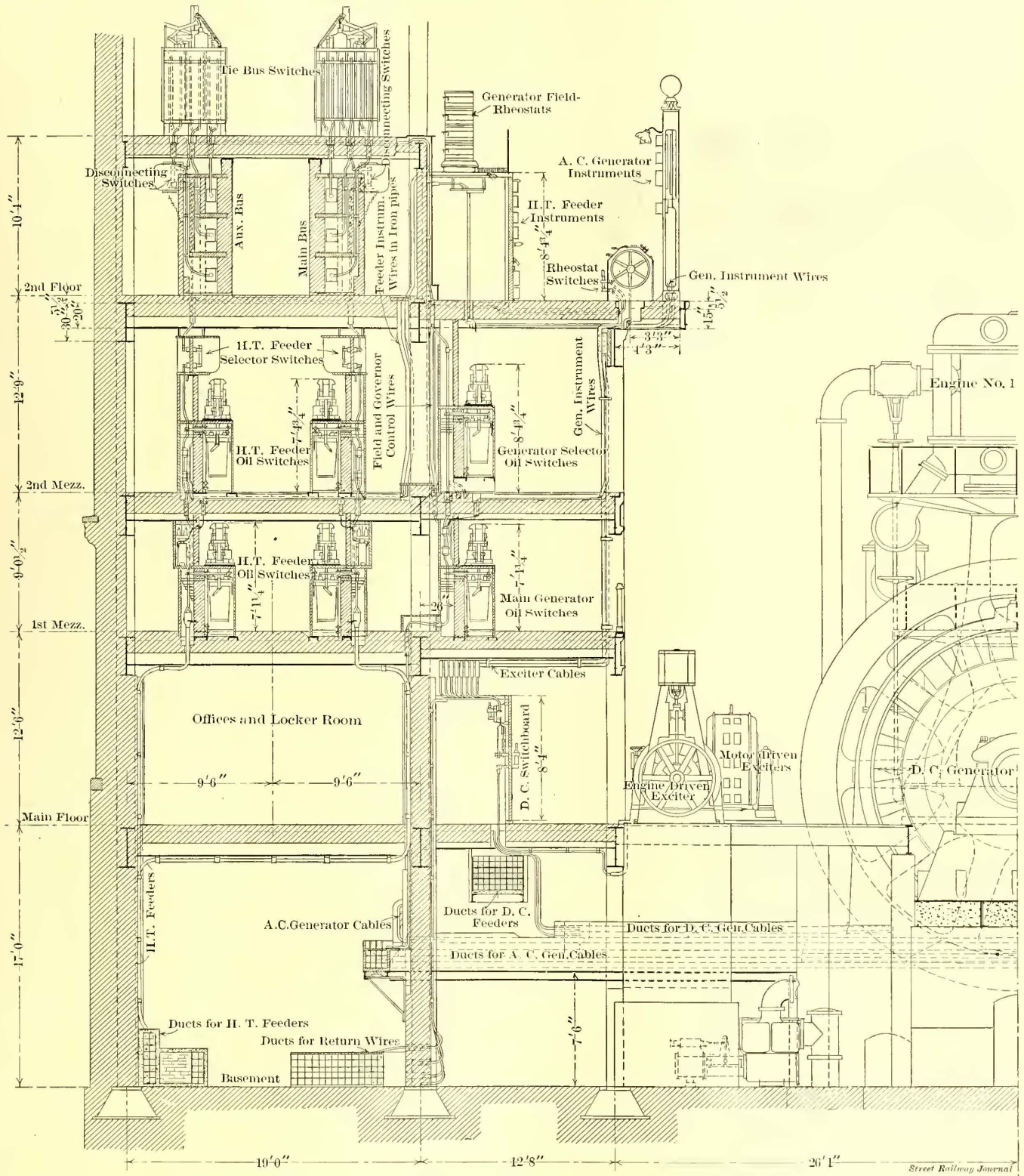
Nothing has been said in the above of the 6000-kw sub-station to be erected near the Brooklyn terminal of the Brooklyn Bridge, and to be known as the Bridge sub-station. The conduits for the high-tension feeders leading to the station have already been laid, four 1000-kw rotaries, the initial equip-

ment, or such additional as can now be spared from the lighting circuits. The Manhattan and Brooklyn illuminating companies are connected by three-phase cables laid across the Brooklyn Bridge. One of these cables has been cut, and both ends are connected to the switchboard of the temporary sub-station. The controlling switches are so arranged that current can be obtained directly from Manhattan, directly from the Brooklyn power station or the two ends can be joined, and the illuminating companies work without connection with the railway circuits. The present installation of the sub-station consists of one 1000-kw Westinghouse rotary and three 400-kw transformers, but this is expected to be duplicated in the near future.

The new Third Avenue power station, the plans of which were given in detail in Mr. Roehl's article, above referred to, is rapidly approaching completion, and it is expected

that within a week or two the first one of the alternating-current machines will be running. This station will be known as the "Central" station, to distinguish it from the "Southern" and "Eastern" stations on other parts of the system. The present condition of the interior is well shown by the illustrations, from which it will be seen that the two generators

There are several features of special interest in the design of the interior. The switching apparatus is all placed at the east end on a series of galleries, the operating board for the alternating current being on the second floor near the top of the station, and that for the direct current on the main floor. Down each side of the room run tiers of galleries about 6 ft.



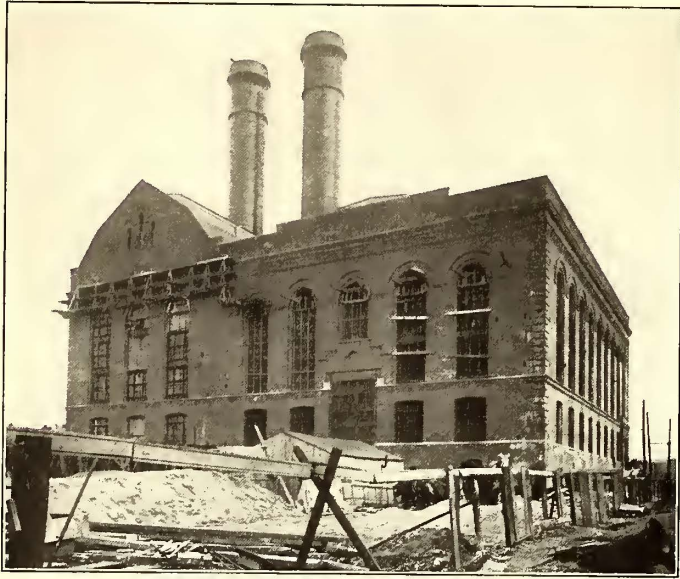
CROSS SECTION OF SWITCHBOARD GALLERIES IN CENTRAL POWER STATION

adjoining the first one erected will also soon be finished. It is hoped that the entire station with its full complement of six alternating-current generators and two direct-current machines will be running by Nov. 1, in time to take care of the winter load next season. This station is one of the handsomest examples of central station design in the Metropolitan district. Ground was broken for the foundation in May 21, 1901, and the engineers of the road are to be congratulated at the rapid progress that has been made in its construction.

wide, which give access to the various stagings around the engines, and from one engine to another, as well as enabling workmen to get at any part of the steam piping and the large barometric condensers which are part of the engine equipment. About half way to the roof these longitudinal galleries are connected at the west end so that the workmen can readily move from one part of the station to another at the upper levels. The boiler room is in practically the same relative condition as the engine room, two batteries of boilers, four units in

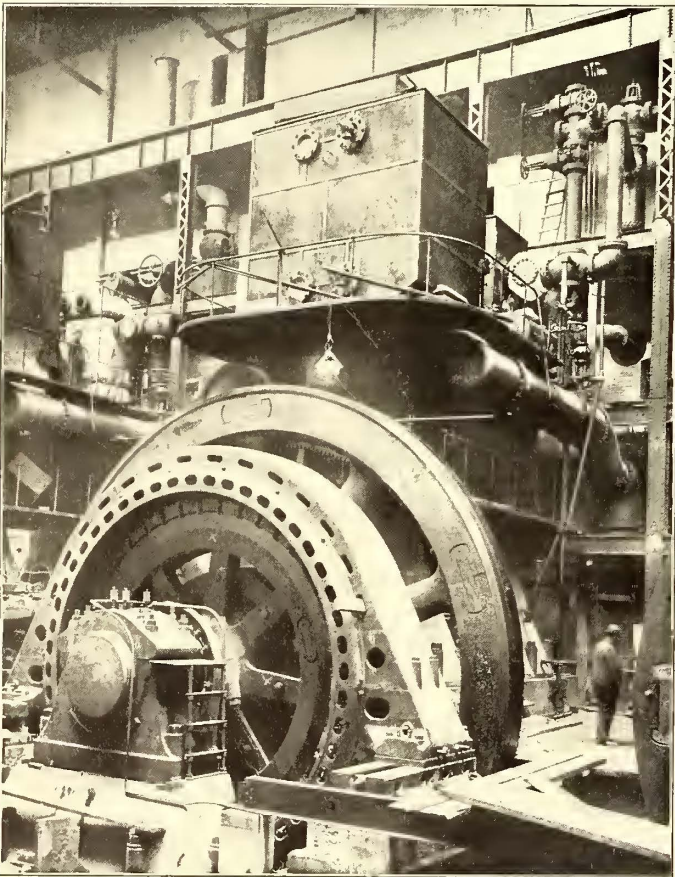
all and sufficient to operate the first generator, being ready to start up.

A cross section is given of the east end of the station, showing the layout of the switching apparatus. Two 2700-kw



THE NEW CENTRAL STATION

direct-current machines are placed nearest this end, and their leads are brought directly to the direct-current switchboard on the first floor through a series of vitrified clay ducts. The high-



THE FIRST UNIT COMPLETED

tension leads from the alternating-current machines are carried in similar conduits to the center of the galleries, from which they are taken vertically to the switches above. In all there are twenty-eight ducts on each side of the station. This line of ducts is placed between the generators and the out-board

bearings. The direct-current switchboard will contain the usual direct-current measuring instruments, generator panels and feeder panels. There are forty-four feeders running from this station, which supply current for the surface lines in the vicinity and for the Fifth Avenue Elevated, two blocks away. Separate panels and recording instruments are used for the two classes of service, so that the relative current consumption of each can be determined. The high-tension cables, after leaving the ducts, are carried vertically to the first mezzanine floor, where are placed three-phase high-tension oil switches, having circuit-breaker attachments. Above each of these main generator switches on the second mezzanine floor are two selector switches which connect with two sets of bus-bars on the second floor. Each pair of selector switches is connected by two sets of cables with the generator switch below, but interlocking devices on the switchboard operating switches prevent a generator from being thrown onto both sets of bus-bars at the same time. Between the selector switches and the bus-bar are placed air-break, hook-type switches, operated by long wooden handles, so that in case of emergency, such as the sticking of the oil switches, a positive break between the bus-bars and the generators can be made and the buses positively killed. The system of connection to the feeders is similar to that described for the generators. Two selector switches connected to the bus-bars by means of the auxiliary air-break hook-type switches connect each feeder switch with the two sets of bus-bars. Interlocking devices at the switchboard prevent the throwing of a feeder onto both buses at the same time. The main feeder switches, like the main generator switches, will act as automatic circuit breakers on an overload of current. From the feeder switches the cables run down vertically to below the main floor level, entering vitrified clay ducts and being carried to the conduits in the street. There will be fifteen high-tension three-phase feeders in the initial installation.

The oil switches are enclosed in brick casings with Alberene partitions and a removable Alberene slab in front. This material is very similar to soapstone. These switches are all motor-operated, 500-volt, current being taken from the trolley circuits or direct-current generators for this purpose. The bus-bars consist of heavy copper strips, supported on porcelain insulators having mica linings, and suspended in an enclosed gallery made of brick with brick columns in front of the bars. This gives complete access to the buses without danger of accidental contact being made. The bus-bars are in four sections, that is, the two sides of the station are separated. Three-phase oil-break switches, placed on the third mezzanine floor, above both the main and auxiliary buses, enable the operator to separate the two halves if occasion requires it, but ordinarily both sides of the station will be run together, the bus-bar tie switches being normally kept closed.

The exciter current for the alternating-current generators will be supplied at 150 volts by a direct-connected generating unit of 150 kw and two motor-driven generators of 150 kw each. These latter generators are driven by induction motors operated on the 6600-volt circuit, and it is expected to start them from the direct-current side in order to avoid the disturbance that might otherwise result in the lines by throwing on the high-tension current while the motors were at rest. The motor-driven sets are from the Westinghouse Electric & Manufacturing Company, and the engine-driven exciter consist of a 250-hp vertical engine, made by James Beggs & Company, of New York, direct coupled to a Westinghouse generator. This engine set is to be held as a reserve, the 300 kw from the motor sets being sufficient to furnish exciting current to the six alternators, which take 350 amps. each at 125 volts. It is expected to install a storage battery later, which will be kept floating on the exciter circuits and serve as a further reserve. The direct-current controlling apparatus on the switchboards is being

urnished by the Albert & J. M. Anderson Manufacturing Company, of Boston.

The following is a short summary of the apparatus to be installed in this station: The boilers are arranged on two floors, there being thirty-two 650-hp boilers in all with coal storage above. The boilers were furnished by the Aultman-Taylor Company, and are of the water-tube type, 6500 sq. ft. of heating surface each. Feed-water is supplied by pumps made by the George F. Blake Manufacturing Company, and will be heated to a temperature of about 212 degs. F., by Wainwright feed-water heaters, placed near the base of the barometric condensers in the engine room. The condensers are furnished by the Worthington Company, as are also the air pumps and other auxiliary apparatus relating thereto. The engines were built by the Allis-Chalmers Company, and are of the vertical marine type of 4000-hp rated capacity each, directly connected to Westinghouse 2700-kw generators. Although the most economical cut-off for the engines is at 4000 hp the guarantee calls for efficient working at 6000 hp, and the generators are also guaranteed to operate successfully under 50 per cent over load. Six of these generators are of the three-phase alternating-current, revolving-field type, generating current at 6600 volts and 25 cycles, and the other two are Westinghouse railway generators, delivering current at 575 volts. The steam pressure is to be 175 lbs. The 50-ton traveling crane with a 10-ton auxiliary hoist, which traverses the entire length of the engine room, was supplied by Alfred Box, of Philadelphia. Coal conveying apparatus is to be installed in duplicate, and will have a capacity of moving 125 tons of coal per hour. This limit being made by the capacity of the coal tower on the receiving dock. Ashes will be handled by means of an electric locomotive and hopper cars.

FREIGHT AND EXPRESS ON ELECTRIC RAILWAYS—II.

BY H. S. COOPER

As stated in a previous article there is now no doubt that the general "short-haul" carriage of freight and express by the electric roads, in any territory they may enter, will come as surely—and much more quickly—as did the short-haul carriage of passengers. The latter has not only paved the way for the former by educating the public in the possibilities and permanency of electric transit, but it has been the means of building many electric lines which will pay as freight roads but which could not have been built as such. Of the many strictly interurban electric roads in the United States over 50 per cent do a regular express and freight business, while over 25 per cent of the remainder carry packages, express or freight to a greater or lesser extent.

Almost without exception this business is not only a very remunerative part of their operating, but it grows in volume and scope in a way that leaves the purely passenger business far behind. This business and this growth has been not only in the face of bitter opposition from without but it has had to contend with ignorance from within. Those who operate this department have been, as a whole, much at sea as to the best classification, rates, service and handling, especially the first two. This does not mean that there is a universal doubt in the minds of individual managers or freight agents as to the correctness of their own particular practice, for of such doubt there appears to be too little, but it means that, back of all this individual certainty, there is a general feeling that the "other fellows" are not quite correct in their policy or practice, and where there is such a feeling it is a pretty sure sign that matters, as a whole, are not satisfactory—either at home or abroad.

This is especially true as to business beginning and ending locally—meaning by this term all business not taken from or

delivered to another road, steam or electric. This local business is, at this time, an extremely short-haul affair, and as such is very much subject to local conditions, but, as the electric roads extend and join and cross, this business will be much extended and increased and will soon need a standard classification and rates of its own or at least it will need a standard "basis" for the same. While it is true that there are many cases where such local business is absolutely peculiar to a particular line or community it is, nevertheless, always reducible to terms of operating cost, and consequently to comparison with carriage costs of other—even if dissimilar—matter. Consequently, extraordinary charges in one locality while tolerated now, in the early stages of electric haulage, because of the absence of any present standard of comparison, or because local conditions permit them, will not be tolerated as soon as the business grows and outside practice and conditions become known. If the electric road haulage of express and freight were only a passing incident, or even if it were a fixed, but limited condition, the irregular and arbitrary rates and methods might continue without harm, but such is not the case. It must be remembered that this business is in its very swaddling clothes, a lusty infant with promise of a vigorous manhood, and consequently that its future must be specially looked to and it must not be allowed to contract habits or get into permanent ways that will injure or retard its growth. It is all very well to say, as has been frequently said of late in regard to this business, "What is the good of worrying over such future matters, they will take care of themselves when they arrive, just as they did in the passenger business. Don't cross a bridge until you come to it!" And yet, on many of these same roads, they are suffering under a heritage of irregular and arbitrary passenger fares, transfers, etc., that were allowed to drift along with the same idea that they were "to take care of themselves when the time arrived," and, like all procrastinated matters, they not only failed to do so but from their very continuance have accumulated a weight of precedent that makes it very difficult to change them. There is no time like the present to plan for the future.

With a view to obtaining information on the subject of local classification and traffic, correspondence was opened by the writer recently with a few of the leading interurban electric roads doing a regular express and freight business. The answers received were so diverse on all points and showed such lack of standard with "hit or miss" results that it was felt that it would be better to devote a little more time and trouble to the matter and find out fully what was actually being done in this field. To this end a personal letter was written to an official of every interurban electric railway in the United States and also to all suburban electric roads which served territory far outlying the corporate limits of their town or city. In connection with each letter was also sent an "inquiry sheet," containing questions applicable to the road to which they were sent. Owing to the "syndicating" of many roads into groups under one management, the number of letters sent out does not represent the actual number of electric roads in the United States that are doing an express and freight business, but the proportion of answers received do represent very closely the practice of a very large majority of all the roads. In addition to this correspondence an extended trip in the Middle West was made, and the express and freight operation of a large number of roads personally examined and the following facts and data are the result of the correspondence and visits.

Letters and inquiry sheets were sent to 147 separate, or separately operated, electric roads, and to the credit of the electric railway fraternity be it recorded, answers were received from 129 of them, which, allowing for some letters having gone astray, gotten into wrong hands or having been mislaid or forgotten, is a very creditable showing, considering that, in many cases, it took some time and trouble to answer them.

The answers were seldom perfunctory, and generally evinced a lively interest in the subject; they not only gave the information asked, where it was possible to give it, but the writers in many instances volunteered suggestions and ideas that had not been touched on in the questions sent them. The same may be said of those personally interviewed; full information was cheerfully given in regard to rates, classification, methods, etc.; forms, blanks and methods of accounting were freely exhibited, and while figures of costs and profit were not asked they were often voluntarily given, and in all cases full opinions were expressed as to the past, present and future of the business, and the consensus of the facts so gathered and the opinions so expressed are given in this and the preceding article.

Of the 129 companies which replied:

Forty-one do no express, package or freight business and do not expect to do any. Various reasons are assigned for this, the majority, however, being prevented from doing so by legislative or municipal enactments or by charter or franchise limitations.

Ten do no express or freight business but expect to do so as soon as possible. Most of these are new roads which are developing their passenger business primarily, and the others are urban or suburban roads who are just adding an interurban extension.

Sixteen do only a small package and express business on their regular passenger cars, using the conductor to attend to it, all the goods being brought to or taken from the car or waiting stations by the shipper and consignee. The rates charged by these roads are absolutely irregular, inconsistent and arbitrary, varying from 1-100 of a cent per pound-mile to 3 cents per pound-mile. All these charges appear to be (as one manager states) "regulated from time to time as emergencies arise." Another states that he considers the business "a necessary evil," and charges accordingly. Another "does it simply for the convenience of the passengers," and proceeds to charge them at a rate of about \$60 per ton-mile, with a maximum allowed weight of 100 lbs. Others go to the other extreme and carry packages up to 50 lbs. in weight, 10 miles for 5 cents. Nearly all of these roads ring up their charges on the fare register, one or two of them having a special register for that purpose. In nearly all of these cases the charges are 5 cents or multiples of it.

Twelve do no "express" business themselves, but have made arrangements with outside public or private companies to take care of this business. These arrangements being private, no details were obtainable in regard to them other than the fact that in six cases the operating companies paid the railway companies a percentage on the gross receipts, the railway companies furnishing cars, power and motormen; in another case the operating company pays the railway company a per diem charge per car run over the whole line of road; in four other cases the operating company pays the railway company a fixed amount per 100 lbs. on all matter carried, regardless of distance. As stated, no details were given as to amounts, percentage or rates received by the railway companies, but all seemed to feel that it was in each case a remunerative arrangement for both parties and, on the part of the railways, that it relieved them of worry, risk and probable loss and damages, that it enabled them better to concentrate their efforts on their passenger business, and that it relieved and greatly simplified their accounting. In two of these cases there is reason to believe that the railway company or some of its stockholders are interested in the operating company, but this belief could not be verified.

Four roads do only a "special freight" business. One of them carries ore in its own cars at 20 cents per ton for a 2½-mile haul, the cars being loaded and unloaded by shipper and consignee. Another does a grain (corn, oats and wheat) business from and to elevators, store business and mills along

its line, the rate on grain averaging about ¼ of a cent per bushel per mile, no loading or unloading being done by the road.

Another hauls logs to and lumber away from the saw-mills on its route, doing neither loading nor unloading, and averaging about 6 cents per ton-mile. Another hauls slate and building stone from quarries on a spur to its line, and averages 4¼ cents per ton-mile, neither loading nor unloading. The hauling in all these cases is done by an ordinary motor car, in two by a regular passenger motor car, running in between the regular passenger cars when travel is light.

Seven others, in addition to their regular business, mention that they have "special freight contracts" for hauling materials on their lines. These materials consist of lumber, wood pulp, pulp-wood, slate, building stone, lime, sugar beets, coal, fertilizers, etc. The rates range from 1½ cents per ton-mile, where the loading and unloading is not done by the road, to 15 cents per ton-mile where it is, the average being a little over 4½ cents per ton-mile.

Of the nearly fifty remaining roads, thirty-four do a regular express business, running cars for that purpose, and the rates as given by them are as follows:

No.	Minimum charge.	Minimum charge per mile.	Average rate per 100 lbs. per mile.	Collection and delivery.
1	.10	.02	.02	Neither
5	Rates about 25 per cent lower than "old line express companies."			"
14	.10	.02	.01	"
19	.10	.01 ⁴ / ₁₀	.01 ⁴ / ₁₀	Delivery
22	Use official local classification and tariff of competing express companies.			Delivery
25	Use official local classification and tariff of competing express companies.			Neither
26	.15	.00½	.01	"
29	Use official local classification and tariff of competing express companies.			"
30	Based on official local classification and tariff of competing express companies; rates about 10 per cent to 15 per cent lower			"
39	.25	.05	.05	"
41	.10	.01½	.02½	"
44	.10	.03	.02	Delivery 2c. per 100 lbs.
51	Rates not given, "made low enough to get the business from the steam roads."			"
53	.20	.05	.05	Neither
52	.10	.01	.02½	"
62	.05	.01	.00 ⁴ / ₁₀	"
67	.10	.02	.02	"
69	Use official local classification and tariff of competing express companies			"
70	.10	.01	.02	"
71	.10	.00 ¹ / ₃	charges based on official classification.	"
76	.05	.00 ¹ / ₃	.02	"
77	.10	.02	.02	"
78	.20	.01	not given	"
83	.15	.01	.02	"
84	.15	.01	Use official classification and add 10 per cent. to official tariff.	"
89	.10	.01	.01 ¹ / ₄	"
99	.10	.01	.02	"
107	.15	.00½	.00½	"
113	.10	.01	.01	"
114	.05	.00½	.01	"
118	.10	.01	.01	"
120	Use official local classification and tariff.			"
121	.10	.00 ² / ₃	.01	"
123	.10	.00 ³ / ₈	.01	"
126	"Based on official local classification and tariff."			"
128	"Based on official local classification and tariff."			"
135	.15	.01	.01	"
136	.10	.02	.02	"

NOTE.—The "minimum charge" is the smallest amount for which any single package is carried any distance, and the "minimum charge per mile" is obtained by dividing the minimum charge by the longest distance for which it is carried. The "average rate per 100 lbs. per mile" is, on some roads, without regard to classification, such roads not using any; where

roads use a classification an average of the rates used have been given.

Any analysis of the above table is somewhat difficult, as outside of the fact that four use "the official local classification and tariff," that three "base their rates" on the same, and that very few give "doorstep" collection or delivery, there appears to be a delightful independence in regard to rates. The "minimum charge per mile" varies from one-third of a cent to 5 cents per mile, with an average, in twenty-eight roads, of 1.34 cents per mile. The "average rates per 100 lbs. per mile" are also very irregular, running from one-half cent to 5 cents, the average of twenty-five roads being 18-10 cents per 100 lbs. per mile, or 36 cents per 2000-lb. ton-mile.

Nine of the above roads, Nos. 1, 39, 41, 59, 62, 67, 83, 113 and 118, do an express business only, and their charges average a little above the general average, but their rates still include almost the lowest (8-10 cent) and highest (5 cents) among all. With one or two exceptions though, those roads which also do a freight business seem to have lower rates in proportion to service given, and from some of the "notices" and advertisements sent out to the public it would seem, as stated in the previous article on this subject, that where both an express and freight business is done by an electric road, and especially where the freight service almost equals that given by the express, any very large proportional difference between the two sets of charges on similar classes of goods would probably be resented by the customers. In confirmation of this belief several of the roads advertise "express at freight rates," and limit the difference between the two classes entirely by a maximum of "package weight" (varying from 15 lbs. to 50 lbs. per package), any excess over these weights placing the package in "special rate classes" or in the "freight."

In many cases local industries of large magnitude seem to necessitate "special rate" classes, which, when compared, give equally as irregular results as do the regular charges. In dairy, fruit or vegetable sections, such articles as butter, milk, small fruits in crates, apples and potatoes in barrels, peaches, onions and celery in crates, etc., are given special rates, which vary from 5 cents to \$1.50 per ton-mile. In one or two cases the rates are made in the nature of a "fixed" or "general" charge, a certain amount being charged per unit package without regard to distance. This seems to be generally applicable, however, to only four classes—personal baggage, bicycles, baby-carriages and milk in cans—although it is applied in other cases to such farm products as are universal or general along the line of the road. In the carriage of milk in cans this seems almost universal, only two exceptions being noted in nearly twenty cases, and the custom of returning the empty cans free of charge is also general. The rate per gallon, however, follows the other "express" rates given, in being very irregular, running from ½ cent per gallon to 4 cents per gallon, the average of twenty-seven roads, which furnished milk rates, being a little less than 1½ cents per gallon. Of course, no figures could be obtained as to the average haul per gallon, but from a comparison of the location and lengths of the roads giving these rates there seemed to be no good reason for the variation shown in rates.

It would seem then, that so far as the practice of electric road express business is concerned, the only fact to be deduced is that it is utterly without any standard of either classification, rates, service or methods—a regular chaos—whose disorder has had some excuse in the past, as its growth has necessarily been on very irregular lines, but whose present extent and prospects not only warrants, but absolutely necessitates, that something be done at once to unify and standardize it.

Of the nearly fifty roads spoken of, which regularly do either an express, a freight or a combined express and freight business, there are four that do a freight business only and thirty-three that do both. Of this thirty-seven eighteen use abso-

lutely the standard classification and local distance tariff of their competing or connecting steam road or roads.

Eight use absolutely the standard classification of the local steam roads, but vary on the tariff as follows:

One includes delivery at standard tariff rates.

One is "a little higher" (amount not given) than standard tariff rates.

One "averages lower" than standard tariff rates.

One adds for delivery 2 cents per 100 lbs. standard tariff rates.

One adds 10 per cent to standard tariff rates.

One "averages 25 per cent higher" than standard tariff rates.

One "averages higher" (amount not given) than standard tariff rates.

One "considerably lower" (amount not given) than standard tariff rates.

Three "base" their classification and rates on local steam-road practice with following variations:

One averages a little higher (amount not given).

Two "average lower."

Thus it will be seen that out of thirty-seven of the largest freight-carrying electric roads in the country eighteen, or 46 per cent, use the standard classification and local distance tariff absolutely, while eleven, or 28 per cent, "base" their rates on the same, thus recognizing it as a standard. This difference from the express part of the business appears to be mainly due to the fact that much more intertraffic is done by the electric roads with steam roads on freight than is done with the "old line" express companies on express and, as previously stated, in such intertraffic with the steam roads: these latter would of necessity insist that the classification used be identical with their own, and that in all "prorating" done between them their own tariff should be the basis. Another reason for this is that, at competing points between the electric and steam roads, the freight (as classified by the steam roads) is a much greater proportion of the business than is the express. This is probably due to the fact that very few of the electric roads have, as yet, more than one preponderatingly large town or city on their lines, and as the bulk of express is between large cities while the bulk of freight is between the country and large cities. The electric roads, therefore, do not come so seriously into competition with the large express companies as they will when they (the electric roads) or their extensions or electric connections are able to carry express directly between the larger cities.

The remaining eight freight-carrying roads, which do not use steam road classification or rates either as a standard or a basis, have rates which are as irregular and arbitrary as the average of the express rates. This is probably due to the fact that, as yet, none of them directly compete or connect with any steam road, and their rates have, therefore, been made either in competition with wagon-hauling or they have had local conditions which forced or enabled them to make either very low or very high rates. In some cases they seem to have followed the steam road maxim of "putting on all that the traffic will bear," while in others they seem to have "taken off all that the directors would bear." For instance, one road hauls brick at a rate of a little over 2 cents per ton-mile, while another charges 12 cents per ton-mile on lumber—both in car load lots. Another road says that its L. C. L. rate averages 2½ cents per ton-mile, while another states that it gets an average of 30 cents per ton-mile for L. C. L. lots.

Still, the fact that such a large proportion do have any standard is a hopeful sign, and, as a rule, the local standard steam road rates seem to be fairly remunerative when any fair amount of business is done. In most cases where traffic is interchanged with steam roads the electric roads prorate with them, and in several cases they have insisted on—and obtained—a "minimum" charge for their part of the service, independent of the classification or rate. This is an important point

and one that should always be insisted on in any traffic agreement with a steam road, as it gives a fixed amount instead of a contingent amount on which to base estimates of income, etc.

In the hauling of steam railroad cars over electric roads there are not as yet many electric roads so favorably situated either physically as to grades, curves and sub-structures on their lines, or by reason of steam road connections that they can do such hauling. These, however, are features which will be improved in the future. The increasing weight and speed of electric cars on interurban lines in necessitating the construction of the track, roadbed and sub-structures and the elimination of steep grades and sharp curves, all in accordance with strict steam railroad practice will, in the future, allow the hauling of steam road cars to a much greater extent than is now done. Also, the increasing number of electric roads which tap steam roads will greatly increase the opportunities for this branch of the business. This will be the case in electric roads, especially which connect or cross different steam roads and which thus will act as "junction" roads.

Eleven roads report the hauling of steam road cars upon their lines, and the following is the individual report of the charges in each case:

- No.
22. So much per 100 lbs. or net ton, according to commodity or distance.
 44. Charges are on ton-mile of contents. No rate given.
 51. .02 cents to .04 cents per ton-mile, excluding weight of car (17 miles operated).
 69. "Use regular Western classification."
 70. 30 cents per ton of contents, minimum of 20 tons, any distance (9-mile road) if less than C. L.; class rates averaging 8 cents per ton-mile are charged.
 87. Arbitrary switching charge.
 89. Charges are largely "joint through tariffs;" a local tariff is in force and S. R. O's are used when required.
 99. Haul steam-road cars on a 2-mile branch, charges are \$3.00 per car.
 114. Have switching charge of \$3.00 for car and return to a certain point on line; arbitrary rate of about \$1.33 per car-mile for further haul.
 126. Charges are based on mileage hauled, and average about 75 cents per car-mile, return free.
 128. Use "through joint tariff" of local steam roads.

It will be seen from the foregoing that there is quite a lack of uniformity in either the method or rate of charging for so simple a service. As this is peculiarly an interchange of traffic with the steam roads it would seem that their practice would have prevailed in this instance, but local conditions seem to have overruled them.

The question of forms and accounts was not gone into very thoroughly, nor was it intended to be, but a great many forms were sent on request, and an examination was made of both forms and methods of accounting on such roads as were personally visited. As might be expected from the other parts of the service, both the forms and methods of accounting were—to say the least—various. This is a matter, though, that can be safely left in the hands of the Accountants' Association, although it will be but justice to say that until the classification, rates and general practice of the express and freight operating departments of a large majority of the roads are unified and standardized, the work of the Accountants' Association will be somewhat that of making bricks without straw.

As previously explained, very few actual figures of the costs or profits of the freight and express departments were obtained even among those personally visited and none among those written to, but many expressions of opinion were given, both personally and by letter, as to the present condition and future prospects of these branches of the business, and they were, almost without exception, favorable; showing incontrovertibly that, as a whole, the business was considered not only a presently remunerative one but that it promised even better results in the future. It would, undoubtedly be difficult at this

time to obtain from the electric railways who are doing an express or freight business sufficient data of costs and income to show really how profitable a business it is, or, perhaps, whether it is profitable at all. One reason for this is that there are only a comparatively few of the larger roads which have sufficiently departmentized this section of their business to be able to state at all definitely as to their operating cost, and even with these there are quite a number of items of actual operating, such as power, track, roadway and overhead repairs, general car house expense, etc., that have to be arbitrarily proportioned between the passenger and freight departments, while very many of the "general" expenses have to be divided in like manner. The operating results could, of course, be obtained much closer if a recording wattmeter and a cyclometer were in use on all cars, and certain expenses proportioned according to mileage and kilowatt use.

Another difficulty in the way of obtaining such figures would be the reluctance of the roads themselves to give any publicity to them. With the present outcry against the "unrighteous" and "exorbitant" profits of corporations, especially of public service corporations such as electric railways, it behooves these latter to keep the details of their business as much to themselves as prying Legislatures, investigating committees and yellow journals will allow them to. In the special cases of express and freight this is all the more a necessity, as in addition to the previous triumvirate the steam roads and the old line express companies would be only too glad to have actual figures as ammunition in the war they are ceaselessly waging against the electric roads, a war which has taken on a more bitter phase since their freight and express profits have been trenced on.

So that it will probably be some time before the exact general status of the electric freight and express business will be publicly known, but still, to those who have watched the course of the business closely from the start there is no doubt that—judiciously managed and operated—these branches of electric railroading are profitable to a very fair degree. As to their enormous increase in the past that is patent to all, and a single visit to a dozen or so freight and express-carrying electric roads will prove that the future increase in both scope and amount will be much greater than in the past.

The crying needs at the present time are a practical and experienced knowledge of the subject by those managing it and a standardization of classification, tariffs, forms and methods. The former is being obtained by the employment of able men who have had full experience in the freight departments of steam roads and with the larger express companies. The latter can only be obtained by a direct organization of those having charge of these departments, a subsidiary organization to the American Street Railway Association, and formed on the lines of the Accountants' Association. There is even a greater need for such an organization of freight and express departments at the present time than there is of the master mechanics'. The standardization of the mechanical and electrical part of the business is a well-recognized necessity, but its deferring for a short time would work but little harm as long as that necessity is recognized, for that very recognition makes each individual master mechanic work separately, if slowly, towards the common end desired. But with the freight and express business such a necessity does not seem to be generally recognized by those engaged in it nor will it be until grave injury has been done to the business, unless such an organization, as is suggested, is soon formed and meets and acts. The writer ventures to say that the first general meeting of such an organization would do more to open the eyes of all concerned to its necessity than would any other one thing, for they would then realize the present chaotic condition of the business, the need of unification and standardization as well as a helpful unity among themselves.

STREET RAILWAY STRIKE AT WATERBURY

The disorderly element which gained the ascendancy among the striking employees of the Connecticut Railway & Lighting Company, at Waterbury, on Jan. 30, is still in evidence in spite of the efforts of the local authorities and the State militia to suppress rioting. On Sunday, Feb. 1, the city was placed under martial law, and 1200 men of the Connecticut National Guard were assembled from other points to assist the local companies. Fourteen companies of the First and Second Regiments, at Hartford and New Haven, were pressed into service to relieve the local companies of the State militia. Disorder and rioting had been very frequent up to this time, and the company had been unable to operate its cars because of the attacks that had been made upon them by the strikers and their sympathizers. As soon as the troops arrived, however, they

by the union for distribution among the people of the town who desired to show their sympathy with the movement. As soon as this became known the management requested the withdrawal of the troops from the power house, as it was thought unsafe to leave them in command of such an important point when it was evident that they were in sympathy with the strikers. This action on the part of the company seemed to awaken among the self-respecting members of the militia a realization of the position in which they were placed, and it soon became apparent that only a comparatively small portion of the troops had become affected by the lawless sentiment that seemed to prevail throughout the town. A large majority of the visiting militia men discharged their duties in a prompt and satisfactory manner, and were highly commended by their officers and by the railway officials.

For more than a week this condition of affairs prevailed and



TROLLEY CAR AND UNION 'BUS

began patrolling the streets upon which the car lines operate, and order was restored in a measure at least, but for several days there were incipient outbreaks whenever a car appeared at an unprotected point that was accessible to the union men. It became so dangerous for persons to ride in the cars that the authorities were forced to adopt very severe measures, and consequently martial law was practically in force from the time of the arrival of the troops. Even with this protection it was found that the operation of the lines outside of the business district, especially after dark, was attended with great danger, as logs and other obstacles were thrown across the track and torpedoes were placed all along the line. Trolley wires were cut and cars ditched at several points. Many serious outbreaks were reported in the first two or three days after the arrival of the troops, and even the cars guarded by militia were frequently attacked.

Early in the proceedings it became apparent that some of the militia were in sympathy with the strikers, and even wore pins bearing the inscription, "We Walk," which had been adopted

then there was a lull which led the State officials to withdraw the troops from the city.

At the end of a week the last scene in the first military occupation of Waterbury was enacted when several companies of the Second Regiment of the Connecticut National Guard withdrew from the city, leaving only the two Waterbury companies of this regiment, which it was thought would be sufficient in case of an emergency. The First Regiment had already been withdrawn. Immediately upon the departure of the troops, however, rioting was resumed, and a great deal of damage has been done since then.

The company has found no difficulty in securing motormen and conductors to operate its cars, but owing to the disturbances the people are afraid to patronize them. Several efforts have been made to effect a compromise and secure an adjustment of the difficulties, but a final settlement seems as far distant as ever. The strikers have refused positively to agree to any settlement which does not include the reinstatement of the entire force with the exception of two men, accused of

intoxication, whose discharge led to the present trouble. The strikers now say that they will not demand the reinstatement of these two men, although the union ordered the strike because of their discharge, but they will insist upon the return of all other workmen who left their places at the behest of the union. The company, on the other hand, declines to discharge the men whom it secured to take the places of the strikers. The management is willing to give employment to as many union men as it will require to fill the places that are now vacant, but



DAMAGED TROLLEY CAR EMERGING FROM A STRIKERS' SALUTE

it cannot consistently turn out the men who have loyally stood by the company through the present difficulties.

The damages to the property of the company have been very heavy and will entail a general overhauling of the rolling stock. The cars that have been operated during the strike have been riddled with stones, and in some instances not only have the windows been broken but the sides of the cars have been very seriously damaged. Some of these cars look as if they had



CAR HOUSES GUARDED BY TROOPS

served as a target for a battering ram; others have been completely wrecked, and all bear evidence of the severe usage to which they have been subjected.

The strikers established a bus line with the intention of competing with the railway company and securing revenue for the union, but the people did not take kindly to the project, and

the movement proved a failure. One of the pictures which is presented herewith shows one of these union 'buses in the heart of the city and also a trolley car, both being empty. Another picture shows a damaged car after a salute by the non-union men.

As usual the executive committee of the striking trolley men's union issued a statement disclaiming all connection with the riot, yet they denounced the authorities for taking steps to suppress disorder.

An attempt was made in the Board of Aldermen to pass a resolution appointing an arbitration committee, to consist of General Manager Sewell, Colonel Burpee, attorney for the railroad company; the Mayor, two Aldermen and two members of the Amalgamated Association of Street Railway Employees. It was voted down.

THIRD RAIL OPERATION ON THE AURORA, ELGIN AND CHICAGO RAILWAY

The Aurora, Elgin & Chicago Railway, representing, as it does, the highest development in electric interurban railway construction, is naturally the center of much interest, and problems coming up in its operation are many of them new. A description of the road appeared in the STREET RAILWAY JOURNAL souvenir number for 1902.

Being a third-rail road of course it has had its troubles with sleet along with the rest. This is the first winter this road has been in operation, and the first two sleet storms caught the road unprepared. Since the first two, however, the sleet has been successfully battled with. The use of a solution of brine seems to be the most efficient way of fighting sleet that has yet been used by this company. The brine is put in a tank on the front platform, and fed through a 1/4-in. rubber tube onto the third rail. The brine acts so quickly that even the first contact-shoe on the car will get current. The brine is applied from 5 ft. to 10 ft. in front of the first contact-shoe, and seems



MILITIAMEN AT MESS

to be a good enough conductor, so that the ice is at once rendered a sufficiently good conductor to allow some current to pass. The amount of brine required per mile is surprisingly small, a run of 24 miles having been made with 8 gals. of brine. A solution of calcium chloride is to be tried instead of brine.

There has been some criticism of the third rail for use on

high-speed interurban roads by some railway men who have ridden over this road at night, because there has been some flashing at the contact-shoes. Part of this flashing has been due to inequalities in the road bed, as the road is new, and the ballast not all settled yet. Running at high speed it takes but slight inequalities to make some flashing at the contact-shoes. It was found by the management that part of the flashing at the contact-shoes has been due to the fact that some of the track men, not being familiar with third-rail work, had put shims under the track rails, in order to bring them up to surface at some places where settling had taken place. This would be done at times when the ground would be so frozen that the ties themselves could not be raised. The effect of this was, of course, to raise the track rails without raising the third rail, because the third rail rests on every fifth tie. The variation in the relative height of track and third rails, of course, did not improve the contact, when running at very high speed. Indeed, in some places the track was so high with reference to the third rail that the shoes are almost lifted off the third rail.

One or two cars are equipped with the spring contact-shoe, devised by W. B. Potter, of the General Electric Company, and previously described in these columns. This shoe seems to be doing very good service. The majority of the cars are equipped with the usual type of third-rail shoe, weighing from 20 lbs. to 28 lbs., and depending upon its weight for contact, being hung loosely on links. Cast-iron links have been used for shoe suspension in the past, and these links were intentionally made the weakest part of the shoe, in order that they might be the first to break in case unusual strains or shocks were put upon the shoe. That is, it was more desirable to have the links break than to tear away the whole contact mechanism. Experience has seemed to indicate the desirability of having these links somewhat stronger, however, and cast-steel links are to be tried. A large number of contact-shoes have been lost off the cars since the operation of the road began by the breaking of the links at high speed when taking the crossings.

As mentioned in the description of this road experiments are to be tried with a short length of overhead trolley at the highway crossings. One crossing has been so equipped, but no trial has been made at present writing. The bow form of trolley on the car will necessarily have to be used, as it will have to take care of itself, with the car running at a very high speed. It is not anticipated by Secretary Bicknell that this will be a very satisfactory device, as even with a carefully arranged angle of approach on the trolley wire there will be considerable shock to the bow trolley and to the overhead work when a car runs under the trolley wire at 70 miles an hour. The cost of putting these overhead trolley wires at all the highway crossings on a system will be considerable, and it is feared that the maintenance will be large, because of the shocks which the overhead work will necessarily receive. Of course, such an overhead trolley would be used only for the purpose of keeping the lights burning at all times at night. The capacity of the bow trolley would not be sufficient to supply the current for the motors, which is from 400 amps. to 1200 amps. Then again, the use of a small storage battery on each car, to supply the lights during the interruption of the third rail at highway crossings, has been considered. Aside from the undesirability of maintaining a storage battery there is little room on one of these cars to place a storage battery, as the type M train-control apparatus and the air brake apparatus take up most of the room under the car. It is not unlikely that acetylene or Pintsch gas lighting will prove to be the best for this purpose. The amount that can be stored in a small tank of acetylene, according to some of the modern methods where a liquid absorbent is used for the gas, would supply a car with light for several days. The car could, of course, be lighted entirely by gas or with gas supplemented by electricity.

Shortly after this road went into operation it became ap-

parent that in order to make the fast schedules which will ultimately be required, and, in fact, to maintain the present schedules on days of extra heavy traffic in the summer, it would be necessary to get the maximum efficiency out of the brakes. In other words, the rate of braking must be more rapid than has heretofore been common in the service stops on interurban roads. If brakes were applied with a constant pressure from the beginning to the end of a stop, much time would be lost, because of the slow rate of retarding the car at the higher speeds. Furthermore, the wheels are likely to be skidded at the lowest speeds. Of course, this is in accordance with the well-known principle of railway car braking, that the coefficient of friction between brake-shoes and wheels is much less at high speed than at low.

To obtain the maximum braking effect with the least danger of flat wheels the motormen have been instructed by a special air-brake instructor in the art of applying the brakes with a very high pressure at first, and gradually reducing this pressure as the car falls off in speed.

There is a rumor that some of the steam roads paralleling the tracks of the Aurora, Elgin & Chicago Railway have issued orders to the locomotive engineers not to race with the electric cars. Racing between the steam trains and electric cars has been very common. On an ordinary straight run, where the electric cars do not have to stop, they never fail to leave their steam competitors, and racing would, therefore, be somewhat uninteresting after the novelty wore off, were it not that the electric cars have to stop occasionally while the steam trains make very few stops. This gives the electric cars a handicap which frequently makes the race exciting to passengers of both lines.

THE COMING MASTER MECHANICS COMMITTEE MEETING

A committee of the master mechanics and electrical men of the electric railways of the country is to meet at the Hollenden Hotel, Cleveland, Ohio, Monday, Feb. 16, 1903, for the purpose of forming an organization. During the convention of the American Street Railway Association, held in Detroit last October, a meeting of the mechanics and electricians in attendance was called for the purpose of discussing the advisability of organizing an association for master mechanics, engineers and electricians connected with electric railways. In response to this call, which was possibly not as generally advertised as it might have been, an enthusiastic meeting was held, everyone present being very favorably impressed with the idea, and a committee was appointed to get the organization started.

At a subsequent meeting of the committee it was decided to interest the most influential street railway men throughout the country and solicit their aid in the movement. A letter has, therefore, been recently addressed to the master mechanics or chief electricians representing the largest street railway companies in the United States and Canada, to get their ideas on the subject, and to ask that it be brought before the management of the various companies to get their consent to become members of such an association, and to have them appoint representatives to meet with the new association at the next annual meeting of the American Street Railway Association.

The principal idea in forming this society is to bring master mechanics and electricians of the electric railway companies together for the purpose of improving and standardizing mechanical and electrical equipment. While the electrical and mechanical men have always had papers and discussions on topics which interested them at the meetings of the Street Railway Association, yet they are obliged to listen to so much that does not concern them that they feel that better results can be obtained by devoting all their time when in session to the dis-

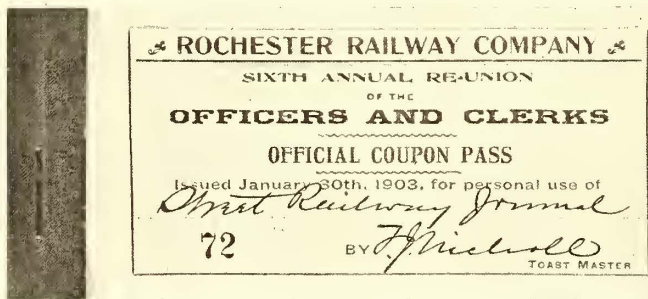
discussion of subjects in which they are directly interested. This would be of benefit, not only to the mechanical and electrical men, but to the American Street Railway Association, which would have that much more time to devote to other and broader questions.

The idea of the committee is to organize along the same lines as the Accountants' Association. The companies which are members of this association are paying dues of \$20 a year, and appointing delegates to represent them at the annual meeting, which is held in conjunction with the American Street Railway Association convention. The committee asks the views of the electric railway men over the country for consideration at its meeting in Cleveland, and would also be glad to have any of the master mechanics or electricians outside of the committee present at its sessions to assist in forming the organization.

The committee consists of Thomas Farmer, superintendent of motive power, Detroit United Railway Company; E. W. Olds, superintendent of rolling stock, the Milwaukee Electric Railway & Light Company; William Pestel, superintendent of motive power, Worcester Consolidated Street Railway Company; G. W. Palmer, Jr., electrical engineer, Old Colony Street Railway, Fall River, Mass.; C. A. Brown, master mechanic, Toledo Railway & Light Company, Toledo, Ohio; W. O. Mundy, master mechanic, St. Louis Transit Company; Walter Mower, of the Detroit United Railway, is secretary for the committee.

UNIQUE ENTERTAINMENT AT ROCHESTER

The officers and clerks of the Rochester Railway Company held their sixth annual reunion on Jan. 30, and celebrated the completion of the sixth year of T. J. Nicholl's administration as vice-president and general manager of the system. Dinner was served at the Livingston Hotel, and an entertainment fol-



CHARACTERISTIC PROGRAMME COVER

lowed, in which several of the officials participated. The arrangements for the affair had been made by a committee representing the officers and clerks, which was composed of Miss Lillian M. Taft, A. Green, G. G. Morehouse and F. M. Nicholl. A unique feature of the entertainment was the programme prepared by Miss Taft, which was printed in the form of an official coupon book, the outside front cover of which is represented in the accompanying cut.

Each coupon in the book was devoted to some particular feature of the entertainment, and the collection forms a very attractive souvenir of the occasion. Vice-President Nicholl was the guest of honor, and he was also called upon to preside at the entertainment that followed the dinner. Speeches were made by several officers of the company, and the event proved a most enjoyable one in every respect.

The annual meeting of the New York & New Jersey Railroad Company, which is to run trolley cars through the tunnel now being constructed under the Hudson River, was held recently. The following directors were elected: David Young, G. Tracy Rogers and Charles W. King.

NEW YORK CENTRAL'S APPOINTMENTS

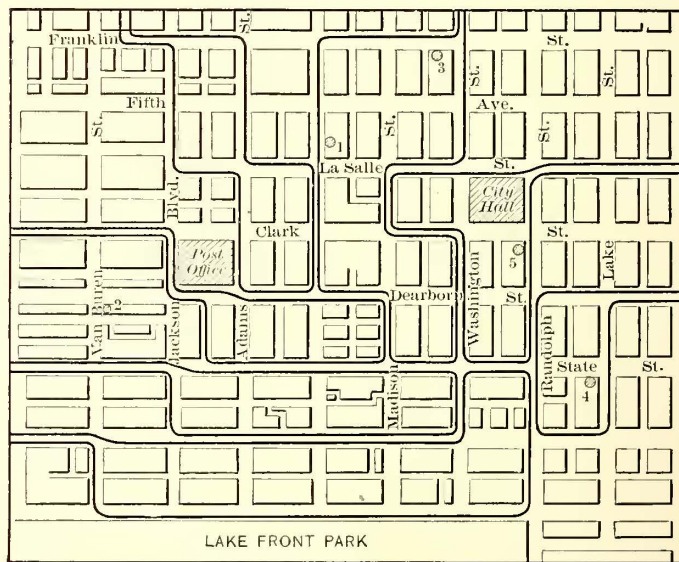
Official announcement has been made by W. J. Wilgus, fifth vice-president of the New York Central & Hudson River Railroad Company, that the electrification of certain portions of the various routes of the company in New York city and vicinity is in charge of a commission, consisting of himself and Messrs. Arnold, Sprague, Gibbs and Waitt. The plan of the organization of this commission and the work upon which it is to be engaged were explained in the STREET RAILWAY JOURNAL of Jan. 17. It is now announced that the electrical and mechanical corps reporting to the commission is under the general charge of Edwin B. Katte, electrical engineer. John D. Keily has been selected as Mr. Katte's assistant, with the title of assistant electrical engineer.

Arthur J. Slade has been appointed mechanical engineer in charge of the designing and construction of heat, light and power plants, water and fuel supply stations, to succeed Mr. Katte, who has just been appointed electrical engineer. E. L. Brown has been appointed assistant steam engineer under Mr. Slade. All of these officers will be engaged upon the new work which the electrification of the Central's lines in and about New York will entail.

H. Fernstrom has been appointed chief engineer of the New York Central & Hudson River Railroad, with headquarters at Grand Central Station, New York, to succeed W. J. Wilgus, who has assumed the office of fifth vice-president.

ANOTHER SUBWAY PLAN FOR CHICAGO

The Illinois Telephone & Telegraph Company has already constructed several miles of low-level tunnels under the downtown streets of Chicago, and it is believed this system of tun-



ANOTHER TUNNEL PLAN PROPOSED FOR CHICAGO

nels would be interfered with somewhat by the low-level subways proposed in the report of B. J. Arnold to the local transportation committee. The company has submitted to the city plans for a system of high-level subways. The Arnold report, however, includes a system of high-level subways, which, in many respects, is superior to the one proposed by the telephone company. The scheme proposed by the telephone company is shown herewith. There is naturally some question as to what will be done with this telephone company's tunnels in Chicago in case it is decided to build a high and low-level or double-deck system of subways.

IMPROVEMENTS ON THE CHICAGO & MILWAUKEE ELECTRIC RAILWAY

The Chicago & Milwaukee Electric Railway Company, operating between Evanston, north of Chicago, and Waukegan, serving the suburban towns near the shore of Lake Michigan, is making extensive improvements looking toward heavier traffic and a faster service. The present service is a car every twenty minutes.

It will be remembered that this was among the first electric roads to employ polyphase transmission in connection with rotary converter sub-stations and storage batteries; heretofore the storage batteries at the sub-stations have been connected directly across the terminals of the rotary converters, which are shunt wound. There has, therefore, been no voltage compensation at the sub-stations for losses in the direct-current feeders. The present improvements will add differential boosters for the storage batteries to the sub-station equipment, so that the storage batteries will more effectively take their share of the fluctuation, and will also maintain a voltage which will compensate for the loss in the direct-current feeders just as a compound-wound generator would. The plans call for the use of longer and heavier cars, enabling the road to carry more people per car during the heavy summer traffic, which is more than double the winter traffic.

The new double-track line from Lake Forest to Libertyville will be in operation in the spring. This branch will be extended from Libertyville to some point in the inland lake district. The Arnold Electric Power Station Company is the consulting engineer for this road.

CHICAGO TRACTION CONFERENCES

Three lengthy conferences were held last week between the local transportation committee of the Chicago City Council and representatives of the Chicago Union Traction Company and the Chicago City Railway. Attorney J. S. Auerbach represented the Union Traction Company, and Attorney E. R. Bliss the Chicago City Railway Company. Other company representatives were present but took little part in the discussion.

At the first session it was agreed by both companies to proceed at once to a discussion of the terms of franchise renewals. Mr. Auerbach at the beginning of the first session read a statement, in which he expressed a desire on the part of the interests he represented to go to the State Legislature, hand in hand with the city of Chicago, to secure State legislation which would make some definite provisions as to what should be done at the expiration of franchises, making municipal ownership and purchase possible at the end of a twenty-year franchise grant, in order that there might be no uncertainty as to the position of the companies and the disposition to be made of the property at the end of the grant. Such legislation would provide that if the city did not take over the lines at the end of the franchise the franchises would either be extended or provision would be made by the city so that the existing lines would be purchased at their physical value. Mr. Bliss, for the Chicago City Railway Company, expressed willingness on the part of his company, to have such legislation enacted as was outlined by Mr. Auerbach. There was an attempt on the part of some members of the Council committee to get the traction representatives to say that they would at once waive all possible rights under the ninety-nine-year act; but this the traction men consistently refused to do until the terms of the proposed franchises were outlined. With satisfactory terms of extension they expressed willingness to waive these claims.

At later sessions these points were taken up more in detail, but no different conclusions arrived at. The committee proposed a franchise by which the city should have the option to purchase the companies' property at its physical value any

time after the end of ten years, after giving six months' notice, or, in other words, a ten and one-half-year franchise. Both traction representatives objected to this as being too short a period, because of the difficulty of raising money for improvements to go into a property which would be sold at a second-hand value at the end of ten and one-half years. Further conferences will be held this week.

OPENING OF THE FOND DU LAC OSHKOSH INTERURBAN

The new interurban line between Fond Du Lac and Oshkosh, Wis., was formally opened with appropriate ceremonies, Jan. 28, 1903. This road was built by the Columbia Construction Company, of Milwaukee, for the Fond Du Lac & Oshkosh Electric Railway Company. The road is 19 miles long, from the center of one city to the center of the other. T. F. Grover, president and manager of the Fond Du Lac Street Railway & Light Company, is also general manager of the interurban. The cost of this line, complete, including roadbed, rolling stock and improvements made in the power plant of the Fond Du Lac Street Railway & Light Company, amounts to \$300,000. The rails are in 62-ft. lengths, weighing 70 lbs. to the yard. The standard overhead construction consists of two No. 0000 trolley wires. The rolling stock consists of four passenger cars and one McGuire rotary snow-sweeper.

A large party of prominent local Oshkosh and Fond Du Lac people celebrated the opening. A special car brought the Oshkosh visitors to Fond Du Lac for lunch at the Palmer Hotel. Over eighty persons sat down to the tables. After the lunch a number of toasts were given, in which a great deal of friendly feeling between the newly-joined cities was manifested. Clement C. Smith, president of the Columbia Construction Company, represented his company at the opening.

This road is but one in a long chain of interurbans which are being constructed and promoted in that part of Wisconsin. The grouping of a number of fair-sized towns in the neighborhood of Green Bay and Lake Winnebago makes that country especially tempting for the construction of interurbans.

The operating officers of the company are as follows: Manager, T. F. Grover; superintendent of transportation, Ralph Colman; superintendent of rolling stock, G. W. Porter; superintendent of roadway and overhead lines, H. S. Hayes.

STORAGE BATTERIES AND CARE FOR PEAK OF THE LOAD

Philadelphia, Feb. 9, 1903.

EDITORS STREET RAILWAY JOURNAL:

The editorial in the issue of the STREET RAILWAY JOURNAL of the 7th inst., under the caption, "Caring for the Peak of the Load" on a railway or lighting plant, does an injustice to storage batteries. It states that the cost of a storage battery to take a peak is about the same as that of extra engines, generators and boilers, but that the advantage of the latter is the lower cost of maintenance and operating expense and a higher efficiency. As your article states, "the most usual method of caring for a peak is by an installation of storage batteries," and experience has shown that in cases where the base line of the peak is not too great, a storage battery will meet the conditions more satisfactorily, both from an operating and financial standpoint, than extra generating capacity.

Under normal conditions the extra units would be used, but for a very short time during each twenty-four hours, whereas a storage battery, in addition to discharging on the peak, is always on the system; it acts as a regulator of potential and also as a reserve which can be instantly drawn upon in case of emergency. A battery has been aptly described as "the watch-

dog of the system," and has been compared to "a bank reserve." In railway plants the battery relieves the generating apparatus of the fluctuations of load throughout the day, reducing the number of units in service, and hence the cost of maintenance on the entire plant.

The efficiency of a storage battery, charged at times of light load, and therefore receiving energy produced at minimum cost, is fully as high as generating apparatus of the class described by you, which, being operated for but a very few hours a day, would show a much higher cost per unit of output than that of the machines from which the storage battery receives its power. The engines would not offer the same class of reserve as a battery, as a very appreciable length of time would be required in which to get them into operation after an emergency arose, during which time either the service must be impaired or the rest of the units be seriously overloaded or both.

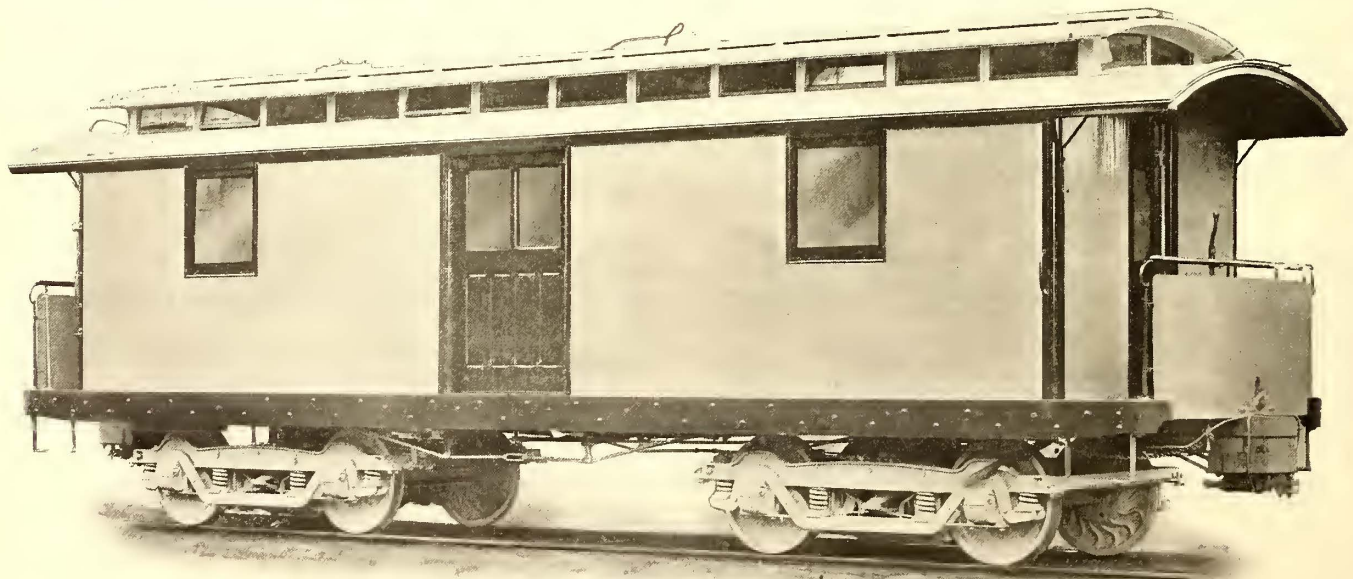
The labor required by the extra units would undoubtedly be greater than that required by the battery.

A comparison between the costs of maintenance of a battery and of maintenance and depreciation of the extra units would certainly not be to the disadvantage of the storage battery, especially if the reduction in maintenance on the entire generating plant affected by the storage battery be taken into consideration. The cost of maintenance of a battery includes its depreciation, inasmuch as the renewal of plates from time to time will keep it always up to date, whereas the repairs to a generating unit merely keep it in operation, and eventually the entire unit must be discarded. Moreover, a battery has the unique advantage of a flexibility which permits it to be adapted to changes in conditions over a very wide range. Its capacity and voltage can be increased or decreased by changing the number of plates per cell or the number of cells in series without destroying the value of the original investment.

CHARLES BLIZARD.

HEAVY SERVICE EXPRESS OR FREIGHT CAR

This car is one of several built by the John Stephenson Company, of Elizabeth, N. J. The construction is particularly strong and substantial, so that it can be used for hauling freight cars if necessary. There are four heavy longitudinal sills along



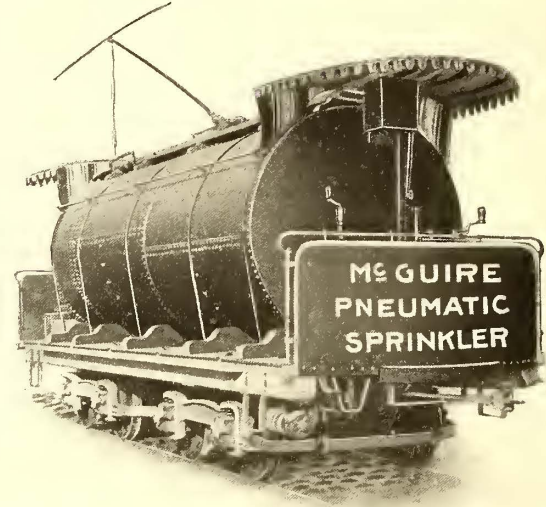
HEAVY CAR FOR FREIGHT AND EXPRESS SERVICE

the bottom, the outer ones being plated with deep steel plates. The sills are placed at a height similar to steam railway freight cars, but the buffers are built down so as to range with the buffers of the passenger cars, to prevent telescoping in case of a collision.

This car is mounted on Stephenson No. 16 extra heavy trucks, having solid steel frames and double equalizing bars, which are looped over the boxes and terminate wide. Coil springs, placed at the ends of the frames, to prevent canting of truck when starting and stopping. The axles are 5 ins. in diameter, and wheels double plate. As in all types of Stephenson trucks the bolsters and boxes are M. C. B. standard pattern. Four heavy motors furnish the power. This car has all the usual appliances necessary for the operation of electric cars as well as a small writing desk at one end.

LARGE PNEUMATIC SPRINKLING CAR

Large sprinkling cars in which constant pressure is maintained by compressed air, and the water is put in a closed steel



LARGE SPRINKLING CAR

tank to permit this to be done, are now made by the McGuire Manufacturing Company. A 4000-gal. double-truck pneumatic sprinkling car is shown in the accompanying engraving. The tank is made of steel, 6 ft. 6 ins. x 18 ft. 6 ins., provided with an inside head, 30 ft. from one end, making an air chamber or air

reservoir, 30 ins. x 78 ins., for storage of compressed air. The remainder of the tank is the water compartment.

The width of the street it will sprinkle is governed by the air pressure supplied to the water compartment. This pressure is controlled by a reducing, regulating valve. Variation in the

distance the water is sprayed is governed by a lever operated by the foot, readily controlled from maximum discharge to quick shut-off by spring action when meeting carriage or vehicle.

The car is provided with an annular sprinkling head at each end, which discharges the water in sheets, maintaining its unity 12 ins. to 18 ins. from the head. Either or both sides of the street may be sprinkled. The cars are designed to spread water very rapidly when desired, and hence will allow running them at a rapid rate of speed. The sprinkling heads are adjustable for either small or large discharge.

The plan embodies a well tried air compressing system similar to that used for air-brake service, consisting of an independent electric motor-driven air compressor of ample capacity, and a high-pressure air reservoir, into which the air is compressed to 75 lbs. or 80 lbs. The air reservoir has a large capacity, nearly sufficient to empty a tank of water with 10 lbs. pressure. This avoids the necessity of operating the air compressor constantly. A six to ten-minute run of the compressor will fill the air reservoir to 75 lbs. pressure, avoiding the complications and troubles inherent to axle-driven compressors or motor pumps pumping water from tank directly to the sprinkling head. These sprinklers are made with tanks of 3000 gal. to 5000 gal. capacity.

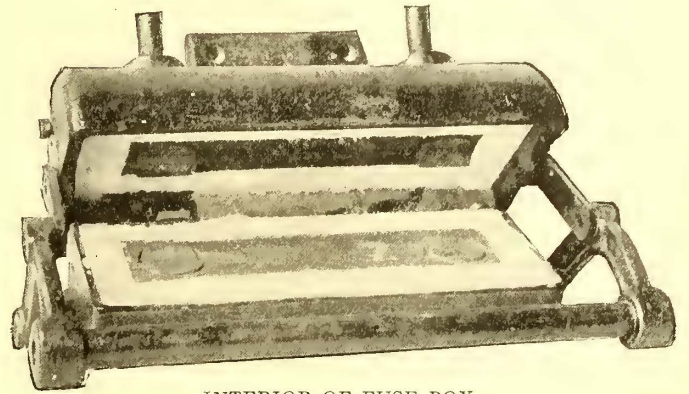
CHICAGO CITY RAILWAY BROOMS

The Chicago City Railway puts up its own brooms for sweepers. A separate department is maintained for this purpose. The rattan, as purchased in the market, is split. This gives the broom greater flexibility and consequently longer life, as it has been found that the ordinary rattan, which has not been split, is so stiff that it is more likely to break in service. The split rattan pieces of the proper length are tied together in bunches of the right size to fit into the holes in the hub of the sweeper. These bunches are stuck into the hub after having the ends dipped into a compound of hot tar and rosin.

PROTECTION OF STREET CAR MOTORS

Where it is not thought advisable to incur the expense of equipping all the cars of a line with automatic circuit breakers

a fuse blows all that is necessary is to open the block, drop a piece of straight copper wire in place and then close it again. The form shown herewith is made by the Westinghouse Elec-

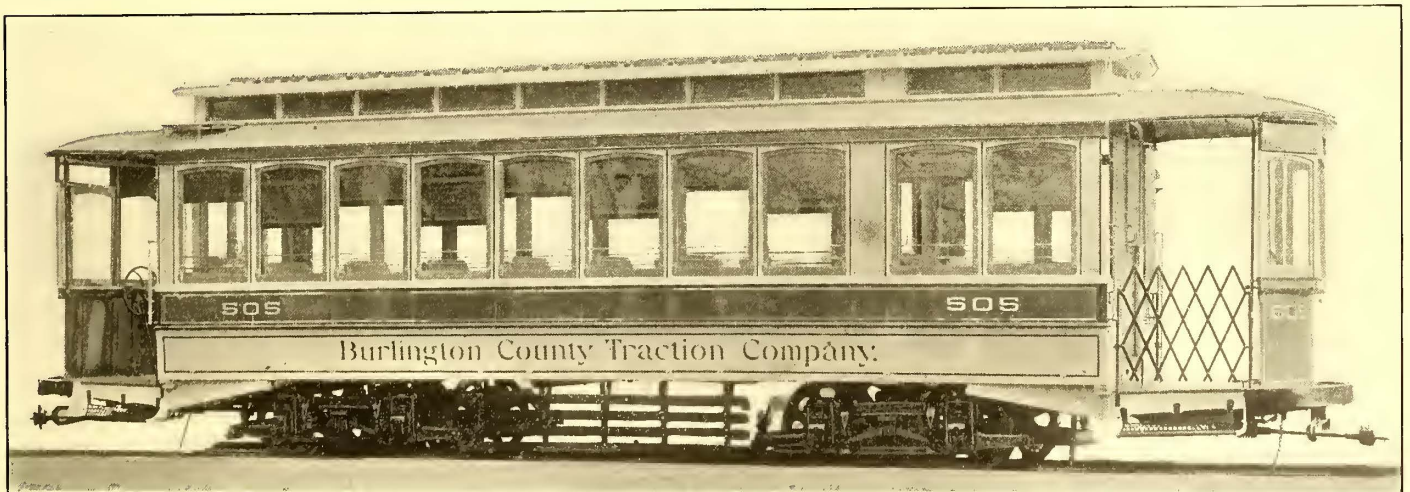


INTERIOR OF FUSE BOX

tric & Manufacturing Company, and is completely enclosed in an iron casing, excepting where the vent for the arc extends through the bottom.

NEW CARS FOR THE BURLINGTON COUNTY TRACTION COMPANY

The J. G. Brill Company, of Philadelphia, has recently completed five semi-convertible cars for the Burlington County Traction Company, of Burlington, N. J., of a type similar to those furnished by the Brill Company to the Philadelphia Traction Company. The window sashes are removable, and when in position are held securely by locks which are operated by a key. The curtains are of waterproof material and the edges extend into the grooves, so that there is protection from rain and wind when the windows are removed. This method does away with wall window pockets, and by placing the ends of the seats close to the side lining between the posts, affords more aisle space. The cars have smoking compartments, which will seat eight passengers; the length of the compartment is 6 ft. 6 ins. The partition between the compartments is of glass, with single sliding door. Spring cane walk-over seats have 33 ins. of seating space, and the total seating capacity of the cars is forty.



NEW BURLINGTON CARS

a fuse block is substituted, possessing the same qualities of easy accessibility, renewal and freedom from danger, such as is shown in the accompanying illustration. When open the contacts on which the fuse is cut out of the circuit, making it safe to replace the fuse while the line is alive. A straight piece of copper wire is used as a fuse and is secured in place and clamped in the contacts by the act of closing the block. When

The cars are very stanchly built, having 4-in. x 7³/₄-in. white oak side sills, plated with 3/8-in. x 12-in. steel. These wide steel plates extend up the base of the posts, and aid materially in strengthening them. The end sills are also of white oak, 5¹/₄ ins. x 6³/₄ ins., and the cross joists 3¹/₂ ins. x 7⁵/₈ ins. The thickness of the corner posts is 3³/₄ ins., and that of the side posts 3¹/₄ ins. The sweep of the posts is 1³/₄ ins. The outside

knees of the platforms are plated the full width with $\frac{1}{2}$ -in. steel. The platforms are fitted with Brill portable vestibules. When the vestibules are removed and the windows taken out the car is practically as open as a regular summer car. The interior finish of the cars is white ash with ceilings of decorated three-ply birch veneer.

The general dimensions of the cars are as follows: Length over end panels, 29 ft.; length over crown pieces, 39 ft.; width over sills, 7 ft 11 $\frac{1}{2}$ ins.; width over posts at belt rail, 8 ft. 2 ins., and height over trolley board, 12 ft. The cars are equipped with sand boxes, "Dedenda" gongs, radial draw bars, folding gates, angle-iron bumpers and other specialties, all of which are made by the builders. The trucks are Brill 27-G type.

EXTENSIONS AT ST. LOUIS

In continuing the work of improving the system of the St. Louis & Suburban Railroad, of St. Louis, began last year, the expenditure of \$1,500,000 during the coming year is proposed by the company.

All that portion of the company's tracks between Sarah Street and the Suburban Garden has been torn up and new T-rails of the heaviest pattern have been laid. From Vandeventer Avenue east to Sixth and Locust Streets the old tracks have also been torn up, and new girder rail of the heaviest pattern have been laid. A loop has been placed in service at Union Avenue, and a new service is to be placed in operation at once. The Union Avenue cars will run from Sixth and Locust Streets to the loop and return. The power stations are to be reconstructed. In the boiler room the old tubular boilers are to be replaced by safety water tube boilers, eight in number. This work is now well under way and will increase the capacity of the steam plant 75 per cent. In the engine room it is proposed to install a 1600-hp engine with a 1200-kw alternator direct connected. This engine will be a duplicate of one erected last summer. The present Hamilton-Corliss engines, operating 800-kw machines, direct connected, will be reconstructed with new cylinders, valve settings, gearings, etc., to run at an initial pressure of 165 lbs. of steam; the steam pipings, separators and piping in general are to be reconstructed.

The car houses are to be improved and rebuilt, with pits for suitable repairs to the cars. Separate tracks are to enter the car house, with the switches outside of the buildings.

The intention is to change the color of all the cars to an olive green, which has been adopted by the company as the standard color. All cars are to be equipped with new trucks of the M. C. B. type, specially designed by the St. Louis Car Company for the Suburban Company. The cars will be equipped with four motors and air brakes. In addition to reconstructing and remodeling the new cars now in use on the system, fifty cars will be added to the service. They are being constructed by the St. Louis Car Company.

These new cars will be 9 ft. longer than the present cars, and will be vestibuled at both ends. They are also to be provided with the Smith arc electric headlight.

Plans are also under way for the construction of buildings and grounds for a car house, general market stores, flats, large hall and club house for the employees.

NEW YORK'S TRAFFIC OBSTRUCTION

State Railroad Commissioner Baker had a conference last Monday with Police Commissioner Greene on the subject of controlling vehicular traffic on New York's crowded streets. General Greene has already expressed a desire to aid the Commissioners along this line. He estimates that 10 per cent of the surface trouble will be obviated by proper and legitimate traffic regulations. A report has been submitted by the Interurban Street Railway Company, giving in detail for the first fifteen days in January the cause and time limit of each delay on the

road. Each page of it shows for each day cases where the service has been held up for periods varying from forty-five minutes to one hour and forty-five minutes by trucks. This, happening at strategic points, means that the entire main thoroughfare is temporarily disabled. Similar statistics, accompanied by maps and diagrams, were submitted by the company during the recent hearing, and were produced in the STREET RAILWAY JOURNAL of Jan. 17.

POWER PROBLEMS AT DENVER

The Denver City Tramway Company during the past two years has built a large direct-current power house on the Platte River, between Fourteenth Street and Fifteenth Street, adjacent to condensing water and to railroad sidings. This station is well situated for a direct-current power house, being near to the heaviest grades on the north side of the city, and also near to the downtown center of load.

The company, however, has a number of long suburban lines, and as the growth of the population has been considerable in the past few years along these longest lines the importance of better voltage on these lines is becoming more and more a matter for consideration. Three of these longest suburban lines are in a southeasterly direction. Another line, which partakes of many of the characteristics of an interurban road, has just been finished northwest a distance of 18 miles, to some coal mines which the company controls. It is also probable that this latter line will be extended into the mountains, to secure tourist passenger traffic, as there is at present no trolley line and only infrequent steam service from Denver to the mountains, although Denver is near the foot hills. This line is in the direction of Boulder.

The rapid increase in traffic of the past two years has made necessary an addition to the new power house, which is now being planned, and will consist of both alternating and direct-current units. The alternating-current units will feed substations supplying the more distant portions of the line. The 18-mile line toward Boulder, which is now finished as far as the coal mines, will be supplied at 26,000 volts.

One somewhat trying condition to be met in Denver is that heavy loads sometimes occur on the very long lines. A freight car containing a small sub-station will probably be used to take care of these temporary loads.

MULTIPLE UNIT COAL TRAINS

The company, will of course, haul its own coal the 18 miles from its mines to Denver, and will also supply some other large consumers in Denver. Coal motor cars, equipped with four motors each, will furnish the motive power on these coal trains. Each motor car will usually take care of about three trailers. When additional cars are to be run in one train, another motor car will be put on, and the length of the train will then be increased to eight cars. The train-control system will be used, so that one man will control all the motor cars in the train.

The grades, after leaving Denver, are but slightly over 1 per cent, the slope being toward Denver, so that the grades will aid the motor cars hauling the coal.

COAL CAR VS. POLE-LINE TRANSMISSION

At the time this power house was first started, L. L. Summers, of Chicago, the consulting engineer, gave careful consideration to the possibility of locating a power house directly at the coal mines, and transmitting electrical energy at high voltage into Denver to several sub-stations there, instead of locating the power house at Denver, and hauling coal from the mines to the power house. In other words, estimates were made on the efficiency of electrical transmission vs. transmission of the coal in coal cars. It was found that the cost of hauling and switching for the 18 miles would probably be less than the interest on the investment, which would be required for high voltage transmission.

FINANCIAL INTELLIGENCE

The Money Market

WALL STREET, FEB. 11, 1903.

The money market, confirming expectations, continues to work toward a lower level. Business has been active during the past fortnight, but the activity reflects rather the pressure of lenders to place their funds than the desire of their customers to borrow. The whole situation is best depicted by the quotations for money themselves. For all periods from sixty days to six months $4\frac{1}{2}$ per cent is the ruling figure, while many of the sixty to ninety-day contracts are being written as low as 4 per cent. Call money, meanwhile, brings at the outside 3 per cent, and the bulk of the transactions occur at $2\frac{3}{4}$. It is a fact of curious significance that the competition to lend is keener in the time money than in the call money branch. This shows, of course, the confidence felt in the indefinite continuance of the present conditions. Two striking developments seem to have followed very naturally from this state of affairs. One is renewed liquidation of last year's advances of foreign capital, the other a rapid expansion of the domestic loan account. According to the highest authorities, our indebtedness abroad is comparatively small, and at the rate it is now being canceled it will soon have been entirely extinguished. This is a most reassuring fact, of course, for the future. Outstanding loans of the New York banks have reached a total which, with one exception—last August—is the largest ever recorded in the history of the local Clearing House. The reason for the recent heavy increases—\$34,000,000 within the last two weeks—is that the great syndicate transactions of one sort or another which were held up during the autumn stringency are seizing the present favorable opportunity to push on to completion. It will probably be made clear, however, that both the enormous loan expansion and the heavy losses in cash, which combined to produce last Saturday's decrease of \$9,000,000 in surplus reserve, were abnormal. This week so far the banks are again creditors in their operations with the Treasury, while they continue to gain, although in greatly reduced quantity, through the interior exchanges. With the past ten days foreign exchange has risen steadily, so that once more it approximates the gold export point. Yet even the most sensitive critics have to admit that, whether we do or do not send gold to Europe, is, in view of the easy money conditions at home and abroad, a matter of little concern.

The Stock Market

The stock market has at length awakened from the lethargy which characterized it for a month or more. For a time after the culmination of the January rise speculative opinion was divided, and one contingent numbering a great many experienced traders were inclined to think that lower prices would result from the existing financial conditions. They based their belief on the fact that an immense supply of new securities having no fixed market value, were being carried by the banking syndicate, and this, together with the absence of the speculative public, they urged, would deprive the regular market of the buying power necessary to any important advance. It is now recognized that whatever force this argument may have for the future it is outweighed for the present by other facts in the situation which are favorable to a higher market. Chief among these, of course, are the excellent position of trade and railway earnings, the easy money market, the growing foreign trade and the concentration of stocks in the hands of a comparatively few powerful speculative interests. Attempts to force a decline during the latter part of last month having failed, speculative attention has turned with considerable unanimity to the possibilities of a movement in the opposite direction. The ease with which prices have risen during the last few days indicates that this campaign is likely to be a success. A certain latent uneasiness is visible, especially in the foreign markets, over the gathering war clouds in the Balkan Peninsula, and ultra-cautious people are not wholly satisfied that the Venezuela controversy has finally lost its serious aspects. But as yet neither of these factors appear to be of sufficient consequence to check the upward tendency of the market. There have been few times in fact during the last year or two when the financial horizon has seemed more clear.

The local traction stocks have not borne as conspicuous a part in the recent trading as they have at various former times in the season. Still they have shared in the general speculative revival

of the last few days, and have all risen rather sharply. The liquidation recently noted in Metropolitan and Metropolitan Securities seems to be over, and the shares have risen partly on investment purchases, attracted by their comparatively low quotations and partly on the covering of a scattered short interest. The general opinion that Manhattan would gradually work away from the field of active speculation and become a more strictly investment issue appears being borne out by current developments. The change in the Brooklyn Rapid Transit directorate has suggested the probability that the representatives of new financial interests in the management may have been adding to their holdings. Some outside buying has been based on this theory and on the further idea that the new capitalists on the board will not be averse to seeing the stock assume a more prominent place in the speculation.

Philadelphia

The last two weeks in Philadelphia, so far as the street railway specialties are concerned, have been singularly unimportant. Business has been exceedingly dull and price changes small and inconsequential. Union Traction, for instance, has not moved outside the range of $46\frac{3}{4}$ -47 during the entire period. Rapid Transit, which has been until lately an active leader, has done scarcely anything, a few trifling purchases carrying the price up from 15 to 16. All the Philadelphia Traction that has changed hands has brought either $98\frac{1}{2}$ or $98\frac{3}{4}$. American Railways has varied between $51\frac{7}{8}$ and $52\frac{1}{4}$. Consolidated Traction of New Jersey has been weak at a decline from 66 to 65. Several hundred Reading Traction sold at 30, and there were odd-lot sales of Indianapolis Street Railway at $84\frac{1}{2}$, Union Traction of Indiana at 50 and United Traction of Pittsburg preferred at $51\frac{3}{4}$. This completes the business record of the past two weeks.

Chicago

Nothing that is at all authoritative has been announced during the fortnight in connection with the readjustment of the Chicago surface properties. Union Traction common sold as low as $8\frac{3}{4}$ a week ago, but has since rallied to 11. This recovery is due probably to assurances from semi-official sources that in no event will there be any assessment on the stock. Otherwise the outcome of the plans now in progress is a mere matter of guesswork. City Railway shares, after reaching 235, dropped suddenly to 230. West Chicago was very weak in sympathy with the decline in Union Traction, falling from $88\frac{1}{2}$ to 85. North Chicago also broke to 165. The action of the Metropolitan Elevated directors in voting a semi-annual dividend of only $1\frac{1}{2}$ per cent on the preferred stock is regarded as eminently conservative in view of the fact that 2 per cent might easily have been paid. The inference is that in view of its many ventures along lines of expansion the company deems it prudent to add liberally to its surplus. Metropolitan preferred has weakened under selling by disappointed speculative holders to 88, the common remaining, however, at 36. Sales are reported in Northwestern common at $32\frac{1}{2}$ and 31, the preferred at 70, and in South Side at 109. As a preliminary to the reorganization of the Lake Street company, the committee has asked for deposits of the various classes of bonds, together with the stock, and has asked the holders to sign an agreement which they believe will insure the success of the undertaking. Lake Street shares made a new low record a week ago, getting down to $6\frac{1}{4}$, but they have since rallied to $7\frac{1}{2}$.

Other Traction Securities

The revival of speculation in the copper shares has so monopolized interest in Boston that the traction stocks have been left pretty much to themselves. Such fluctuations as have occurred were meaningless, and trading was in all cases very light. Massachusetts Electric common sold up at one time to 37, but fell back quickly to $35\frac{3}{4}$. The preferred rose from $92\frac{1}{2}$ to 93, then lost its gain. Boston Elevated, selling ex-dividend, wandered aimlessly about between 150 and 152. West End issues were the strongest features of the market, the common rising from 95 to 97 and the preferred from $112\frac{1}{2}$ to $115\frac{1}{8}$. Baltimore securities have enjoyed a fair degree of activity during the last two weeks, with advance in prices the rule. United Railways income bonds, which were quoted a fortnight ago around 67, were bid up to $68\frac{3}{4}$ and held the advance, while the general mortgage 4's were remarkably strong and active at an advance from 95 to $96\frac{5}{8}$. The stock of the company went as high as 14, then reacted on scattering sales to

133 $\frac{3}{4}$. Charleston Consolidated Electric 5's, which were an active favorite some time ago, jumped on the execution of a single buying order from 92 $\frac{1}{4}$ to 95. Nashville Railway shares went at 4 $\frac{1}{2}$ and the 5 per cent certificates at 106 $\frac{1}{2}$. Other sales included City and Suburban (Washington) 5's at 99, City Passenger 5's at 107 $\frac{1}{2}$, Baltimore Traction 5's at 116 $\frac{3}{4}$, Lexington Street Railway 5's at 103 $\frac{1}{2}$ and Anacostia and Potomac 5's at 100. On the New York curb some sharp fluctuations in San Francisco 4 per cent bonds have been the main incident recently. These securities beginning at 80 $\frac{1}{2}$ dipped suddenly to 78 $\frac{7}{8}$ and then rushed back to 82 as quickly as they had come down. There was no news to explain this curious movement. Brooklyn Rapid Transit new 4's, reflecting the prevailing satisfaction over the changes in the management of the company, have been very strong, advancing from 83 $\frac{1}{2}$ to 86 $\frac{1}{2}$. Other curb transactions of less note include San Francisco subscription privileges at 49 $\frac{1}{2}$, Washington Traction 4's between 80 $\frac{1}{4}$ and 80 $\frac{3}{4}$, Interborough Rapid Transit (60 per cent paid) at 114 $\frac{1}{4}$ to 112 $\frac{1}{4}$, St. Louis Transit 5's from 94 $\frac{3}{8}$ up to 96, United Railways of St. Louis 4's at 84 $\frac{3}{8}$, New Orleans common stock at 14, the 4 $\frac{1}{2}$ per cent bonds at 80, Brooklyn City Railroad at 245 $\frac{1}{2}$, and Nassau Electric 4's at 93.

Tractions were remarkably inactive on the Cleveland 'Change last week. Northern Ohio Traction & Light common sold to the extent of 430 shares, all of which brought 19 $\frac{1}{4}$, a slight advance over previous figures. A small lot of Cleveland Electric sold at 88, the same as last. There was some activity in Cleveland City, and a small lot sold at 105. Monday of this week three 100-share lots came out at the same figure, the lowest price at which the stock has been sold in many months. For the past year it has been held at 115, but when the recent issue of \$1,000,000 worth came out the price dropped to 110, and since has shown gradual decline. It is thought forced liquidation caused the selling, particularly since consolidation rumors are again in the air and the consummation of the deal would send the stock soaring. Lake Shore Electric is selling at 14 for the common, the lowest in many weeks. Syracuse Rapid Transit gained a point on a sale of fifty shares at 77. Ten thousand dollars' worth of N. O. T. & L. 4 per cent bonds sold at 61 and 62. On the Cincinnati Exchange, about 700 shares of Cincinnati Street Railway stock changed hands at between 140 and 140 $\frac{1}{2}$ and 300 Cincinnati, Newport & Covington common at from 39 $\frac{1}{2}$ to 40 $\frac{1}{8}$, the latter the closing figure.

Security Quotations

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

	Closing Bid	
	Jan. 27	Feb. 10
American Railways Company	51 $\frac{1}{2}$	51 $\frac{1}{2}$
Aurora, Elgin & Chicago	32	a38
Boston Elevated	153 $\frac{1}{2}$	150 $\frac{1}{2}$
Brooklyn R. T.	68	69 $\frac{1}{4}$
Chicago City	228	225
Chicago Union Tr. (common)	12	10 $\frac{3}{4}$
Chicago Union Tr. (preferred)	45	45
Cleveland Electric	86 $\frac{1}{2}$	85
Columbus (common)	63	70
Columbus (preferred)	—	104
Consolidated Traction of N. J.	66	65
Consolidated Traction of N. J. 5s.	107	107 $\frac{1}{2}$
Detroit United	87	89 $\frac{1}{4}$
Electric People's Traction (Philadelphia) 4s.	98	98
Elgin, Aurora & Southern	a54	a52 $\frac{1}{4}$
Lake Shore Electric	14	14
Lake Street Elevated	7 $\frac{3}{4}$	7 $\frac{1}{8}$
Manhattan Railway	144 $\frac{5}{8}$	144 $\frac{7}{8}$
Massachusetts Electric Cos. (common)	35 $\frac{1}{4}$	35 $\frac{1}{4}$
Massachusetts Electric Cos. (preferred)	93 $\frac{1}{2}$	92 $\frac{1}{2}$
Metropolitan Elevated, Chicago (common)	36	35
Metropolitan Elevated, Chicago (preferred)	87	87 $\frac{1}{2}$
Metropolitan Street	138 $\frac{1}{2}$	137 $\frac{3}{4}$
New Orleans Railways (common)	15 $\frac{1}{8}$	-14 $\frac{1}{8}$
New Orleans Railways (preferred)	—	43
North American	112	116
Northern Ohio Traction & Light	16	19 $\frac{1}{8}$
Northwestern Elevated, Chicago (common)	33	31 $\frac{1}{2}$
Philadelphia Rapid Transit	16	16
Philadelphia Traction	98 $\frac{1}{4}$	98 $\frac{3}{8}$
St. Louis Transit (common)	28	28 $\frac{1}{2}$
South Side Elevated (Chicago)	107	109
Syracuse Rapid Transit	28 $\frac{3}{4}$	—
Syracuse Rapid Transit (preferred)	75 $\frac{1}{2}$	—
Third Ave.	123	125

	Closing Bid	
	Jan. 27	Feb. 10
Toledo Railway & Light	a36	35 $\frac{7}{8}$
Twin City, Minneapolis (common)	a122	120 $\frac{3}{8}$
United Railways, St. Louis (preferred)	80	80
United Railways, St. Louis, 4s.	84 $\frac{1}{4}$	84 $\frac{3}{8}$
Union Traction (Philadelphia)	46 $\frac{5}{8}$	46 $\frac{7}{8}$
Western Ohio Receipts	28	—

a Asked. † Ex-"rights." The rights closed on Tuesday at 6 $\frac{1}{2}$.

Iron and Steel

The general situation in the iron trade continues favorable, with increasing activity in all lines. As the best testimony to these facts the report of the constituent companies of the United States Steel Corporation shows aggregate orders on hand of 5,509,000 tons, the largest in the history of the concern. Higher prices are being talked of in iron ores, and prices are strengthening elsewhere, but so far this has had no effect in curtailing consumption. The greater activity in the domestic iron trade has further reflected itself in larger purchases of foreign articles, especially steel and steel rails. It is to be noted, however, that prices are rising steadily abroad, and this movement will, if continued, put a check upon imports into this country. Quotations are as follows: Bessemer pig iron, \$22; Bessemer steel, \$30; steel rails, \$28.

Metals

Quotations for the leading metals are as follows: Copper, lake, 12 $\frac{3}{4}$ @12 $\frac{7}{8}$ cents; tin, 29 cents; lead, 4 $\frac{1}{8}$ cents, and spelter, 5 cents.

NEW ENGINEERING FIRM

Dugald C. Jackson, professor of electrical engineering at the University of Wisconsin, and William B. Jackson, until recently traveling engineer with the Stanley Electric Manufacturing Company, have opened an office at Madison, Wis., as consulting engineers and experts. The new firm is prepared to do engineering work of all classes, especially that relating to applied electricity embracing the design and construction of complete steam or hydraulic plants, central stations, isolated installations, long distance transmission, electric railway systems, etc. It is also fully equipped to make examinations and professional reports on proposed and existing properties and to undertake the duties of experts in patent litigation and of referees and arbitrators in matters relating to industrial enterprises.

THE HISTORY OF THE BERLIN STREET RAILWAY COMPANY

The Grossen Berliner Strassenbahn, which is the largest street railway in Germany, if not in all Europe, has recently published a very handsome book descriptive of the organization and equipment of the company's lines in Berlin. The volume consists of over 270 pages, printed on heavy paper and interleaved with fine full-page illustrations of Berlin views. The company has recently completed the transformation of its line from horse to electric power, and now has 481.76 km (300 miles) of track and is capitalized at 85,780,000 marks (\$21,445,000.) The electrical equipment, power station and other features of the engineering side of the railway are thoroughly described and illustrated. Chapters are also given on the traffic of the line, the track construction, employees, etc., and much of the information of a statistical character is illustrated by graphical diagrams printed in colors, by which the data are rendered more clear. Altogether the book is the finest and most complete, so far as is known, which has ever been published by a street railway company.

It is not a case of a duplicate register at Montreal, but a case of a duplicate fare-box. The conductor under arrest for stealing had a duplicate fare-box which he used, turning into the company's box at the end of the day only such portion of the receipts as he thought the company entitled to receive.

In the *Street Railway News*, published in the interest of street railway employees in and near Cleveland, is recorded the death of a woman who was the mother of a motorman, oldest sister of a motorman, mother-in-law of an employee of one of the street railway shops, grandmother of a power-station employee of a road in Virginia, and grandmother of an ex-employee in a street railway shop in Cleveland.

SOUTH SIDE ELEVATED REPORT—CHICAGO

The stockholders of the South Side Elevated Railroad Company, of Chicago, held their annual meeting Jan. 29, at which time the following statement of earnings for 1902 was submitted:

RECEIPTS		
	1902	1901
Passenger.....	\$ 1,433,828	\$ 1,316,009
Other earnings.....	48,476	45,646
Miscellaneous.....	1,537	576
Total gross.....	\$ 1,483,841	\$ 1,362,231
EXPENSES		
Maintenance way and structure.....	\$ 57,442	\$ 74,498
Maintenance equipment.....	107,145	105,280
Conducting transportation.....	364,736	361,620
General expenses.....	149,956	*141,202
Loop rental and expenses.....	183,057	162,360
Total.....	\$ 862,338	844,960
Net earnings.....	621,505	517,271
Bond interest.....	33,750	33,750
Balance.....	\$ 587,755	\$ 483,521
Dividends.....	409,125	357,955
Surplus for year.....	\$ 178,631	\$ 125,566

* Includes taxes for 1899, 1900 and 1901.

BALANCE SHEET—ASSETS

	1902	1901
Cost of property.....	\$12,006,657	\$11,787,044
Capital stock in treasury.....	92,390	92,390
Material and supplies.....	24,930	23,613
Bills receivable.....	5,141
Current assets.....	16,621	6,650
Due from agents.....	4,966
Other assets.....	9,181
Cash on hand.....	8,814	62,721
Totals.....	\$12,158,522	\$11,081,599

LIABILITIES

Capital stock.....	\$10,323,800	\$10,323,800
Funded debt.....	750,000	750,000
Current liabilities.....	*183,814	134,846
Profit and loss.....	850,907	722,953
Depreciation.....	50,000	50,000
Totals.....	\$12,158,522	\$11,981,599

* Includes taxes payable in April, December pay rolls and supplies.

Month	Daily average passengers	Pct increase	Earnings	Ex-penses	Pct. ex-penses
January.....	79,154	11.27	\$ 126,209	\$ 74,354	58.9
February....	79,386	6.52	115,462	70,234	60.8
March.....	80,313	5.30	129,358	73,737	57.0
April.....	81,009	4.16	125,930	69,038	54.8
May.....	76,063	2.50	122,767	68,129	55.5
June.....	76,449	9.77	119,745	67,632	56.5
July.....	70,767	10.98	113,241	68,925	60.9
August....	68,334	11.76	109,320	71,864	65.7
September..	76,572	13.23	118,784	69,662	58.6
October....	83,112	13.76	133,091	75,989	57.1
November..	83,299	8.50	129,062	74,071	57.4
December... 88,513	11.00	140,869	78,697	55.9	
Totals....	78,566	8.95	\$1,483,843	\$862,338	58.1

PRESIDENT CARTER'S TALK

President Leslie Carter, in his annual statement, noted the increase of 8.95 per cent in the number of passengers carried and said the corresponding gain in revenue had enabled the company to meet the increased expenses of operating and at the same time continue to maintain the property. He recounted the improvements to equipment and structure, the addition of cars costing \$160,000 and mentioned other expenditures, adding:

"I mention these items to show what has been done with earnings over dividends, adhering to the policy of providing additions to equipment out of earnings, instead of increasing the bonded debt.

"The pay of every employee of the company, except the general officers, has been raised during the last fifteen months, making

an increase for the year of \$20,552 in the pay-roll, which increase will be heavier during 1903, as some of the increases were made during the year 1902."

Joseph Leiter and Byron L. Smith, retiring directors, were re-elected.

"We have made application to the council for the right to build a third track to Forty-Second Street. Should the ordinance pass we will also operate a line to Lake Avenue. It is believed that these lines will be popular and will add needed facilities to the south division; but we must not expect a large increase in net revenue from them, as the cost of construction is at this time high and materials and labor are also much advanced, while we are restricted to a fixed and extremely moderate price for the transportation furnished."

LINE TO ENGLEWOOD

A branch line has been projected to a thickly settled district of Englewood under the name of the Englewood Elevated Railroad Company. Residents of Englewood are anxious for the line and have held mass meetings favoring it. Plans have been submitted to the council track elevation committee.

QUARTERLY AND HALF-YEARLY REPORT OF THE MANHATTAN ELEVATED RAILROAD

The report of the Manhattan Elevated Railway Company, of New York, as filed with the Railroad Commissioners, for the quarter ending Dec. 31 and the six months ending December, shows that material increases have been made in the earnings of the company. There was an increase of \$374,225 in gross earnings for the December quarter, while net earnings increased \$423,560. The surplus for the December quarter shows an increase of \$52,741. The gross earnings for the six months ending December 31 increased \$775,061, while the net earnings increased \$797,585. The increase in surplus for this period was \$304,348. The statements of the company, together with the balance sheet as of December 31, follows:

Quarter ending Dec. 31—	1902	1901
Gross earnings.....	\$3,211,373	\$2,837,148
Operating expenses.....	1,355,636	1,404,971
Net earnings.....	\$1,855,737	\$1,432,171
Other income.....	65,287	201,287
Total income.....	\$1,921,025	\$1,633,465
Interest and taxes.....	747,954	753,135
Balance.....	\$1,173,071	\$880,330
Balance.....	\$1,173,071	\$880,330
Dividend.....	720,000	480,000
Surplus.....	\$453,071	\$400,330
Passengers carried.....	64,822,675	57,225,850
From July 1 to Dec. 31—	1902	1901
Gross earnings.....	\$5,706,485	\$4,931,424
Operating expenses.....	2,694,577	2,717,101
Net earnings.....	\$3,011,908	\$2,214,323
Other income.....	146,575	392,575
Total income.....	\$3,158,483	\$2,606,898
Fixed charges.....	1,392,723	1,385,486
Balance.....	\$1,765,760	\$1,221,412
Dividends.....	1,200,000	960,000
Surplus.....	\$565,760	\$261,412
Assets—	1902	1901
Cost of road and equipment.....	\$82,299,262	\$70,932,738
Cost of leases.....	14,014,000	14,014,000
Real estate.....	3,254,465	3,148,472
Cash on hand.....	210,693	191,139
Central Trust Co., N. Y., trus., etc.....	1,511	4,593
Supplies on hand.....	410,438	348,583
Estate Jay Gould.....	300,000
Due by agents.....	112	437
Due by others.....	9,968	9,697
Open accounts.....	49,400	222,460
Loaned on collateral.....	104,355	7,641,479
Prepaid insurance.....	13,007	15,793
Sundries.....	16,173	335,367
Total.....	\$100,383,386	\$97,164,758

Liabilities—		
Consolidated capital stock.....	\$47,999,700	\$47,999,700
Subscriptions to increased capital.....	300	300
Funded debt, including \$1,000 New York Elevated first mortgage 7s, called for redemption.....	39,558,000	39,545,000
Interest due and accrued.....	368,952	317,553
Sundries.....	199,034	36,995
Dividends unpaid.....	127,358	17,358
Coupons due, not presented.....	60	60
Manhattan 4 per cent bonds, special.....	300,000
Due for supplies, etc.....	1,586,429	417,620
Open accounts.....	111,319	62,649
Profit and loss surplus.....	6,825,489	5,366,686
Convertible bond certificates.....	26,000	42,935
Taxes on litigation.....	3,580,743	3,058,802
Total.....	\$100,383,386	\$97,164,758

WHAT HAS BEEN DONE AT DES MOINES

The Des Moines City Railway Company, on Dec. 31, 1902, had been in existence just forty-nine years. It was first organized on Dec. 31, 1853, with a capital stock of \$100,000, for the purpose of constructing and operating a street railway system within the city of Des Moines, under the name of the Des Moines Street Railroad Company. The incorporators were M. P. Turner, U. B. White, F. M. Hubbell and Jeff S. Polk. The company constructed and operated the old horse car railway system of the city, and in the year 1889 had from sixteen to twenty miles of track in operation. In 1889 the capital stock was increased to \$1,000,000, a large power plant was constructed, and electricity was substituted for horses as the motive power. In 1891 the capital stock was still further increased to \$2,000,000, the increase being used in extending the lines, and in securing better equipment. In 1892 the capital stock was increased to \$3,000,000. In 1893 the new articles of incorporation were adopted and filed, and the name of the company was changed to the Des Moines City Railway Company.

Since 1892 the company has been extending its lines to all parts of the city, improving its power plant, and bettering its service in every way, until at the present time the system is one of the best in the United States for a city the size of Des Moines. The company has over sixty miles of track in operation within the city limits, a large portion of which is laid with 70-lb. rails. During the past three years the company has made at its own shops several large double-truck cars, besides purchasing a large number of double-truck cars. The power plant has been greatly enlarged, several new engines have been installed, and the capacity of the plant increased more than sufficient to operate the present street railway system and furnish power for the operation of the inter-urban lines from Des Moines to Valley Junction and from Des Moines to Colfax.

During the year 1902 the efforts of the company were devoted to the work of improving the power plant, painting, refitting and improving the cars and relaying heavier rails. A new addition to the power plant was started, in which was erected an Allis cross-compound 2500-hp engine direct connected to a General Electric generator. A duplicate of this unit is now being installed in the new section of the power plant, and the company expects to have the new unit in operation early in the coming year. The company purchased and put in service fifteen new cars during the year, and is now manufacturing and purchasing that many more cars to be ready for service by spring. During the coming year the company will relay considerable track with heavier rails, and will extend its lines from 5 to 10 miles.

The Interurban Railway Company, which is operated in connection with the Des Moines City Railway Company, has been in existence almost five years. The company was incorporated April 22, 1898, with a capital stock of \$50,000, by H. H. Polk, J. B. Jones and Simon Casady. In March, 1902, the capital stock of the company was increased to \$250,000. The company has in operation at the present time about 32 miles of track. The first line constructed was from the terminus of the Ingersoll line of the Des Moines City Railway Company to Valley Junction. This line was constructed in 1898. In 1901 the army post site line was commenced and was completed last year. During the year 1902, the company has constructed about 29 miles of track. The line from Grandview Park, Des Moines, to Colfax was completed the latter part of December, and the freight line north of the city, from the end of the Flint Valley line of the street railway system to a connection with the Colfax line north of Grandview Park, is almost completed. The company constructed waiting-rooms and freight warerooms at Altoona, Mitchellville and Colfax. Four cars are in operation on

the Colfax line, two passenger cars and two combination passenger and baggage cars. These cars were built by the St. Louis Car Company, of St. Louis, Mo., and are 46 ft. over all. They are finished in mahogany, have plush seats and are heated by the hot-water system. Each car is equipped with four G. E.-67 motors. The line has been in operation as far as Mitchellville for several weeks. The company announces that it will extend the line from Colfax to Newton, the county seat of Jasper County, during 1903, a distance of 14 miles. Also that it may extend the army post line to Indianola, the county seat of Warren County, and also to Winterset, the county seat of Madison County.

IMPROVEMENTS AT DES MOINES

The Des Moines City Railway Company, of Des Moines, Ia., has decided to expend \$500,000 in betterments and extensions during the coming year. The plans include the erection of an addition to the power plant, the construction of new car-building shops, the building of a large number of new double-truck cars, the construction of new car houses, the construction of 10 miles of new track within the city limits, the building of a large auditorium at Ingersoll Park and the building of a big pavilion at the State Fair Grounds. These improvements will be sufficient to put the system in condition to handle the rapidly increasing business and to anticipate a rapid growth of the city.

The most important improvement will be at the power plant. Last year the capacity of the plant was doubled, and in doing this work an extension of the buildings was made sufficient to accommodate the installation of machinery that would triple the output of the plant. A third generator, an exact duplicate of the machine installed last year, and a battery of new boilers will be provided. Mechanical stokers will also be provided, and a new steel smokestack 200 ft. high will be constructed.

The car-building plant will be erected on property adjoining the power plant and will be 250 ft. long by 150 ft. wide, of vitrified brick, with a steel arch and slate shingle roof, cement floors and pits. It will be absolutely fireproof and is to be heated by steam. The greater portion of the building will be used for a carpenter shop, but there will be in it also a blacksmith shop, painting and varnishing rooms, etc., and inside trackage. The company expects to construct all its cars in this shop. The capacity of the plant will be fifty double-truck cars a year. The armature and electrical working rooms will be continued in the present quarters, the space now given over in these quarters to assembling cars being added to this department.

The new car house will be constructed at Twenty-Fourth Street and Ingersoll Avenue. It will be 80 ft. x 250 ft. and will be separated from the present house by a fire wall. Constructed of vitrified brick, with a steel arch roof, it will be entirely fireproof as regards construction. The two houses will have a capacity of storing seventy double-truck cars.

The auditorium that is to be built at Ingersoll Park will be in the form of an amphitheater, to conform to the slope of the ground, and will have a seating capacity of 4000 people. The most up-to-date facilities will be provided for putting on summer attractions. In addition to building the auditorium a number of improvements will be made to the grounds.

The large pavilion surrounding and enclosing the company's big loop at the State Fair Grounds will be located just across the street from the racetrack amphitheater and will extend to the stock pavilion. It will be provided with ticket-selling booths for the State Fair ticket department and with compartment loaders, so that when enough people to load a car have been admitted to the compartment it can be closed and the crowding and the crush attending the fairs done away with.

The twenty large double-truck cars that the company is to put into service are being built in Ohio and are to be ready for delivery April 1. These cars, with those already in the service, will be sufficient to do away with all single-truck cars except during big rushes. The company now has 110 cars, which, with the cars contracted for and those to be constructed as soon as the car shops are completed, will make the total 170 by the close of the year.

The 10 miles of new track that are to be built within the city limits during the year include the extension of some of the present lines and the building of new lines touching portions of the city not now reached by the system.

PLANS FOR BUILDING INTERURBAN LINES AT DES MOINES

The Interurban Railway Company, of Des Moines, has recently announced plans for building extensions during 1903. In all, about 80 miles of new road will be constructed. The company is now engaged on a survey from Colfax to Newton, and will in all probability build on what is called the north line, a survey that has been made to the north of the Rock Island tracks. Work on

this line will be commenced as soon as the frost is out of the ground. The line will be about 10 miles long. From a point just beyond Colfax a spur will be built 7 miles south to Prairie City, passing through the coal fields of Jasper County. These two sections will be constructed at the same time, and a supplementary power station will be constructed at Colfax to furnish power for both extensions. The company will also build into Indianola and Winterset by way of Norwalk. The expiration of franchises in those towns will not interfere with the company's plans, for, if necessary, new grants will be secured under the law giving electric railways the same rights in securing right of way enjoyed by steam roads. The survey that has been made to Indianola and Winterset will be abandoned. The Indianola line runs about 3 miles east of Norwalk, and the survey to Winterset started from Valley Junction and passed through the towns of Commerce and McIntire. The route over which the company will build will start from the end of the army post line and extend in a southwesterly direction to Norwalk. From there the company will construct two branches, one to Indianola and one to Winterset. The line from Des Moines to Winterset will be operated as a through service, and the line from Norwalk to Indianola will be operated as a branch. With a supplemental power station at Norwalk, the company will be able to operate these lines with but one additional plant. Had the Indianola and Winterset lines been built as originally proposed, it would have been necessary to erect plants at Indianola and Winterset.

Y. M. C. A. RAILROAD WORK

Upon invitation of the Young Men's Christian Association of Topeka the eleventh international convention of the railroad department of Young Men's Christian Associations will be held in the Auditorium at Topeka, Kan., April 30-May 1 and 2. Representatives of all railroad associations and departments, railroad men from unorganized points, railroad presidents, secretaries and general secretaries of city associations at railroad centers will be present. For the benefit of delegates, special rates will be secured at hotels and boarding houses. Applications for hotel accommodations should be addressed to Richard C. Wilson, chairman committee on entertainment, railroad department Young Men's Christian Association, Topeka, Kan., at the earliest date possible, and not later than April 20.

The formation of branches among the street railway employees on the same lines as the steam roads will form the subject of a special report. Marked progress has been made in this department during the last year, and it is hoped that a more general knowledge of the movement will be appreciated by street railway managers where co-operation is necessary for the success of the undertaking.

VENTILATING STREET CARS *

Tests of a new system of car ventilation were made on Tuesday afternoon in the presence of F. M. Baker, of the State Railroad Commission, and C. R. Barnes, the electrical expert of the board, a representative of the Board of Health, Oren Root, Jr., of the Metropolitan Street Railway Company, and others interested in street railway equipment and operation.

A car had been equipped by the Interurban Street Railway Company for the purpose of making a practical demonstration under ordinary operating conditions. The device employed consists of a small steel box set just below the roof of the car, in the space usually occupied by the ordinary ventilating windows and protruding out and inside. There are ten of these ventilators to a car, five on each side, and they are made in several sizes to meet the requirements of the different sizes of cars. It is the purpose to change the air of the car three times an hour, and it is claimed that this can be effectually done without creating drafts or introducing dust or other extraneous matter into the car. Air is admitted through a small aperture, an automatic valve regulating the force and volume and at the same time excluding snow, sleet, rain or foreign substances of any kind. The air then passes upward through a perforated metal strip and is deflected upward so that no draft is created. The principle upon which the device is based has been found practical in the ventilation of offices, hospitals and in steam railroad cars, and the form exhibited on Tuesday afternoon is a modification devised especially for street railway cars. It is pointed out in this connection that it is not necessary or desirable to use one of the many artificial methods of forcing in fresh air and drawing out foul air, because of the fact that where the air is thus driven out of its natural channels drafts are necessarily created. It is contended, too, that a considerable

saving can be effected in the cost of heating the cars and a much more uniform temperature maintained throughout.

In the tests on Tuesday a quantity of oakum was burned in the car while the ventilators were closed, so that the car could be filled with smoke. The ventilators were then opened and the car was cleared of smoke in nine minutes. This, of course, is a condition that would not arise in ordinary operation, but was created expressly for the purpose of illustrating how the change of air was effected without opening doors and windows or otherwise creating draft.

The system is being placed on the market by the National Ventilating Company, of New York.

EXCURSION TO HISTORIC POINTS

The Richmond, Fredericksburg & Potomac Railroad Company is making preparations to handle a much larger business this year than formerly, as the growing popularity of the points reached by this system demands additional facilities. The district penetrated by this road is one of great historic interest, and is so closely associated with events that are still fresh in the minds of the people that the opportunity afforded by the Richmond, Fredericksburg & Potomac Railroad Company to visit these scenes will be generally welcomed. The company operates fast and frequent train service between Washington, Fredericksburg and Richmond, enabling all who desire to visit the historic battlefields nearby and return to Washington the same day, if desired. Points of interest include Arlington, Alexandria, Aquia Creek, Rappahannock River, Fredericksburg, Marye's Heights. The battlefields of the Wilderness, Chancellorsville and Spotsylvania Courthouse are a few miles from Fredericksburg. At Hamilton's Crossing, 3 miles south of Fredericksburg, a monument of unhewn granite marks the famous battlefield. The Chandler House, near Guinea, in which "Stonewall" Jackson died, can be seen from the car windows. The principal battlefields near Richmond are Yellow Tavern, Ellerson's Mill, Harrison's Landing, Mechanicsville, Cold Harbor, Malvern Hill and Seven Pines.

FIFTY-YEAR FRANCHISE FOR BRONX RAILWAYS

The fifty-year franchise to the New York City Interborough Railway Company in The Bronx, subject to the approval of the Board of Aldermen, has been granted by the Board of Estimate and Apportionment. It was first proposed that the city should purchase the plant and cars and rails of the Interborough Company at the termination of the franchise. An amendment was offered leaving it optional for the city to do this, but the Mayor produced a statement giving his reasons for believing that it would be wise for the city to commit itself to the purchase of the plant of the road at the termination of the franchise. The view of the Mayor was adopted by vote, and the franchise was approved. It will now go to the Board of Aldermen. The statement of the Mayor, which he read himself, concludes as follows:

"I think that the city, in granting a terminable franchise, should agree to buy at a fair rate at the expiration of the franchise all the plant that is necessary at that time for its actual operation. If the city pursues a different policy it will pay many times over, in my judgment, in bad service, for what it will save in money by reserving an option to buy or not, as it pleases."

THREE-CENT FARE LAUGHED DOWN IN CHICAGO COUNCIL

An ordinance providing for 3-cent fare was introduced in the Chicago City Council at its meeting Monday night. It met with all manner of good-natured ridicule during its reading by its author and was referred to the local transportation committee for burial. The city fathers of Chicago are evidently not inclined to disturb the local transportation committee of that city in its present commendable efforts to settle the franchise question on a satisfactory, business-like basis.

Supreme Court Justice Marean, in New York city, spoiled a \$10,000 suit for damages brought last week against the Brooklyn Heights Railroad Company. The plaintiff claimed that his hand had been injured and that his thumb was bent over the palm and could not be moved. Judge Marean asked to see the hand, and with a quick motion straightened out the "poor, maimed thumb," and it was all over with the \$10,000.

ANNUAL DINNER OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

The American Institute of Electrical Engineers held its annual dinner at "Sherry's," in New York City, on the evening of Feb. 9. The dinner this year was designated as a "Library Dinner," and the guests of honor and speakers were prominent donors to the Institute's library fund and men interested in library work. Andrew Carnegie, whose gift of \$7,000 supplemented the similar gift of Dr. S. S. Wheeler that purchased the famous Latimer Clark collection and gave a working capital to the library committee, was the principal speaker. Mr. Carnegie received a most enthusiastic reception, and probably never made a more eloquent and characteristic speech on the subject of libraries. Earning some of his earliest wages as a telegraph operator, he claimed the privilege of talking to the representatives of the electrical profession present in a fraternal spirit, and interspersed his remarks with many quaint reminiscences of the old days. President C. F. Scott made the opening address of the evening, calling attention to the fact that during the last year the Institute had entertained Mr. Marconi and Lord Kelvin. Mr. Scott advanced the idea that electricity was a foe to narrowness and that it increased human and individual efficiency. He made a strong plea for co-operation among the members for bettering the facilities of the Institute and pointed out the rapid growth which has recently taken place. The toastmaster was T. C. Martin, editor of *The Electrical World and Engineer*, and the speakers were introduced in turn by a series of characteristically humorous remarks and graceful recognition of their labors and achievements in their chosen fields. Dr. Wheeler, the founder of the Institute Library, gave a modest account of the manner in which he secured his gift of the Latimer Clark collection, and praised his fellow-members for the material support which they had given in carrying on the work. The other speakers were R. R. Bowker, editor of *The Publisher's Weekly*; Dr. J. S. Billings, director of the New York Public Library; Theodore L. De Vinne, the celebrated American printer and bibliophile, and Dr. J. C. Bayles, M. E., technical editor of *The New York Times*.

Thomas A. Edison and Mrs. Edison were among the diners, and Mrs. Carnegie accompanied her celebrated husband. W. D. Weaver, chairman of the library committee, was, unfortunately, unable to be present on account of illness. Many graceful references were made in the speeches to his unselfish labors in placing the library on a practical, working basis. Among those who attended were Dr. F. B. Crocker, Louis A. Ferguson, H. L. Doherty, F. W. Jones, J. C. Barclay, B. J. Arnold, Elihu Thomson, L. B. Stilwell, Frank J. Sprague, J. F. Calderwood, J. W. Lieb, Jr., T. E. Murray, G. A. Hamilton, Dr. Samuel Sheldon, H. G. Stott, W. N. Ryerson, W. J. Hammer, A. A. Knudson, Dr. L. Waldo, Prof. W. L. Robb, Edward Katte, F. H. Taylor, J. D. Keiley, C. A. Terry, H. V. Henshaw, P. A. Bates, A. L. Doremus, W. C. Andrews, Kern Dodge, Charles Day, P. B. Delany, C. O. Mailloux, W. S. Barstow, Leo Daft, Oberlin Smith, W. C. Gotshall, H. G. Reist, H. A. Lardner, J. J. Mahony, E. H. Mullin, R. A. Fliess, H. Wray Weller, F. A. Scheffler, R. W. Pope, C. Blizard, C. E. Knox, H. R. Leyden, Joseph Bijur, C. A. Bragg, George F. Sever, Dr. Max von Rocklinghausen, F. H. Shepard, A. K. Warren, T. C. Wood, D. B. Rushmore, Prof. W. E. Goldsborough and F. Darlington.

THIRD-RAIL OPERATION

At the next meeting of the Chicago Electrical Association, to be held at room 1736 in the Monadnock building, Chicago, on Friday evening, Feb. 20, H. M. Brinckerhoff, general manager of the Metropolitan West Side Elevated Railway Company, of Chicago, will present an illustrated paper on "The Third-Rail System for Electric Railways," which will be followed by the usual discussion.

THE STRIKE AT MONTREAL

After a brief but riotous history the strike of the employees of the Montreal Street Railway Company, of Montreal, Que., declared Feb. 5, was settled Feb. 8 through a series of conferences between the committee representing the City Council, officials of the company and the representatives of the strikers. The main objection of the company was to a formal recognition of the union, the representatives of the company stoutly maintaining that no settlement could be effected while the clause for formal recognition of the union remained in the articles submitted for signature. After considerable dickering on all sides this clause

was modified and the articles signed. The agreement, as signed, follows:

1. None shall be dismissed without full and equitable reason.
2. The company will give an equitable hearing to any employee against whom a complaint has been made. An appeal may be made to the highest officer, be it the superintendent, the manager or even the president.
3. The company will maintain the same scale of wages to sweepers as they had in force on Feb. 3.
4. The company will, on demand, show to a deputation of its employees the reports that shall have been made against recently dismissed employees.
5. The company will grant a general increase of salary equivalent to 10 per cent on the scale of wages in force on Feb. 3.
6. The company shall recognize the right of their men to belong to any union or benefit association of their own that they may see fit. In case of any difference arising between the company and its employees the management will, at all times, be ready to discuss such grievance with the men in its employ and attendance upon any deputation to lay views of the men before the management will, in no wise, be prejudicial to the employees composing the same. The company cannot undertake to discuss among its employees nor to grant any difference of treatment to those who are members of such union and those who are not.
7. All men discharged since Jan. 1, 1903, may have their cases considered by the directors, and, in case there is dissatisfaction with the verdict, their case may be, on the demand of either party, submitted to a board of arbitration, composed of one representative named by the men and one person by the company and a third by the agreement between the two thus named, each party agreeing to be bound by the final verdict.
8. If there are any other matters at issue, the company is prepared to discuss the same with its employes as soon as the service is resumed.

TOPICS OF THE WEEK

The Columbus, Delaware & Marion Railway, of Delaware, Ohio, is picking up considerable extra business by providing skating at Stratford Park. The lake at the park is kept cleared of snow, and lights have been stretched across, making night skating perfectly safe. The pavilion is heated and lunch is served. A special round-trip rate is made to people who desire to skate.

It is understood that the Rapid Transit Subway Company, of New York, is considering the advisability of establishing a private hospital for the employes of the system, to be in readiness when the tunnel system is placed in operation. General Manager E. P. Bryan, of the company, says that the Terminal Company in St. Louis, with which he was connected before coming to New York, has a hospital for employes, and that it works most satisfactorily.

"In St. Louis," said Mr. Bryan, "when an employee needed medicine he got it from the hospital, and when he was too ill to be around he went to the hospital. All the expense of conducting the hospital was covered by the monthly dues of 50 cents from each member. We have not fully decided to establish the hospital as yet, but the idea seems to have been favorably received by the directors, and at the next meeting of the board doubtless the subject will come up for final disposition."

It would seem that the recent remarks of President Vreeland, of the Metropolitan Street Railway Company of New York, about the interruption of street railway traffic through the blocking of cars by trucks and other vehicles, are to receive the serious attention of the lawmakers at Albany. Already plans are making for serious changes to the section of the city charter governing the street cleaning department. The first change proposed is to take the Bureau of Incumbrances from the control of the borough president and lodge the powers in the street cleaning commissioner, who will be given absolute jurisdiction over all incumbrances, with power to declare an express wagon or a truck or any vehicle which blocks the street car tracks an incumbrance. Further than this the Street Commissioner is to have police powers. He is to apply to the Police Commissioner for a detail of police not exceeding seventy in number, who are to act under his sole jurisdiction. These policemen are to see that no incumbrances or obstructions are permitted to remain in the street. If a truck is left standing on the tracks a policeman can remove it and arrest the driver.

In his report for the two years ending Dec. 1, 1902, Secretary of the Commonwealth Griest, of Pennsylvania, gives the number of street railway charters issued at 362, and of elevated and underground railways twenty-eight. During these two years 258 street

railways extended their lines, and 180 increased their capital stock. Attention is called to the fact that when street railway companies are incorporated it is the practice to make the capital stock the minimum amount allowed by the act of May 14, 1901, which same law permits companies to extend their lines without limit. The result is that a company may have a charter route of 10 miles with a capital stock of \$60,000, and the lines may be extended 20 miles without an increase of capital stock. The Secretary recommends legislation compelling the companies to have a capital stock of at least \$6,000 for every mile of its charter and extension routes, as provided in the present law governing steam railroads. He also recommends that corporations pay a bonus upon the creation for increase of their indebtedness, and that foreign corporations be required to pay a bonus upon the amount of their bonded or other indebtedness in the hands of residents of this State. He also recommends the passage of a general act relating to the manner in which all corporations may be permitted to change their corporate title, requiring such proceeding to be approved by the Governor.

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STREET RAILWAY PATENTS

UNITED STATES PATENTS ISSUED JAN. 27, 1903

[This department is conducted by W. A. Rosenbaum, patent attorney, Room No. 1203-7 Nassau-Beekman Building, New York.]

718,993. Car-Switching Mechanism; T. A. Ennis, Albrecht, Ark. App. filed Oct. 23, 1902. A grooved block located in the middle of the track and curved toward the side track is engaged by a tongue suspended from the car.

719,003. Surface-Contact Structure; E. M. Hewlett, Schenectady, N. Y. App. filed Oct. 20, 1897. A bolt placed in an axial cavity in a wooden block has a contact button threaded to its end, the cavity being filled with insulating material surrounding the bolt.

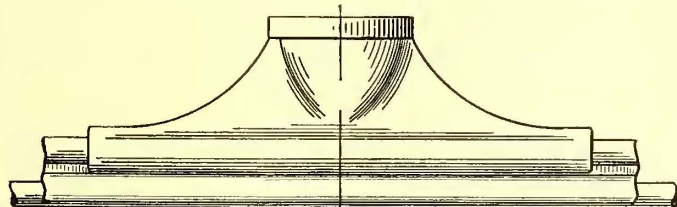
719,006. Trolley; A. J. Johnson, Cleveland, O. App. filed April 14, 1902. Automatic means controlling the spring action of the pole whereby the same upward force is exerted at any angle of the pole.

719,010. Rail-Joint for Street Car Tracks; J. Jones, Denver, Col. App. filed May 27, 1902. Consists of rail sections having abutted inclined ends overlapping each other.

719,020. Railway Electric Motor Cooling System; C. O. Mailoux and W. C. Gotshall, New York, N. Y. App. filed Oct. 6, 1902. A controller acts periodically upon a valve which admits compressed air from any suitable source into a piping system which conveys the air to the motors for cooling purposes.

719,029. Fender; J. McGuire, St. Louis, Mo. App. filed March 31, 1902. Relates to a fender which will be lowered into operative position, close to the surface, automatically, upon contact with an obstruction or at will.

719,055. Switch-Controlling Apparatus; C. W. Squires & J. B. Squires, Springfield, Mass. App. filed July 2, 1902. Relates to improvements in electro-magnetic apparatus for throwing a railway switch. The magnet is operated on a circuit independent of the motor and so arranged that the switch tongue is held immovable during the passage of a car.



PATENT NO. 719,112

719,112. Trolley Support; E. Hill, South Norwalk, Conn. App. filed May 7, 1902. The support is of uniform cross-section and has a longitudinal enlargement. The hanger has a continuous longitudinal recess adapted to receive said enlargement, said support being continuous to extend between a plurality of such hangers.

719,180. Electric Car Sign; J. B. Brower, Philadelphia, Pa. App. filed April 4, 1902. A sign box containing lights is mounted upon a peculiarly constructed pivot through which the circuit leads.

719,256. Car Fender; J. Quern, Brooklyn, N. Y. App. filed Oct. 28, 1902. Details.

719,339. Car Wheel and Track Therefor; T. W. Kester, Treichlers, Pa. App. filed April 3, 1902. Teeth or serrations cut in the periphery of the wheel at the side opposite the flange engage teeth or serrations in the rail.

719,412. Railway Crossing; Z. Frei, St. Louis, Mo. App. filed Nov. 7, 1902. Relates to the construction of a noiseless crossing block.

UNITED STATES PATENTS ISSUED FEB. 3, 1903

719,452. Trolley System for Electric Railways; J. S. Fox, Jackson, Mich. App. filed June 28, 1902. A third rail having a movable cap adapted to be forced inward by the trolley wheel to make contact with a conductor located inside of the rail.

719,453. Railway Rail; J. S. Fox, Jackson, Mich. App. filed June 28, 1902. Embodies a channeled base, a recessed cap vertically perforated at the lower portion thereof and a movable post extending through said perforation.

719,496. Interlocking Center Bearing for Cars; J. E. Norwood, Baltimore, Md. App. filed June 4, 1902. An interlocking center bearing designed to prevent the pulling of the truck from beneath the car when starting under a heavy load.

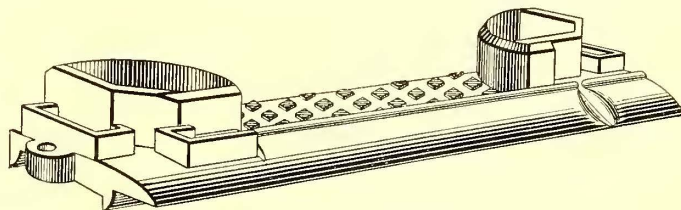
719,512. Street Railway Track; J. Scanlan, Chicago, Ill. App. filed Nov. 21, 1902. The flanges of the two rails extend laterally in the same direction, so that traffic wagons may readily turn out of the track.

719,557. Railway Switch; H. Blanchard, Boston, Mass. App. filed Nov. 13, 1902. Two detents in the bed-plate engage the switch point to prevent accidental movement of the switch.

719,566. Electric Brake; F. E. Case, Schenectady, N. Y. App. filed July 31, 1899. A brake electrically or mechanically operated which will permit independent control of the movements of a car by either system of operation.

719,672. Door Sill; W. O. Jewell & F. H. Jewell, Marion, Ind. App. filed Aug. 5, 1902. A metallic door sill for cars forming a cap for a wooden sill and provided at its ends with upwardly extending pockets arranged to receive and support the corner posts.

719,699. Safety Emergency Brake; W. T. Sears, Boston, Mass. App. filed Sept. 6, 1902. The brake-shoe is pivoted to the axle and is adapted to be thrown under the wheel, said shoe being provided with a straight edge adapted to fit the tread of the rail, and a series of friction rollers adjacent to the periphery of the wheel.



PATENT NO. 719,672

719,763. Construction of Underground Conduits; T. E. Devonshire, Chislehurst, England. App. filed Nov. 3, 1902. The conduit is formed in lengths, each consisting of a concrete body part provided with flanges at the ends and with metal network embedded in the said body part.

719,952. Side-Bearing for Cars; J. E. Norwood, Baltimore, Md. App. filed April 14, 1902. Roller bearings so constructed that an effective number of bearing balls will at all times lie between the bearing plates or races to sustain the body of the car and in which the balls will have free bodily movement and will automatically return to their normal positions when pressure is removed from them.

12,079. Electrical Switch Operating Mechanism; C. B. Russell, Marlboro, Mass. App. filed Aug. 13, 1901. Details of the circuits controlling the switch.

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PERSONAL MENTION

MR. F. J. GUERNSEY has been appointed superintendent of the Union Elevated Railroad, of Chicago, to succeed E. W. Richey, resigned.

MR. JOHN D. CAUGHELL, secretary of the Waupaca Electric Light & Railway Company, of Waupaca, Wis., was married to Miss Maud Eleanor Rowe, of Waupaca, Jan. 29.

MR. W. S. WATERBURY has been elected secretary and treasurer of the Ballston Terminal Railroad, of Ballston, N. Y., to succeed Mr. J. M. Cronly, of New York, resigned.

MR. C. F. DARRACH, formerly superintendent of the Commercial Dispatch, of Chicago, has been appointed freight agent of the St. Louis & Suburban Railway, of St. Louis, Mo.

MR. H. I. MANVILLE, of Milwaukee, Wis., of the H. W. Johns-Manville Company, was married Jan. 28 in New York to Miss Romaine, daughter of Mr. Frank Hall Romaine.

MR. E. J. W. DIETZ was appointed, on January 15, traffic manager of the Aurora, Elgin & Chicago Railway Company. Mr. Dietz will have his headquarters at 1409-100 Washington Street, Chicago.

MR. H. FERNSTROM has been appointed chief engineer of the New York Central & Hudson River Railroad, with headquarters at Grand Central Station, New York, to succeed Mr. W. J. Wilgus, who has been elected fifth vice-president.

MR. CLINTON R. ROSSITER has been appointed by Mayor Low a commissioner of the Atlantic Avenue improvement in Brooklyn to succeed the late Commissioner Steele. Mr. Rossiter's familiarity with the needs of Brooklyn admirably fit him for this office.

MR. FRANK GINN, superintendent of the Lancaster Traction Company, of Lancaster, O., has resigned to become connected with the American Shipbuilding Company. Mr. Ginn went with the Lancaster Company in 1896, and had entire charge of the work of installing the system. His successor has not yet been appointed.

MR. HARRY HARTWELL, associate member of the American Society of Civil Engineering, formerly construction engineer of the San Paulo Tramway, Light & Power Company, Ltd., San Paulo, Brazil, has accepted the position of assistant superintendent of construction with the London office of J. G. White & Co., Ltd., and will sail for England on Feb. 14.

MR. M. E. STARK, superintendent of the Albany & Hudson Railway & Tower Company, of Hudson, N. Y., has resigned from that company to become assistant superintendent of the local properties of the Connecticut Railway & Lighting Company at Waterbury, Conn. Mr. Stark will be succeeded at Hudson by Mr. George Stock, treasurer of the Utica Gas Company.

MR. ARTHUR A. ANDERSON, who resigned Dec. 1, 1902, as general manager of the Pennsylvania & Mahoning Valley Railway, of Youngstown, O., has accepted the position of general manager of the Union Traction Company of Indiana, with headquarters at Anderson. Mr. Anderson was at one time connected with the traction interests of Indianapolis. He accepted the position of general manager of the Youngstown system about nine years ago.

MR. O. W. BRAIN, electrical engineer for the New South Wales government railways, who has been making a tour of inspection of the railways and manufacturing establishments of this country, has sailed for home via the Hawaii Islands. Mr. Brain was much gratified by the uniform courtesy with which he was treated, and he carries away with him considerable important data regarding American methods and apparatus which he collected during his visit.

MR. B. S. JOSSLYN, general manager of the Hudson Valley road, with headquarters at Glens Falls, N. Y., has resigned to accept another position. He was previously general manager of the Kentucky and Indiana Bridge & Railroad Company. He held this position for three years prior to his appointment with the Hudson Valley Road, in September, 1902. Mr. Josslyn had a long experience in steam railroad operation before attaching himself to the electric railway field.

MR. W. H. TUCKER has been appointed superintendent of the Houston Electric Company, of Houston, Tex., with entire charge of transportation, and Mr. C. H. Byrne is appointed assistant secretary and treasurer of the company, succeeding Mr. Tucker. Mr. Tucker has during the past eighteen months occupied the position of assistant secretary and treasurer. He came to Houston from Columbus, Ga. Mr. Byrne comes more recently from Dallas, but originally from the general offices of Stone & Webster, of Boston, Mass., who control the Dallas and Houston systems.

MR. LUKE ROBINSON, who was formerly superintendent of the Montreal Park & Island Railway, of Montreal, Que., has been appointed assistant superintendent of the Montreal Street Railway and Montreal Park & Island Railway. Mr. Robinson was with the Park & Island Railway up to the time that he went to Paris with Mr. Duncan McDonald. He returned from Paris a few weeks ago. Mr. Robinson's appointment makes necessary a number of changes in the personnel of the company. The positions of the assistant superintendents, who have heretofore had charge of the eastern and western divisions, are to be abolished, and the officers in charge of these divisions will in future be known as division superintendents, and will report to the assistant superintendent, who has jurisdiction over the entire system.

MR. CHARLES O. KRUGER, who has recently been appointed general manager of the Philadelphia Rapid Transit Com-

pany, was formerly second vice-president and assistant general manager of the Union Traction Company. From the organization of this company until 1895 Mr. Kruger served as its secretary and treasurer. He was also the secretary and treasurer of the People's Traction Company, which was one of the constituent companies of the Union Traction Company. Mr. Parsons was officially the president and general manager of the Union Traction Company, but in the new organization of the Philadelphia Rapid Transit Company he holds the position of president, while Mr. Kruger is general manager. Mr. Kruger was born in Philadelphia on Dec. 14, 1864, and has always lived there. His advancement to his present position has been steady and has been based upon merit. He is able, energetic, and is a thorough master of all the details of the great organization of which he is the responsible head.

MR. R. C. TAYLOR, formerly master mechanic of the Twin City Rapid Transit Company, Minneapolis, Minn., has been appointed assistant to the general superintendent of the Brooklyn Heights Railroad Company, Brooklyn, N. Y. The duties of the engineer of power and electrical transmission, which heretofore covered maintenance and operation of power houses and substations, as well as the construction, maintenance and operation of line and management of transmission, have been divided, and the power and sub-station maintenance and operation have been placed in Mr. Taylor's hands. He has been in Brooklyn about a month, during which time he has been enabled to make a thorough inspection of the property, and at the very commencement of his new work is perfectly familiar with its details. As master mechanic of the Twin City Railway, Mr. Taylor had charge of both power stations and rolling stock equipment, and he will probably devote much of his time to the latter subject in his new position. A Scot by birth, he has been in this country since he was twenty years of age. He was master mechanic for four years of the West Superior Iron & Steel Company, West Superior, Wis., and afterwards spent six years as mechanical engineer in the St. Paul office of the Buckeye Engine Company. He has had four years' experience in railway work with the Twin City Rapid Transit Company.

COLONEL H. G. PROUT, whose retirement from the editorship of The Railroad Gazette has just been announced, has been appointed vice-president and general manager of the Union Switch & Signal Company. Colonel Prout has been engaged in editorial work for the last sixteen years, and his work has commanded the respectful consideration of the engineering fraternity. In addition to his regular editorial work, Colonel Prout has given lectures before many prominent engineering organizations, and he is now departmental editor for the railroad division of the Encyclopedia Britannica. He has also contributed largely to the current technical literature on railroad engineering. He is a member of the American Society of Civil Engineers, vice-president of the Engineers' Club, of New York, a member of the American Railway Engineering and Maintenance of Way Association, of the Master Car Builders' Association, the New York Railroad Club, corresponding member of the American Geographical Society and a member of the Century Club, of New York. The current issue of The Railroad Gazette, in announcing the retirement of Colonel Prout, publishes an appreciative sketch of his interesting career by W. H. Boardman, who has been associated with him in this work.

MR. JOHN D. KEILEY, assistant master mechanic of the Brooklyn Rapid Transit Company, recently resigned that position in order to join the engineering staff of the New York Central & Hudson River Railroad. Although a young man, Mr. Keiley has had exceptional opportunities for following the improvements in electric car equipment during the last few years, especially with regard to multiple-unit control systems, and he has obtained a number of valuable patents on devices of his own invention. He left Johns Hopkins University in 1893, after taking the four years' scientific course, with special attention to electrical engineering, but instead of immediately taking up electricity he spent a number of years in the South engaged in civil engineering work. In the spring of 1899 he came to the Brooklyn road to take a position in the track department, where, after a few months, he was made assistant engineer and assigned to the larger of the two divisions of the Brooklyn Rapid Transit Company's lines. Later he was transferred to the electrical engineering department, then under the late R. P. Brown, and since then has been prominently connected with the electrical engineering work of the road, particularly the installation of heavy elevated equipment and extensive tests and consequent improvements which have been made in connection with the equipment of both elevated and surface lines. Mr. Keiley commenced his new work on Feb. 1 with the title of assistant electrical engineer.