

# Electric Railway Journal

A CONSOLIDATION OF

Street Railway Journal and Electric Railway Review

VOL. XXXVIII

NEW YORK, SATURDAY, AUGUST 5, 1911

No. 6

PUBLISHED WEEKLY BY

**McGraw Publishing Company**

239 WEST THIRTY-NINTH STREET, NEW YORK

JAMES H. MCGRAW, President.

HUGH M. WILSON, 1st Vice-President. A. E. CLIFFORD, 2d Vice-President

CURTIS E. WHITTLESEY, Secretary and Treasurer.

TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK.

HENRY W. BLAKE, Editor.

L. E. GOULD, Western Editor.

Associate Editors:

RODNEY HITT, FREDERIC NICHOLAS, WALTER JACKSON.

News Editors:

G. J. MACMURRAY, FRANK J. ARMEIT.

CHICAGO OFFICE.....1570 Old Colony Building  
CLEVELAND OFFICE.....1021 Schofield Building  
PHILADELPHIA OFFICE.....Real Estate Trust Building  
EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

#### TERMS OF SUBSCRIPTION:

For 52 weekly issues, and daily convention issues published from time to time in New York City or elsewhere: United States, Cuba and Mexico, \$3.00 per year; Canada, \$4.50 per year; all other countries, \$6.00 per year. Single copies, 10 cents. Foreign subscriptions may be sent to our European office.

Requests for changes of address should be made one week in advance, giving *old* as well as new address. Date on wrapper indicates the month at the end of which subscription expires.

#### NOTICE TO ADVERTISERS.

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to Thursday, 9 A. M., of the week of issue.

Copyright, 1911, by McGraw Publishing Company.

Entered as second-class matter at the post office at New York, N. Y.

*Of this issue of the ELECTRIC RAILWAY JOURNAL, 8500 copies are printed.*

NEW YORK, SATURDAY, AUGUST 5, 1911.

#### CONTENTS.

Answers for the Question Box.....	215
Precautions in Signal System Operation.....	215
Methods of Training Motormen.....	216
Subway Extensions in Berlin.....	216
The Public Functions of the Engineer.....	217
The Exhibits at the 1911 Convention.....	218
Terms of the Subway Proposals.....	218
Development of the Aurora, Elgin & Chicago Railroad.....	220
Electric Railway Legislation in Massachusetts.....	228
Schöneberg-Berlin Underground Railway.....	229
Déri Motor on Martigny Single-Phase Railway.....	235
Annual Report of the Vienna Tramways.....	236
Instruction Methods of the Second Avenue Railroad, New York.....	237
Electric Railways in Buenos Aires.....	239
Metropolitan Street Railway Reorganization.....	240
Government Bulletin on Cost of Materials.....	241
Electrolysis Situation in Chicago.....	242
Exhibits at the Atlantic City Convention.....	243
Performances of Storage Battery Cars.....	245
Collapsible Steel Forms for Concrete Culverts.....	245
Inter-Pole Direct-Current Motors.....	245
Simplified Controller Diagrams.....	246
Aluminum Car Panels and Fittings in Zurich.....	246
New Cars for the Arkansas Valley Interurban Railway.....	247
English Semi-Convertible Car.....	248
Electrolytic Hydrogen and Oxygen Generators.....	249
New Car Headlining.....	249
London Letter.....	250
News of Electric Railways.....	251
Financial and Corporate.....	254
Traffic and Transportation.....	257
Personal Mention.....	259
Construction News.....	260
Manufactures and Supplies.....	263

#### Answers for the Question Box

Last year there was some talk of discontinuing the publication of the "Question Box" of the Engineering Association on the ground that the members of the association were no longer interested. The large number of questions to be answered this year which were contained in the circular letter sent out last week is convincing proof that the "Question Box" has a legitimate right to exist as a means of interchanging information about the practical details of electric railway engineering. One hundred and twenty-four questions sent in by more than fifty companies and associate members have been selected by the committee from among a still larger number submitted as being of timely interest and otherwise suitable for inclusion in the "Question Box." It is not expected that any one member will answer more than a few of the many questions which have been asked, but almost every engineer in glancing over the list should find one or more questions relating to subjects which he is qualified to discuss, and he should be willing to contribute his share of knowledge and experience to the common fund. Inasmuch as the questions relate for the most part to practical subjects, the most valuable answers can be made by men occupying subordinate positions, who nevertheless are intrusted with the details of the work to which the questions refer. Every one who can answer any of the questions should have an opportunity of so doing, and in this the responsible heads of the engineering departments of electric railways can help along a good cause by encouraging the men under them to study the questions submitted and answer them if possible. With such a large number of questions, a full and adequate discussion of all of the topics considered in the "Question Box" at the convention would take up the time of at least two or three sessions. This is too much to expect. Even if no oral discussion whatever is had, the educational value of the "Question Box" will not be lessened materially.

#### Precautions in Signal System Operation

A recent head-on collision between a regular car and an extra car on a single-track Eastern interurban railway equipped with block signals was the result of reckless operation following a signal failure due to lightning. The trainmen of the regular car had not been notified that an extra car was opposing them and they assumed that the signal was out of order because it indicated "danger" without apparent cause. Without ascertaining from the dispatcher whether an opposing car was in the block ahead they proceeded on their time-card rights and collided with the extra car, which was trying to make the next siding. This accident points out two dangers affecting especially small roads which operate cars on long headway. One is that

of installing unreliable signal apparatus or of failing to maintain the signals at all times in good operating condition, so that the trainmen lose confidence in their indications and acquire the vicious habit of running by danger signals when to stop and wait would prevent their making schedule time. The other danger is the absence of a rigid rule to cover procedure in case a car is stopped by a signal which obviously is out of order. The latter danger could be obviated by a rule similar to rule No. 144 of the Illinois Traction System, which reads: "When a train is stopped by a block signal that is evidently out of order, after waiting two minutes, the motorman must call up the dispatcher and proceed only after the dispatcher has given the authority for so doing on the form used for a regular order." Had such a rule been in force on the line where the collision occurred the accident probably would have been prevented. As the best maintained signal system may be disabled temporarily, the necessity of providing for such a contingency must not be overlooked.

#### Methods of Training Motormen

The elaborate equipment and methods which a large railway uses for producing skilful motormen were described in an article in the May 13 issue entitled "The Platform Instruction System of the Philadelphia Rapid Transit Company." It has been deemed well, however, to supplement this description by the article published elsewhere in this issue on the platform instruction system of a comparatively small railway like the Second Avenue Railroad, New York. While differing greatly in size, both companies have the same problem of developing into serviceable employees not only the best men who enter the service, but also those men who enter the electric railway field with the fixed idea of leaving it as soon as something better turns up. The effort of the railway management to dispel this feeling should begin at the very moment that the applicant is accepted for the instruction course. First of all, the instruction should not be given in some dark, obscure corner of the carhouse, but in a light, well-ventilated and cheerful-looking room where the students can work in reasonable comfort. It might even be well to follow the practice of the Second Avenue company in other respects, such as providing the instruction room in summer with iced spring water and electric fans. A little thoughtfulness of this sort will exert much influence for good, as the men are made to feel at once in a subtle way that their well-being is being considered by their future employer. The second point lies in the nature of the instruction itself. Most of the applicants have had so little book learning that the prospect of memorizing a catechism fills them with apprehension. Demands of this kind should be kept to a minimum. There are so many fascinating things about electricity that it is indeed a poor teacher who cannot interest his pupils in the mysteries of motor and controller action. The principle of the Second Avenue Railroad's instruction system is based upon the belief that the meaning of every step in car operation can be permanently engraved in the memory of the future motorman if it is properly brought out by some striking demonstration with simple apparatus in addition to the use of the customary system of platform drills.

#### SUBWAY EXTENSIONS IN BERLIN

In view of the enormous amount of underground railway construction which has just been approved for New York and the agitation in other American cities for similar means of transit it may be timely to discuss the latest extension to the subway system of Berlin, Germany. In size the Schöneberg-Berlin installation, which is described in this issue, is not a very impressive undertaking, inasmuch as it is only 1.85 miles long. Nevertheless it is quite interesting from the standpoints of transportation and of city development. As is well known to many of our readers, the city of Berlin and parts of the adjacent suburbs are densely built up with apartment houses, which average five stories in height. This congested condition, combined with a zone system of comparatively high fares, made financially successful the pioneer subway-elevated line, which is operated east and west through the best traffic areas of Berlin by the Elevated & Underground Railway Company. This company found it impracticable, however, to build extensions in the western suburbs owing to the onerous franchise terms which were demanded by the independent municipalities of Schöneberg, Wilmersdorf and Charlottenburg. Instead each of these communities began to plan its own routes without much regard to the course to be followed by its neighbors, although all of these lines would have to feed, at least for a time, the existing system because of the latter's central geographical position. It is significant that the Schöneberg line, which is the only one of these projects so far undertaken and completed, will be operated for the next four years by the present company as part of its system.

The new Schöneberg subway illustrates one way of securing extensions of existing subway lines, where the company is unwilling to build for the traffic to be secured, or is unable to reach terms for such work with the municipality. This question came up seriously in New York before the recent decision in favor of a comprehensive system of subways, and the plan was seriously suggested there to raise the money necessary to secure the construction of extensions of the existing subway by special assessments against the property directly to be benefited. No other logical method of satisfying the strenuous demands for subway extensions from property holders in different outlying sections of the city seemed available. In a sense, this was the plan followed in the extension of the Schöneberg subway.

There is a great difference in the benefits which accrue to the citizens of Berlin and New York from subway development. In Berlin every extension, whether owned by a private company or a municipality, means an increase in fare, whereas in New York it is possible to-day for a passenger to ride for 5 cents more than twice as far as he is able to ride in Berlin for 10 cents. In the future the odds will be still more against the New York company because it has been shown that even without extensions the average length of ride in New York is increasing.

In this connection it might be said that one serious drawback to the service supplied by the Berlin subway and elevated system, from the rider's point of view, is the absence of any express tracks. As there is no provision

for their subsequent installation, this inconvenience will become more and more burdensome as the rapid transit system is extended.

The general transportation features and rolling stock practice of the new Schöneberg subway offer little of striking interest to the operator of heavy electric railways who is already familiar with German methods. There is much to interest him, however, in the methods of construction and in the elaborate precautions which have been taken to insure the convenience of the passengers and their safety in emergencies. Another most interesting feature of the latest Berlin subway is the combination of art and utility in the design of the stations and portals. The entire project, in fact, was so largely a matter of civic pride rather than of plain business methods that the designers were given a free hand in applying what they should consider the most appropriate embellishments. While no private corporation could be expected to follow the lavish example of Schöneberg in this respect, there is no valid reason why a municipality should not grant subsidies for the artistic construction of railroad structures which are of a quasi-public character. In fact, this is often done by ambitious suburban towns in this country in the case of steam railroad stations, and the practice might well be extended to passenger stations and shelters on electric railways.

#### THE PUBLIC FUNCTIONS OF THE ENGINEER

The present trend of civic affairs brings the engineers and operating officials of railway systems steadily into closer and closer interrelation with public officials and commissions. Whatever the merits of the situation, it is a fact that public service corporations of every kind are being brought more and more closely under the supervision of the civil government, be it national, state or municipal. Hardly a day passes when some question is not under actual examination between public officials and transportation companies. In the past investigations of this sort have been hampered by considerable acrimony on one or both sides, and have frequently led to disagreeable if not unfortunate results. At present the situation has greatly improved, the public having learned that the modern railway man has a keen sense of his responsibility toward the people who constitute his patrons and their representatives, and the transportation companies themselves have found that with the new state of things has come a more friendly spirit and a more reasonable view of the responsibility of companies toward their stockholders. These last, it must not be forgotten, are to be found in every class of every community, and this fact itself tends to establish a better mutual understanding.

The situation as a whole brings, or ought to bring, the real directors of railway activities to the front in dealing with the representatives of the company. The time has gone by when the two parties at a hearing on transportation matters can be advantageously represented merely by a pair of bristling lawyers bent on gaining only the utmost possible advantage for their respective clients. A broader view of equities has arisen, in which a plain statement of the working facts of a road has vastly more weight with a commission or even with its attorney than an obviously

*ex parte* presentation of the case by the legal department. It, therefore, behooves the real operators of the transportation system, who are responsible for the details that make its success or failure, to put themselves in a position to be able to lay down the facts in the case frankly, clearly and fully when they are required, and experience has shown that carrying out this policy often smooths the path over difficulties and even prejudices apparently formidable. When questions arise which can be settled only by an appeal to fundamental facts it is the man who has these facts at his finger tips whose opinion commands the greatest respect. A statement made with hesitation or coupled with a profession of ignorance as to collateral matters apparently related to the subject at hand always produces a bad impression and a suspicion, however unjust, of endeavoring to conceal the truth. The public does not realize the degree of subdivision of labor necessary in the modern transportation system and how genuinely ignorant, unfortunately, some heads of the departments may be of the work which is being carried on by others. There is real need of such a closer co-ordination of work as shall enable chief engineers and heads of operating departments, to say nothing of the higher officials, to have the existing conditions well within their grasp. Often a few words of explanation from one who knows what he is talking about will forestall a wearisome investigation, exasperating to every one connected with it.

The constant tendency in the operation of the affairs of a large company is toward this subdivision of effort. It is as necessary in administrative affairs as it is in manufacturing, but, and this is the point which we wish specially to impress, it can be carried to an extreme in the one case as in the other. The business of a large concern soon gets beyond the personal grasp of any one man, but there is no reason why it should get beyond the grasp of the group who are actually directing the activities of the whole organization. The time comes, we think, when it is generally advisable to adopt measures to counteract the effects of too great specialization of effort by such means as may be available. A half dozen men in a railway corporation who really know what is going on, who are in the habit of comparing notes and of keeping up with the progress of the art, as far as may be, in each other's specialties, form a force that is pretty nearly invincible from the standpoint of operating efficiency and of prompt and effective dealing with public questions. The well-carried-out system of conferences between department heads, practised already in many organizations, is invaluable in securing this solidarity of action.

We believe, however, that the problem involves more than this. There is also a large field for personal effort. If the chief engineer understands the practical workings of the transportation department pretty thoroughly and both have gained a sympathetic view of the troubles of the master mechanic, the three combined make a force vastly more effective than the three separately, and when, as now, the strong tendency is toward playing the game with the public absolutely on the square, with the cards on the table, the practical value of men with a profound knowledge of the situation ought to be obvious.

### THE EXHIBITS AT THE 1911 CONVENTION

The first indication of an approaching convention is always the published list of manufacturers who propose to exhibit there. This list for the 1911 convention is published elsewhere in this issue and is very representative of the electric railway manufacturing industry. It also shows that the exhibit will be at least up to all past standards in extent, character and interest. In fact, the applications for space now exceed in area those at this time last year.

Most railway men who have attended conventions for years have come to take the exhibit feature largely as a matter of course. By this we do not mean that they do not utilize to the fullest advantage the opportunity of profiting by examining the apparatus shown and by discussing its uses with the manufacturing experts in attendance. We mean simply that they look upon the exhibits as an inseparable feature of the convention and that the vast majority would protest strongly, as they did a few years ago, against any suggestion that the manufacturers abandon their exhibits.

We can easily conceive, however, the surprise at the extent and instructive value of the exhibits of any one who had previously never attended a convention. Here under one roof he would find assembled the latest type of practically every class of machinery employed in electric railway operation. The very largest and heaviest machines, such as turbines and generators, might not be shown, and they would be represented by smaller types. But the exhibit would include such heavy apparatus and equipment as large pieces of special work, cars, trucks and often even electric locomotives. The convention visitor will not only have the opportunity of examining all of this equipment, but of seeing it working, so far as such a condition is practicable. In the machine-tool section drills, planers and lathes fitted with the most modern form of high-speed tools will be in service. Wheels will be turned and pressed on axles and motor casings will be re-bored. The same practical exemplification of the uses of the other equipment will be in progress elsewhere in the hall. Nor is this all. In charge of these exhibits or at them a visitor will find the best engineering and operating talent in the country represented among the users and manufacturers, men who have spent practically their entire lives in developing these machines and in using them.

If we assume there are 200 exhibitors at a convention, it would take an electric railway manager or engineer practically a year to visit each city where this same apparatus was manufactured and to see actually in service the same equipment as that to be shown at Atlantic City. The year thus spent would undoubtedly be profitable to any one engaged in the practical side of electrical railroading. But even if one employed his time in this way he might not find in their home cities all of the representatives or engineers of the manufacturers who would attend a convention, and he would, of course, not find on any such trip as many railway men with whom he could confer about the merits of the individual apparatus exhibited. Some of those railway men who attend a convention, as well as many who remain away, do not perhaps realize its full importance unless they stop to consider in just what other way they

could see the same apparatus and meet the same men, and should compute the time which such an undertaking would require.

The fact should not be forgotten that the prosperity and even the existence of an electric railway undertaking is indissolubly bound up with the character of the apparatus used. No skill in operating methods only will compensate for a lack of proper equipment; indeed, the highest operating knowledge presupposes a full acquaintance with the developments of the manufacturing art in electric railway equipment. And in no place can this acquaintance be so quickly and accurately gained as at the annual convention.

### TERMS OF THE SUBWAY PROPOSALS

The statement of President Shonts, of the Interborough Rapid Transit Company, in defense of the final offer of that corporation for rapid transit development in New York City, which was rejected by the city representatives, emphasized the point that the directors were not justified in destroying a valuable earning property by making further concessions in terms. That the earnings of the present subway system were computed by the Public Service Commission of the First District at between 17 and 18 per cent on the investment of the company is evidence, whether perfectly accurate or not, of an earning capacity of an extraordinary character. It is not remarkable that the Interborough Company should seek by every means within its power in the negotiations to conserve the returns on its investment or, on the other hand, that the Brooklyn Rapid Transit Company should be tempted by the example furnished by the present profitable subway to enter upon a great program of expansion.

These conditions make it of interest to review the offer which represented the last concession of the Interborough Company. It was proposed by that company to construct, equip and operate the subway lines allotted to it by the report of the special committee, as amended, upon payment by the city of one-half of the cost of construction. The initial capital expenditure of the company under this plan, counting the cost of the present subway lines, as of June 30, 1911, at \$48,029,668, would be approximately \$125,000,000. Upon the final equipment and operation of the new lines the gross receipts of the existing system and the new lines were to be pooled and certain agreed deductions made. These consisted of operating expenses, provision for depreciation, renewals and obsolescence, taxes, insurance and rentals to the city on the present subway. While the return to the company was stated nominally as the next charge on the gross receipts it was to be cumulative and thus assured. Any deficits that existed were to be adjusted annually out of a fund which the company was to provide as part of its capital expenditure and they would thus be capitalized. The rate of return was to be 9 per cent upon all capital furnished by the company during the entire period of the contract, consisting of 5 per cent interest and 1 per cent sinking fund upon the capital furnished by the company for the new subways and the old system, plus 3 per cent which was to have been termed compensation for the pooling of the receipts, leveling the leases of the present subway and exchange of different lines so that the city

could acquire complete operating parts of the enlarged system, and, in general, "for services in connection with the operation of the property."

These are broad references to details of the negotiations that have been under discussion for many months. The receipts as classified were to consist under either the Interborough or the Brooklyn contract of: (a) The value of the tickets collected at stations; (b) miscellaneous earnings from stations; (c) a pro-rata of advertising and other general receipts. By the leveling of leases is meant the acceptance by the Interborough Company of shorter terms on its present system so as to make the leases of all the lines expire at the same period, forty-nine years from the commencement of operation of the new subways, or, as estimated, in 1964. Under the present contracts the leases of the principal lines built under Contract No. 1, covering the original system, expire in 1954, or, allowing for the option of a renewal for twenty-five years, in 1979; and the leases under Contract No. 2, which covers the tunnel under the East River and the Brooklyn extension, expire in 1943, or, allowing for the optional renewal extension, in 1968. The proposed exchange of lines was designed to give the city the right to take over at the end of ten years, if it desired, either one of the two main north and south routes which would have been created under the enlarged subway system; that is to say, either the present subway line north of Forty-second Street with the projected extension down Seventh Avenue to the lower west side of Manhattan Island and Brooklyn, or the present subway line south of Forty-second Street with the projected extension in Lexington Avenue to the Bronx.

After provision for the preferential payment to the company the next charge on the receipts was to consist of interest and sinking fund requirements upon the capital furnished by the city for the construction of new lines. From the remaining receipts in any year the city was to receive a sum which would raise the total payments to it to 9 per cent on its capital investment in the new subways. Any remaining receipts were to be divided equally between the company and the city.

Without detailed explanation of certain points of difference, arising mainly from territorial questions, between this plan and that of the Brooklyn Rapid Transit Company, which has been accepted by the city authorities, attention may be called particularly to the modifications of the financial arrangement. In the Brooklyn plan it was proposed to pool the gross receipts of present lines embraced in the agreement and new lines to be constructed in accordance therewith and to provide first for operating expenses, with depreciation, renewals and obsolescence. From the balance there was to be retained by the company annually, in lieu of all earnings on existing lines, before other charges were met, a sum representing the net profits from operation of the existing lines included in the agreement during the year ended June 30, 1911, but not to exceed \$3,500,000, proper deductions having been made for current depreciation; the receipts of existing lines above this sum to be pooled for distribution upon the general terms fixed. The next charge was interest and amortization upon the new capital supplied by the company for construction. Under the offer of the company provision was to be made

then for taxes, insurance and rentals of leased lines, if any. However, the amended report of the committee of the Board of Estimate and Apportionment and the Public Service Commission recommended that the company incorporate with its existing lines, in such manner as the commission might propose, subsidiary lines held under lease and that no allowance be made under operating expenses for further rental of such lines. The last charge was to consist of interest and amortization upon the cost to the city of the lines constructed by it. After these deductions the balance was to be divided equally between the city and the company.

The city authorities were insistent upon the application of like bases in certain particulars in the contracts with either or both companies. Both the Interborough Company (together with its subsidiary, the Manhattan Elevated Railway) and the Brooklyn company were to be required to submit their plants to examination by a board of engineers to be named by the Public Service Commission and to make provision to cover such deferred maintenance as the commission might require to be met. Whether this provision was to be made from existing surplus or current earnings was to be optional with the companies. Costs of construction were to be the costs in money. It was partly owing to the provision that the city should have the right to take over the lines at the end of ten years on payment of a bonus of 15 per cent that the city authorities maintained that discount on bonds should be excluded from the cost of construction. In the general terms favored by the city conferees for application to any new contract it was suggested that in connection with the annual charges of the operator for carrying the cost of equipment provision be made for a sinking fund of not to exceed three-quarters of 1 per cent per annum to meet obsolescence. It was also suggested that in any segregation of operating costs that might be made between old and new lines, the costs of transportation, power, maintenance of equipment, general expenses and general taxes, the costs for the extensions should be determined on a per passenger basis, according to unit results on the entire system.

With respect to the final effect of the proposed new plan on the Interborough Company finances the city committee considered as conservative the estimate of the company that accumulated deficits on the preference payment of \$12,150,000 a year would be discharged within eight years from the beginning of operation, while the deficits of the city on its interest accounts would be discharged in five years more. The rate of increase in population in New York City in the decade 1910-20 was estimated at from 38.7 per cent, the rate in 1900-10, to 45 per cent. In a special study of this subject the commission stated that no one had estimated the increase in the next decade at less than 35 per cent, and it assumed that traffic should increase in this period not less than 70 per cent.

If no serious dilution of its earning capacity is effected through the construction of extensions in outlying districts the Interborough subway remains an enterprise which will illustrate the great profit possible for pioneer development of this character in this country. Because of the strength of its position in this respect this company was able to determine the limits beyond which it would not go.

# Development of the Aurora, Elgin & Chicago Railroad

This Road, Now Nine Years Old, Was Built for Very High Speed Service. The Traffic Has Increased Rapidly and Numerous Interesting Operating Changes Have Been Required to Meet New Conditions.

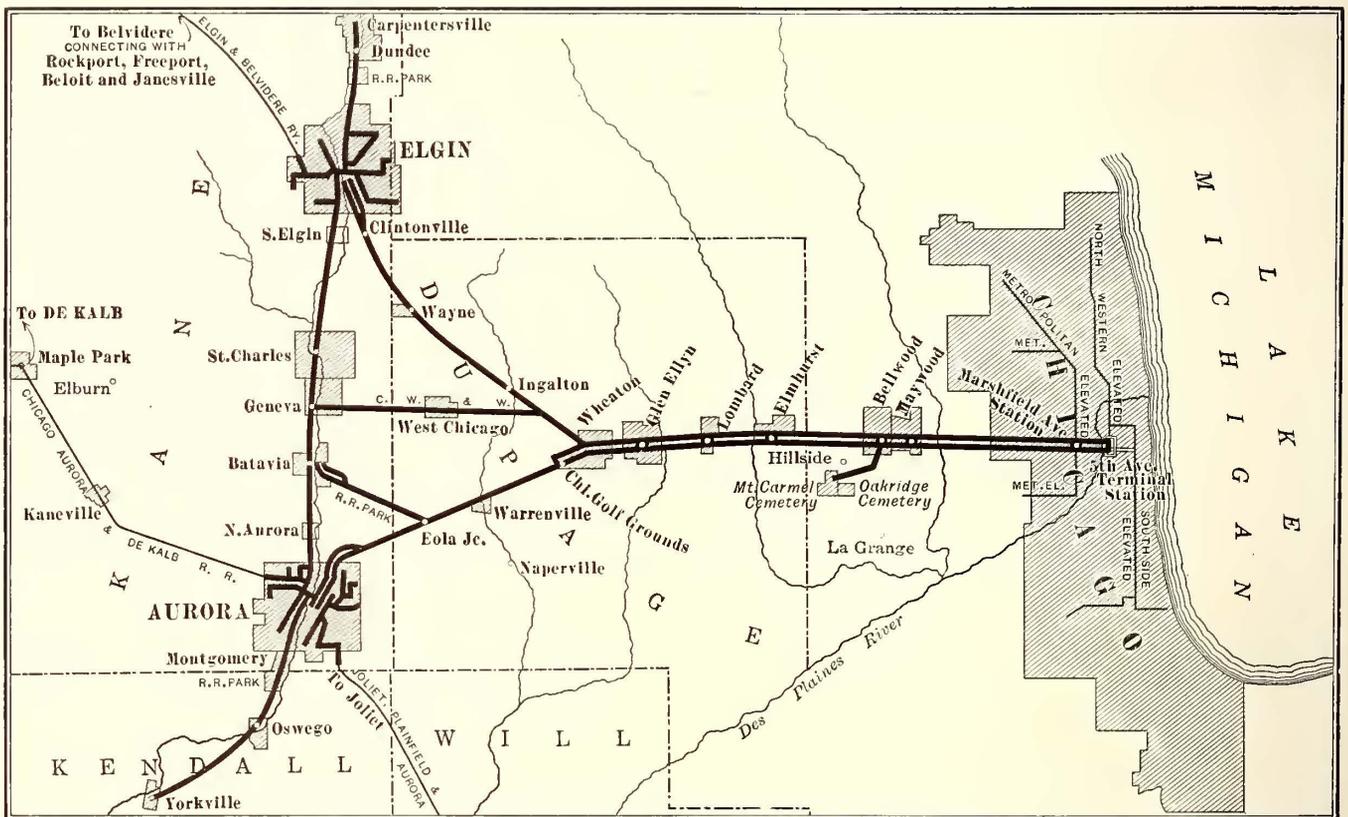
The Aurora, Elgin & Chicago Railroad Company operates frequent trains on a high-speed third-rail road between Chicago and four terminals in the Fox River valley, 40 miles west. It also furnishes these western terminals with city street railway service in Elgin and Aurora. Lighting and power service is supplied to eight cities and towns. The accompanying map shows the third-rail and trolley routes operated and the relative location of the cities served.

The first section of the third-rail division, that between Aurora, Wheaton and Fifty-second Avenue, Chicago, was opened for public service on Aug. 25, 1902, and on May

roads is for the life of the franchise and any extensions thereof.

### GENERAL ENGINEERING FEATURES OF THE PROPERTY

Several articles published in the STREET RAILWAY JOURNAL during 1902 described the construction details of the Aurora, Elgin & Chicago Railway, which at that time exemplified the most advanced ideas then held in regard to high-speed interurban electric roads. The road was designed to compete actively with several large steam roads, in whose territory lying just out of Chicago to the westward it had been built. At that time the use of a third-rail for operating interurban cars was some-



Aurora, Elgin & Chicago—Map of Route

26, 1903, the section from Wheaton to Elgin was put in operation.

During the first two and one-half years the Aurora, Elgin & Chicago Railroad Company's cars ran to a terminal station at Fifty-second Avenue, Chicago, where through passengers had to transfer to cars of the Metropolitan West Side Elevated Railway. The Fifty-second Avenue terminal is 6.5 miles from the "loop" district, which is the business center of Chicago. In March, 1905, the companies entered into a traffic agreement providing for the use of the Metropolitan tracks for entrance to the center of Chicago by the Aurora company's cars, and a large terminal station was built at Fifth Avenue and Jackson Boulevard in the "loop" district. The Metropolitan company operates over private right-of-way, and its franchise in Chicago covers the right to cross streets. At the time at which the traffic agreement was made this franchise had forty years to run and the agreement between the two

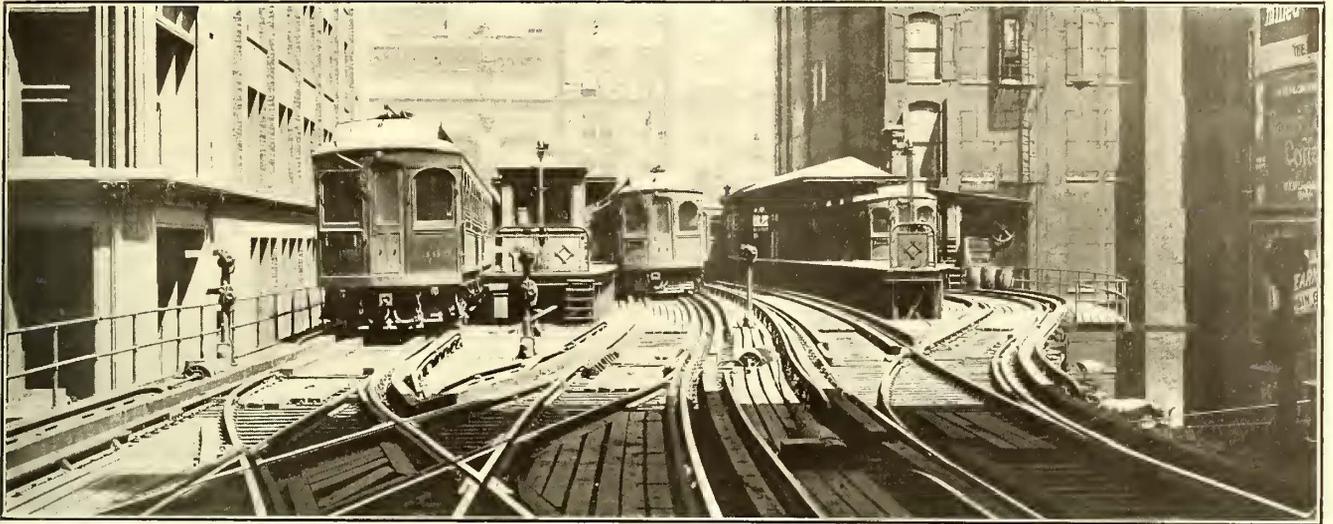
what of an experiment, and to provide for such a project in the complete and necessarily expensive way that was followed seemed to many at the time like building for the very distant future. That the enterprise has been a success and that the standards set at that time were warranted the present business and condition of the road fully attest. It is the purpose of this article, after briefly reviewing the original scheme, to describe some of the more interesting operating features, as well as the more important changes and extensions which consolidation and the development of a unique property have demanded.

Originally the road was designed for strictly high-speed interurban service, with the expectation that local trains would stop on the average every 3 miles, and that limited trains would stop every 7 or 8 miles. The excellent service offered, however, has caused the territory to be built up rapidly, and this condition has had a reflex influence on itself, which might properly now be termed

"rapid transit suburban service," as there are twenty-seven regular local stops in the 25 miles between Chicago and Elgin. Each of the single-track sections has long through sidings in spite of the fact that largely the same territory is traversed by five paralleling steam trunk lines, because of the shorter

Ridge and Mount Carmel cemeteries, near Chicago, was built in 1906 to care for the rapidly increasing funeral traffic. Each of the single-track sections has long through sidings which greatly facilitate operation.

From Fifty-second Avenue, the end of the elevated



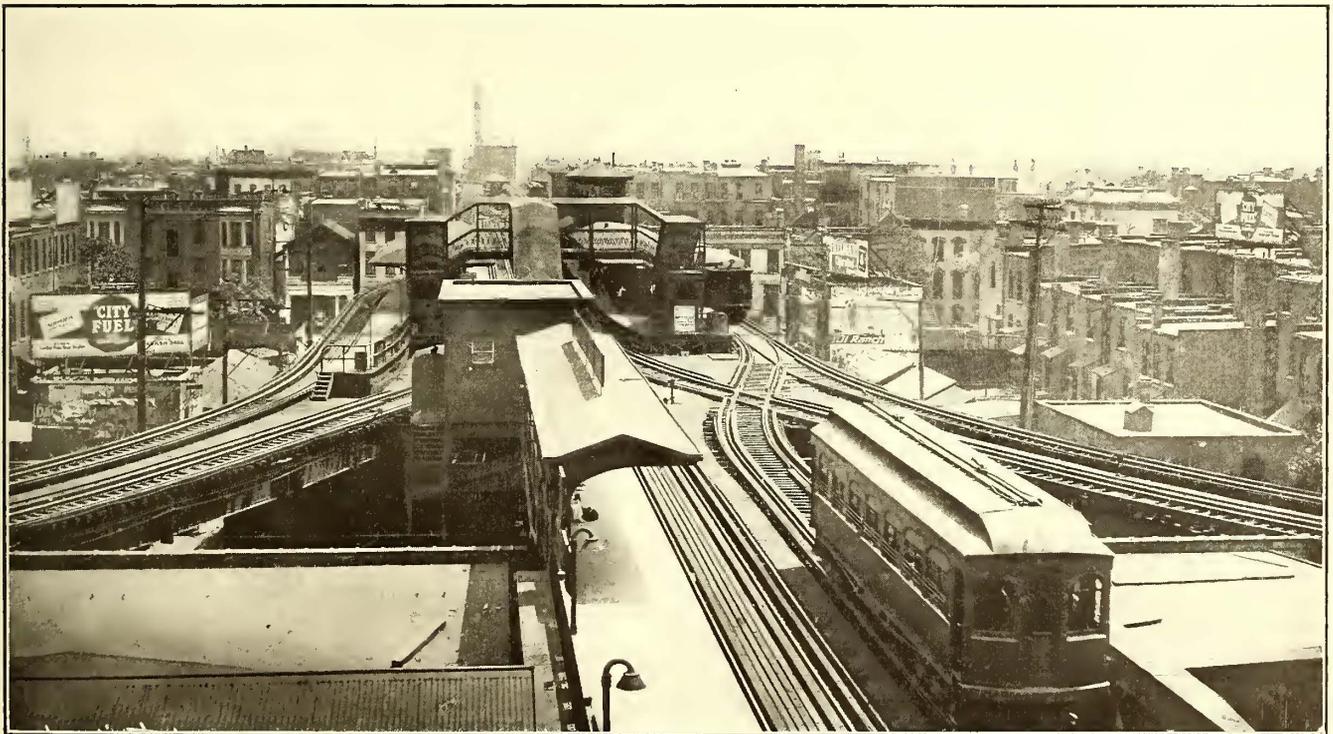
Aurora, Elgin & Chicago—Loading Platform Above Fifth Avenue Terminal Station

structure in Chicago, westward through Wheaton to the operate at a maximum of 70 m.p.h. The road hauls freight and has track connections, either directly or through belt-line roads, with all of the steam lines entering Chicago.

ROADWAY AND TRACK

As shown by the map on page 220 the line has a double track between Chicago and Wheaton, a distance of 25.5 miles. West of Wheaton the tracks diverge. One

structure in Chicago, westward through Wheaton to the four termini at Aurora, Batavia, Geneva and Elgin, all track, including that within municipalities, is upon private right-of-way. The Fox River valley division from Carpentersville southward through the four cities just named and on through Oswego to Yorkville is built upon the highway when it passes through the municipalities, but largely upon private rights-of-way in the country. The right-of-way of the third-rail division varies in width from 66 ft. to 100



Aurora, Elgin & Chicago—Joint Station on Metropolitan Elevated at Marshfield Avenue Junction

extends northwesterly from Wheaton to Elgin, a distance of 16 miles, the other in a southwesterly direction to Aurora, a distance of 15 miles. There are also branches from Eola Junction, on the Aurora branch, to Batavia, 6 miles, and from Geneva Junction, on the Elgin branch, to Geneva, 10 miles. A 3-mile trolley line from Bellwood to Oak

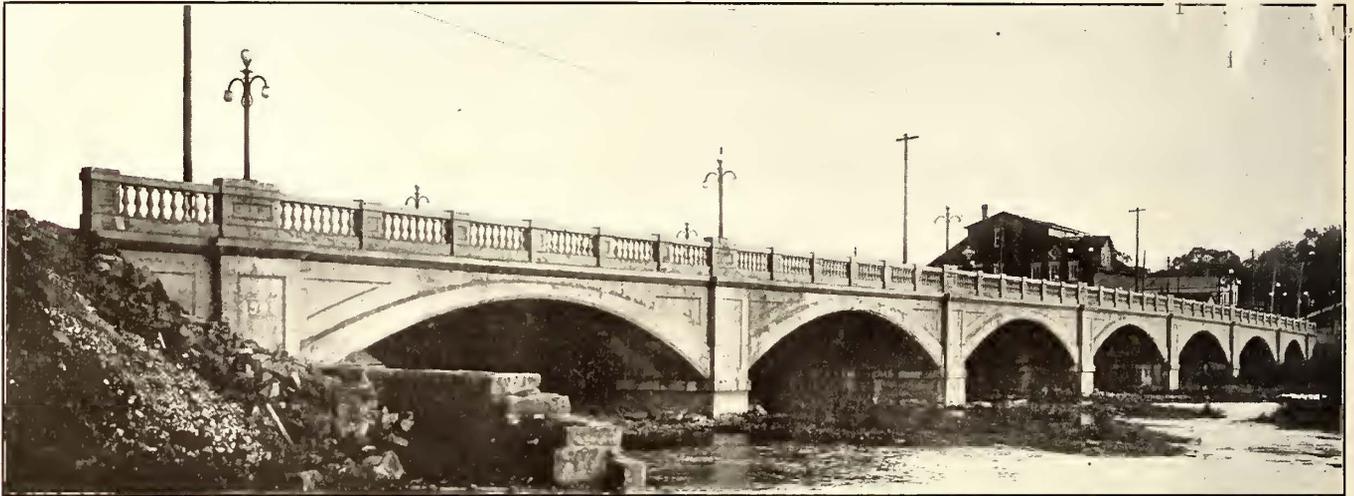
ft. and is protected by a woven wire fence 5 ft. high, the street and highway intersections being closed in with wing fences and the track is protected throughout by Climax tile cattle guards.

The table on the following page shows the trackage of the system subdivided into sections.

MILES OF TRACK OF AURORA, ELGIN & CHICAGO RAILROAD

	Third-Rail Division.				Total
	Main.	Second.	Siding.	Industrial.	
Chicago to Aurora.....	32.66	22.54	0.14	3.67	59.01
Batavia branch.....	5.89	0.88	....	1.14	7.91
Wheaton to Elgin.....	15.89	0.56	0.77	1.22	18.44
Cemetery branch.....	2.25	....	0.25	0.15	2.65
Geneva Jc. to Geneva.....	9.35	....	0.40	0.07	9.82
Total.....	66.04	23.98	1.56	6.25	97.83
Fox River Division.					
Aurora-Elgin.....	18.88	....	0.80	0.11	19.79
Aurora-Yorkville.....	12.14	2.03	0.08	0.21	14.46
Elgin-Carpentersville.....	4.20	....	0.26	....	4.46
Total.....	35.22	2.03	1.14	0.32	38.71
Aurora city lines.....					18.10
Elgin city lines.....					14.98
Total all lines.....					169.62

1½ horizontal to 1 vertical. In grading the single-track branches, many of the heavy cuts were excavated for the full double-track width so that in the future, when double track is needed, much of the expense of grading at these points will be avoided. The maximum grade was kept at 1 per cent maximum and the curves on the high-speed section in the country at 3 deg. An 80-lb. A. S. C. E. standard rail in 60-ft. lengths with broken joints is used, the joints on one rail being laid opposite the center of the other rail. There are 2816 ties to the mile. Cedar ties of standard size are used on straight track and white oak ties on the curves. Six inches of ballast was placed under the ties. During the past nine years the cinders from the power house have been used as ballast. The cedar ties show



Aurora, Elgin & Chicago—Concrete Bridge at Geneva

FOUR-TRACKING

Some of the trains of the Metropolitan West Side Elevated run for 3 miles over the tracks of the Aurora, Elgin & Chicago from the joint station at Fifty-second Avenue to Forest Park, an amusement resort at Desplaines Avenue. The traffic on this section is now so large that the Aurora company has arranged with the Metropolitan elevated company for the construction of two additional tracks as far west as Desplaines Avenue for the

effect of very little rail cutting after nine years of heavy traffic, and the oak ties, so far as can be estimated, will have a life of from ten to fourteen years. The ties when installed received no preservative treatment. A Commonwealth weed burner has recently been purchased for track maintenance work.

The third-rail, which is a 100-lb. T-section, is supported by white oak ties, 6 in. x 8 in. x 9 ft., spaced 10 ft. apart.



Aurora, Elgin & Chicago—View on Double-Track Division Near Glen Ellyn



Aurora, Elgin & Chicago—Example of a Standard Through Girder Bridge

use of the local elevated trains. The cost of these two additional tracks will be borne entirely by the Metropolitan company under the terms of the traffic agreement between the two companies. The right-of-way is of ample width to accommodate this new trackage.

THIRD-RAIL TRACK

On double track the roadbed of the third-rail division is 30 ft. wide and in cuts 34 ft. wide, with banks sloped

The steel in the third-rail is low-carbon and has a conductivity as compared with copper of about 1 to 8. The wear of the third-rail is practically negligible. The original type of third-rail insulator is still employed. The insulators are of wood impregnated with paraffine and provided with malleable-iron bases and caps.

BRIDGES

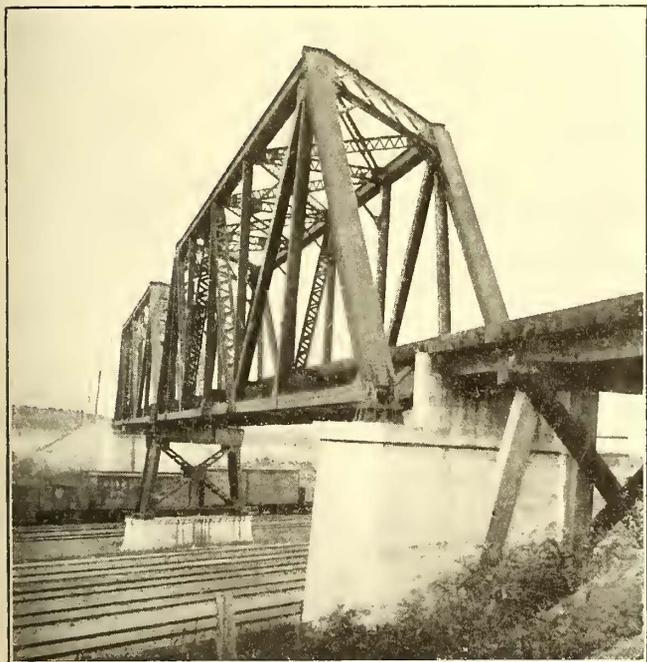
All bridges and culverts along the third-rail division are

of sufficient strength to carry heavy standard railroad equipment. They were designed to carry Cooper's E-40 loading, with a factor of safety of four. Ten of the bridges are of steel and vary in length from 20 ft. to 157 ft. All other bridges and culverts are of concrete. Some of the concrete bridges have arches 70 ft. long and all have ballasted decks, so that the track surface is unbroken. An illustration of one is presented on this page.

#### GENEVA BRANCH

The Geneva branch is the newest section of the third-rail division, and was made a part of the operating system in 1909. In the design of the roadbed and structures of this division the standards on the original part of the road were closely followed. This branch when built was known as the Chicago, Wheaton & Western Railroad.

The Geneva branch joins the Elgin branch at Elgin Junction, about 2 miles west of Wheaton, and from there extends due west through West Chicago to Geneva, on the Fox River trolley division. West Chicago has a population of 3500 and is an important steam railroad junction point. Here the new third-rail division is carried over the yards of the Chicago & Northwestern Railroad and the Elgin, Joliet & Eastern Railway on a through truss with a span



Aurora, Elgin & Chicago—Bridge Over Steam Railroad Tracks at West Chicago

of 260 ft. and long earthwork approaches, which contain 220,000 cu. yd. of earth. In making borrow pits to obtain this material a deposit of about 50,000 cu. yd. of excellent gravel was uncovered. Geneva is entered over a large concrete bridge across the Fox River. This structure has six 56-ft. arches and one 40-ft. arch, all of which support a roadway 50 ft. wide. A view of this bridge is shown.

The track on the new Geneva branch is laid with 70-lb. rail in 33-ft. lengths, connected by "Continuous" joints and bonded with two No. 0000 bonds. The third rail is a 60-lb. T-section, carried on Ohio Brass Company porcelain insulators and bonded with two 250,000-circ. mil compressed terminal foot bonds. This track is ballasted with washed gravel. Its grades and curves conform to those of the original road.

#### TRACK AND THIRD-RAIL BONDS

The track of the original third-rail divisions, when built, was bonded at each joint with two 250,000-circ. mil "Protected" rail bonds 12 in. long and with 16/16-in. terminals. The third-rail, weighing 100 lb. per yard and in 33-ft. lengths, was bonded with two 500,000-circ.

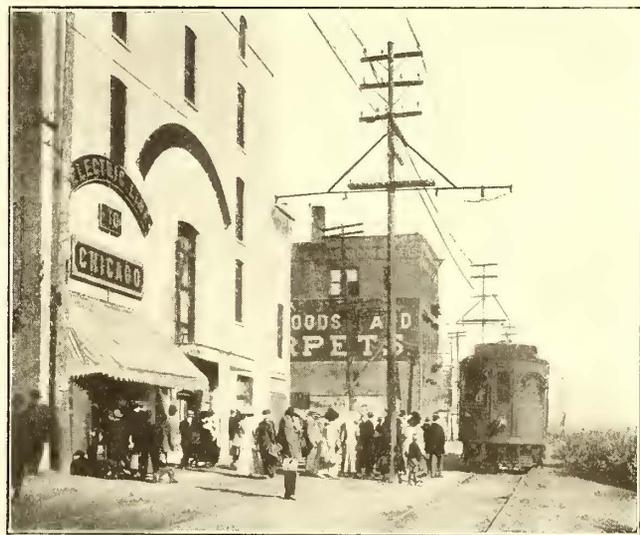
mil foot bonds per joint. These bonds are U-shaped and have 1-in. terminals. Both styles of bond were furnished by the Electric Service Supplies Company, and were applied in large part by the use of hydraulic punches and compressors.

The apparatus of the rail-bonding department now includes a bonding car, furnished by the Electric Railway Improvement Company, for electrically welding bonds to the rail and equipped with various types and sizes of clamps



Aurora, Elgin & Chicago—Ballasted Floor Concrete Bridge

and electrodes, so that any capacity of bond may be applied to the head or web of either the running rail or the third-rail. The company also owns and operates a test car of the Herrick type for making an autographic record of the condition of all bonds. This car is run over the system periodically. A test by it of the condition of all the third-rail tracks, conducted six years after the bonds had been installed, showed that 98 per cent of the bonds were perfect. Practically all of the 2 per cent defective bonds were found either at special track work or at highway crossings where



Aurora, Elgin & Chicago—Station at Elgin

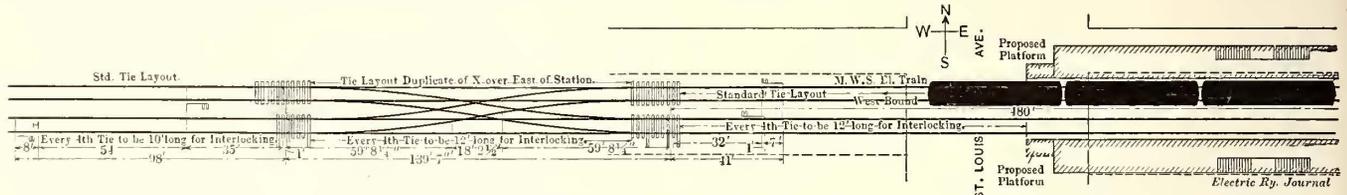
it had not been possible conveniently to keep the rail joints tightly bolted.

#### STATIONS

The principal station on the road is the Fifth Avenue terminal, near Jackson Boulevard, in the Chicago Loop district. This station, which has four tracks, all above the roof of the building, is used jointly with the Metropolitan Elevated road. The usual waiting room, restaurant, barber shop and toilet facilities are provided here, and the head-

quarters of the general passenger and freight agent are on the ground floor. There are two other stations in Chicago, both on the elevated route. One is at Marshfield Avenue, at the junction of the four-track and the three double-track divisions of the Metropolitan Elevated. The other is a joint terminal at Fifty-second Avenue. The latter consists of two depots connected by a subway and

alighting and will reduce the time of station stops materially during the rush hour. When the platforms have been raised to the level of the car floors it is planned to install agents at these stations near Chicago and to sell one-day round-trip tickets, good only on the date of sale. The color of the tickets will be changed from day to day to permit their easy identification.



Aurora, Elgin & Chicago—Diagram Showing Arrangement of Pocket Tracks at St. Louis

arranged for easy transfer of local passengers between the through interurban trains and the local elevated trains. Views of these stations are published.

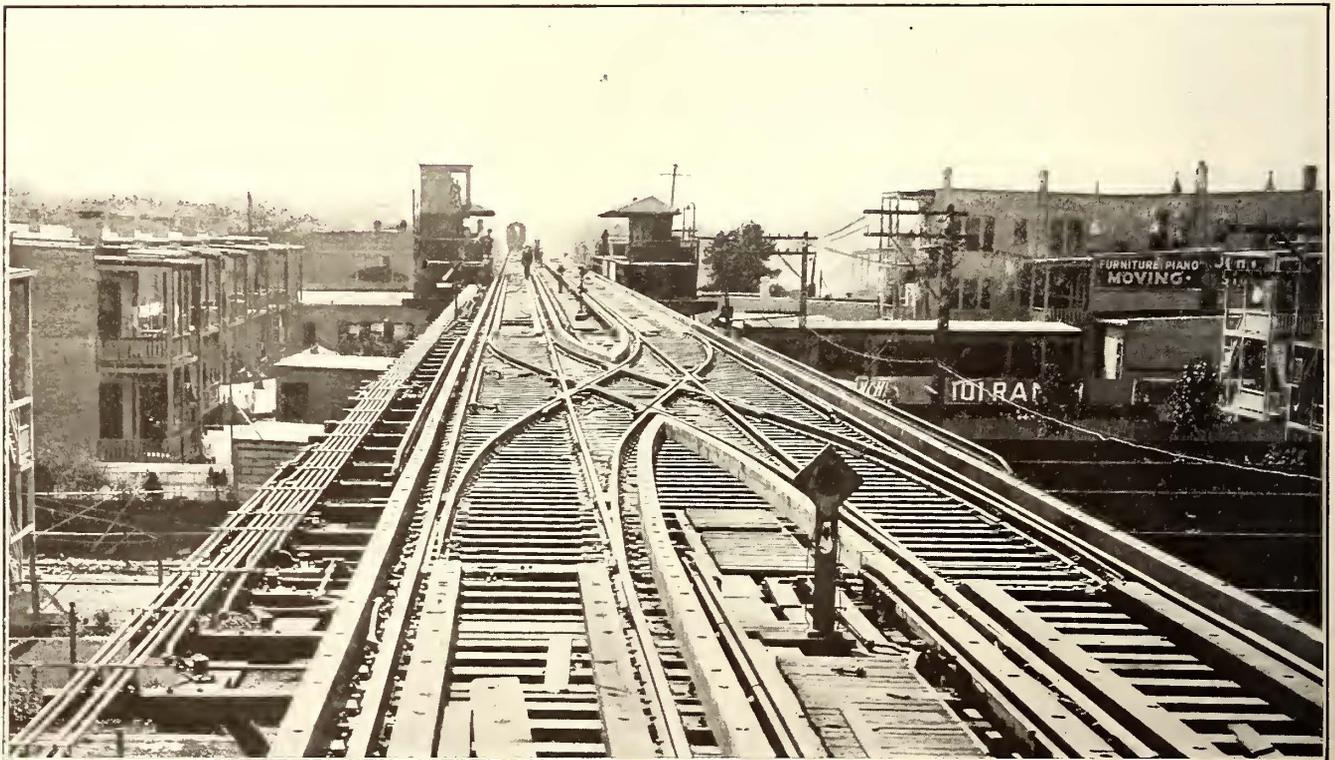
At Aurora, Elgin and other Fox River cities the passenger stations are remodeled store buildings changed to meet the service requirements. The Aurora station is used jointly with the Joliet, Plainfield & Aurora and the Aurora & DeKalb interurban lines, and the Elgin station is occupied jointly with the Elgin & Belvidere interurban line. This latter station is reached on a private right-of-way, extending 1 mile along the river front to the main street intersection of the business district.

Shelter stations of attractive designs, as described in the ELECTRIC RAILWAY JOURNAL for Oct. 2, 1910, have been built at six points along the third-rail division. These stations cost approximately \$2,000 each, and are of a permanent, fireproof type, as illustrated on page 225.

The general operating headquarters, located at Wheaton,

POCKET TRACKS ON METROPOLITAN ELEVATED

A new interlocking plant controlling two sets of diamond crossovers has just been put into service at St. Louis Avenue on the Metropolitan elevated structure. This new plant is installed so that the trains of the Aurora, Elgin & Chicago Railway, which overtake the slower Metropolitan trains midway between the Marshfield Avenue junction on the elevated structure and the Fifty-second Avenue terminal, may be passed around the Metropolitan trains while the elevated trains are standing at the St. Louis Avenue platform. Ordinarily an interurban train leaving Fifth Avenue overtakes and passes a Metropolitan train at Marshfield junction, where the four-track division of the Metropolitan Elevated is subdivided into three double-track divisions. After loading at Marshfield Avenue the interurban trains then run westward on the Garfield Park double-track structure. The running time of these trains, however, is so much faster than that of the elevated



Aurora, Elgin & Chicago—One of Two Diamond Cross-Overs for Pocket Tracks at St. Louis Avenue

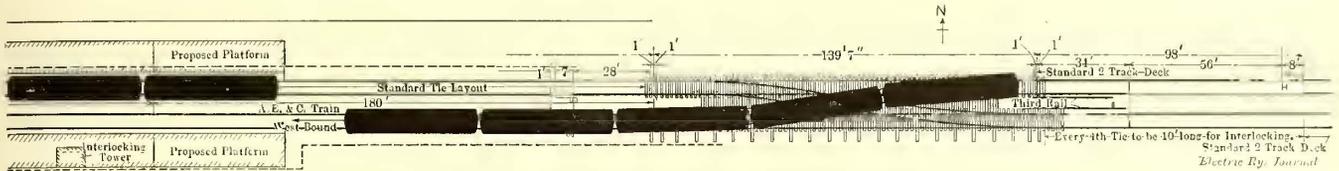
are installed in a three-story brick building, formerly used as a hotel, but since re-equipped for an office building.

Because of the rapidly increasing traffic to and from the suburban stations near Chicago the ten platforms at five stops, between Fifty-second Avenue and Bellwood, will be raised to the height of the car floors and made long enough for four-car trains. This will accelerate boarding and

company's cars, which stop at every platform, that ordinarily a second elevated train one interval ahead of that first passed is overtaken at St. Louis Avenue, halfway between Marshfield Avenue and the joint terminal station at Fifty-second Avenue. Similarly the inbound trains of the Aurora, Elgin & Chicago usually overtake the elevated company's trains near St. Louis Avenue.

Until the new interlocking plant was installed the inter-urban trains were obliged to follow the elevated trains at the slower speed for about 2 miles from St. Louis Avenue west to Fifty-second Avenue, or east to Marshfield Avenue. The accompanying diagram shows the arrangement of tracks and signals just installed at St. Louis Avenue to remedy this condition and permit an elevated train while

The principal highway crossings along the third-rail route are protected by bells and signals manufactured in part by the National Electrical Manufacturing Company, of Elgin, and in part by the Hoeschen Manufacturing Company, of Omaha. These crossing signals are all designed to announce the approach of a train by the ringing of bells and lighting of lamps. This service is being extended as needed.



Avenue by Which an Aurora Train Is Passed Around a Metropolitan Elevated Train

making a stop at this station to be passed by an interurban train. A half-tone on page 224 gives the general appearance of one end of the track layout. The interlocking plant is of the mechanical type, and crossovers have No. 7 frogs. The work in connection with these crossovers and the interlocking was installed by the Metropolitan Elevated forces.

SIGNALS

During the past year automatic block signals have been installed at two locations on the Elgin branch of the third-rail division of the Aurora, Elgin & Chicago Railroad, where the view was obstructed by curves, and the company will install in the near future a comprehensive system of block signals on its entire third-rail division.

The equipment already installed on the Elgin branch was manufactured by the General Electric Company. It consists of a c. motor-operated signal mechanisms which actuate standard steam railroad semaphores mounted at the tops of steel masts. The indication given by the signals is at all times controlled by the position of the cars on the track, and the installation is so laid out that but one car at a time is permitted to operate over the portions of the roadway where the view is obstructed. Energy for the control and operation of the signals is obtained from the power-distribution system of the road.

In addition to these block signals, signal equipment has been purchased for the district between Maywood and Bellwood, about 3 miles of double track. Here the purpose is to facilitate the safe movement of the funeral trains, which, in operating westward from Chicago past Maywood, must cross over the eastbound tracks in order to reach the single-track branch leading south from the junction at

and about twenty-five Hoeschen bells are now on order.

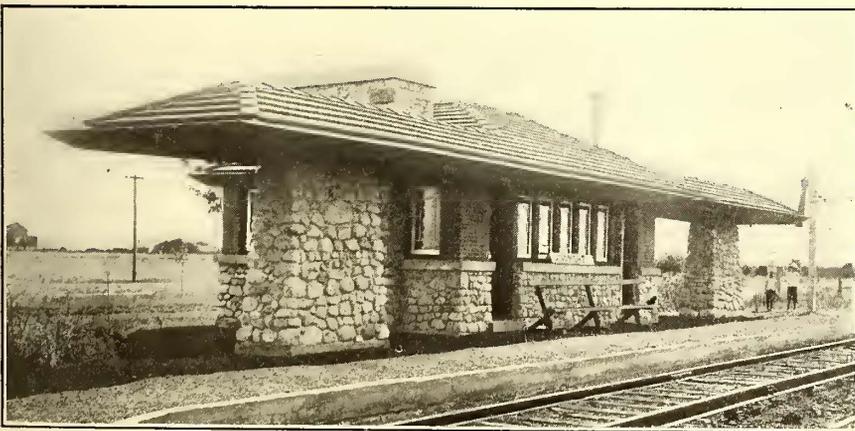
HIGH-SPEED PASSENGER TRAIN SERVICE

The Aurora, Elgin & Chicago Railroad operates its passenger trains on very close headway, in view of the extremely high speeds at which the trains runs. The schedule includes fifteen limited trains from the western terminals to Chicago in the morning, eleven limited trains from Chicago westward in the afternoon, in addition to thirty-nine local trains eastbound and forty-six local trains westbound. During the morning and evening rush hours—that is, from 6 to 10 a. m. and from 3:30 to 6:30 p. m.—the headway of trains between Chicago and Wheaton is not more than 15 minutes, and from Wheaton west on the three branches the headway is not more than 30 minutes.

The third-rail trains just mentioned connect with those of three interurban lines. At Elgin connection is made with the Elgin & Belvidere Electric Railway, which extends 36 miles northwest from Elgin to connect Belvidere with the Rockford & Interurban Railway system reaching Rockford and Freeport, Ill., and Beloit and Janesville, Wis. The cars of the latter two roads are not operated into Chicago, but make close connection with the Aurora, Elgin & Chicago cars, using the terminal in Elgin, and passengers are handled on interline tickets. At Aurora connection is made with the cars of the Chicago, Aurora & DeKalb road, and interline tickets are sold from Chicago via this road to DeKalb, distant 71 miles west of Chicago. Connection is made also at Aurora with the Joliet, Plainfield & Aurora road, which has an hourly service between the cities included in its name.

The car-mileage report on page 226 for the month of May, 1911, is interesting because it shows a very complete segregation of the service and because it includes a statement of the sizes of trains on different sections of the third-rail division. Such reports are rendered monthly and are made use of by several departments.

The trains operating to and from Chicago, on account of their high speed, have been able to gain and hold the patronage of probably 70 per cent of all the through business. Practically all the property between Fifty-second Avenue, Chicago, and Wheaton, 18.9 miles, has been subdivided and is being rapidly sold and built up by people who go to Chicago for business each day. Thus the commuter traffic is in-



Aurora, Elgin & Chicago—One of Six of the Later Type of Shelter Stations

Bellwood. The speed of the limited trains is very high through this section, and it is desirable to display distant indications of the occupancy of the tracks by funeral trains moving against normal traffic.

On the Fox River division a number of trolley-contact signals of the United States Electric type have been installed to protect the congested sections of track.

creasing at a rapid rate.

The rates of fare for the five different classes of tickets issued have been determined largely by the severe steam-railroad competition. A table reproduced on page 226 shows the fares in detail from the Fifth Avenue terminal station in Chicago to each of the important stations between Maywood and Elgin.

The competition of frequent through high-speed steam trains requires very fast running by the electric cars, so as to hold the advantage from the transportation standpoint. Multiple-unit train service is regularly operated, the motor cars having 500-hp capacity each and being geared to 70 m.p.h. The necessity for this very high gear ratio is felt

cars when they reach their own tracks to exceed considerably the scheduled speeds just noted, in order to maintain their own service, and this requirement was one of the important factors in determining the high gearing used. Local trains make the 41.5-mile run from Elgin to the downtown Chicago terminal in 1 hour and 25 minutes, their

THE AURORA, ELGIN & CHICAGO RAILROAD COMPANY			
Car Mileage Report			
Month of <u>MAY</u> 191 <u>1</u> .			
LINE	This Year	Last Year	Total This Year
Passenger	2,005.4	2,625.6	1,024.9
Excursion	106.6	259.0	1,152.0
<b>TOTAL</b>	<b>2,112.0</b>	<b>2,884.6</b>	<b>1,676.9</b>
Fox River Div.	361.0	418.1	3,570.0
Aurora-Elgin	1,409.6	1,435.7	261.1
E. T. & M.	1,221.2	1,265.2	65.0
Elgin-Capekennedy	280.0	327.8	417.9
<b>TOTAL</b>	<b>6,820.3</b>	<b>7,237.8</b>	<b>6,520.3</b>
City Elgin	69.1	63.7	54.5
Aurora	545.0	516.4	325.3
Elgin	71.8	45.7	262.4
<b>TOTAL</b>	<b>1,312.1</b>	<b>1,193.1</b>	<b>1,131.2</b>
<b>TOTAL ALL DIVISIONS</b>	<b>8,132.1</b>	<b>8,430.9</b>	<b>7,652.5</b>
Freight and Excess	219.0	157.2	593.6
Grand Total	8,351.1	8,588.1	8,246.1
Work Train	489.6	681.5	4,131.9
Work Motor	346.3	360.0	1,137.7
Work Half Motor	422.2	454.7	8,246.6
Coach	257.2	220.5	285.7
A. E. & C. Freight Cars	514.3	327.5	969.0
Foreign Freight Cars	344.2		
<b>TOTAL</b>	<b>3,088.0</b>	<b>2,078.4</b>	<b>2,073.7</b>
<b>TOTAL ALL DIVISIONS</b>	<b>11,220.1</b>	<b>10,509.3</b>	<b>9,726.2</b>

RATES OF FARE AND DISTANCES ON THE AURORA, ELGIN & CHICAGO RAILROAD

Between Fifth Avenue Terminal Station, Chicago, and	Miles.	Single-Trip Fare.	Round-Trip Fare.	Fare by Using \$5.00 Interchangeable Coupon Ticket.	54-Ride Monthly Individual Ticket.	60-Ride Monthly Individual Ticket.
Maywood	11.0	\$0.10	\$0.20	.....	.....	\$5.40
Bellwood	13.0	.15	.30	.....	.....	6.15
South Elmhurst	16.0	.20	.40	\$0.16%	\$5.70	6.30
Lombard	20.5	.25	.50	.20%	6.00	6.65
Glen Ellyn	23.0	.30	.55	.25%	6.40	7.10
Wheaton	25.5	.35	.65	.29%	6.75	7.50
Chicago Golf Grounds	26.5	.40	.75	.33%	7.65	8.50
Warrenville	30.5	.45	.85	.37%	8.10	9.00
Aurora	39.5	.60	1.10	.50	9.00	10.00
Glenwood Park	39.5	.55	1.00	.45%	.....	.....
Batavia	40.0	.55	1.00	.45%	8.75	9.70
West Chicago	31.8	.45	.85	.37%	7.75	8.40
Geneva	37.1	.55	1.00	.50	8.75	9.70
St. Charles	40.0	.55	1.00	.50	8.75	9.70
Wayne	34.8	.50	.95	.41%	8.55	9.50
Elgin	42.0	.60	1.10	.50	9.00	10.00

average speed being 29.3 m.p.h. for the entire run and 32.7 m.p.h. for the run over the Aurora, Elgin & Chicago tracks.

In the foregoing fast schedules time is included for changing the make-up of a number of trains at Wheaton. It is the practice throughout the day, so far as possible, to combine the single-car and two-car trains from the western termini to form longer multiple-unit trains at Wheaton for the run to Chicago. Thus trains from the Elgin and Geneva divisions consisting of one or two cars are

Aurora, Elgin & Chicago—Monthly Report Showing Car Mileage Subdivided and Compared with Previous Year

more and more each year as new suburbs develop and as the number of stops is increased.

OPERATING SPEEDS

As an illustration of the severe requirements which the cars have to meet in the way of speed attention is called to the running time of the different classes of trains between Elgin and Chicago. These trains are typical of those operating to Chicago from the other western termini. The distance from Elgin to the Fifth Avenue downtown terminal in Chicago is 41.5 miles, and the scheduled running time for limited is 70 minutes. Thus the average speed, including all stops, is 35.6 m.p.h. It should be remembered that this run includes 6.5 miles over an elevated, railway structure on which 19 of the 70 minutes are required. Considering only the run from Elgin, over the Aurora, Elgin & Chicago Company's own tracks, to the junction with the elevated road at Fifty-second Avenue, the limited trains make this distance of 35 miles in 51 minutes, or at a speed of 41.2 m.p.h., including stops. In the 35 miles four interlockings are passed and ten passenger stops are made by all trains.

The speed on the elevated structure is about 17.4 m.p.h. if the interurban cars do not overtake the elevated cars. As delays are quite probable during the rush-hour service on the elevated, it becomes necessary for the interurban

Metropolitan Equipment Used

MOTOR	2240
COACH	4400
<b>TOTAL</b>	<b>6720</b>



Aurora, Elgin & Chicago—Typical Way Station on Single-Track Branch

scheduled to arrive at Wheaton one minute apart and there be coupled for operation as one train into the Fifth Avenue terminal at Chicago. Similarly, certain of the trains on the westbound trip are divided at Wheaton and the different cars sent to the separate western terminals. This method of operation brings about a reduction in number

of the men required for handling traffic and reduces the number of trains over the Wheaton-Chicago section—a feature which is most important, due to the rapidly increasing traffic.

PARLOR AND DINING-CAR SERVICE

Parlor buffet cars are operated on trains spaced three hours apart out of Chicago. The company owns and operates two of these cars. The bodies are similar to those of the standard passenger cars, but the interiors are subdivided by the kitchen into a main compartment and smoking compartment. The interior fittings include tables, wicker chairs and equipment for serving high-grade meals to thirty passengers at one time. A crew includes four buffet employees, in addition to a parlor-car conductor. The service privileges are handled by contract, and they are very well patronized. A charge of 15 cents is made to each passenger who rides on the parlor buffet cars, but the receipt for this extra fare is accepted as 15 cents in payment for any purchases made from the buffet department. The average number of passengers carried on each 40-mile trip is sixteen.

PARKS

The Aurora, Elgin & Chicago Railroad owns two large parks, one on the trolley line south of Aurora and the other near Batavia. Both parks are on the Fox River. The park south of Aurora is well equipped with the usual amusement features. The one near Batavia includes about 100 acres of woods, and is kept in its natural state. It is used principally as picnic grounds for excursion parties from Chicago. These parks were described in this paper for Jan. 30, 1909, page 177.

service, as described in the ELECTRIC RAILWAY JOURNAL for Oct. 8, 1910, page 619. No funerals are handled on regular trains, only chartered cars being used for this service. It is stated that the revenue from the funeral-train service amounts to more than \$1,000 per month, and that from three to five trains are handled each day.



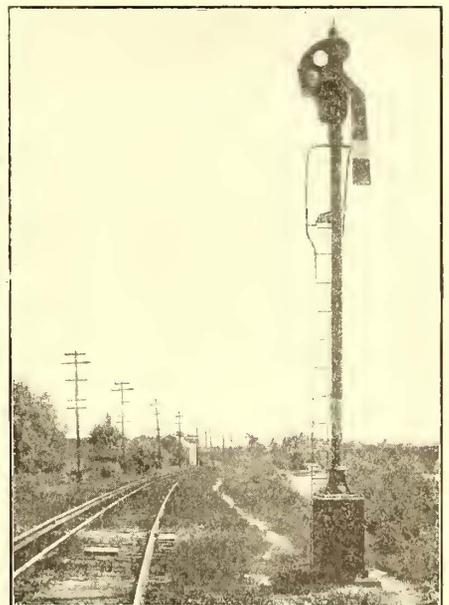
Aurora, Elgin & Chicago—View Westward from Fifty-second Street, Showing Terminal Yards and Milk Station

NEWSPAPER TRAINS

Another special service which this road during the last eight years has demonstrated to be profitable is that of handling newspapers in bulk. Special newspaper trains



Aurora, Elgin & Chicago—View Eastward from Fifty-second Street Station, Showing Approach to Metropolitan Elevated Structure



Aurora, Elgin & Chicago—Signal Mast on Elgin Division

FUNERAL TRAINS

A funeral-train service is operated to and from the five large cemeteries on the Aurora, Elgin & Chicago lines, the larger part of the traffic originating in Chicago and being shared jointly with the Metropolitan West Side Elevated Railway. Special equipment has been provided for this

are run out of the Chicago terminal at 3:30 each morning; these trains make the 41-mile run to the Fox River termini in 70 minutes. On Sunday two cars are required to handle the large Sunday editions. Payment for the service is made according to weight, which frequently exceeds 250,000 lb. per month. The service is much appreciated by the

patrons along the road, because it makes possible the distribution of the city editions in the suburban territory, rather than the out-of-town editions which are distributed on the steam trains.

#### FREIGHT AND EXPRESS SERVICE

In addition to its dense passenger traffic this company operates a freight and local express service; the through-express business is in charge of the United States Express Company. Tariffs are issued for the freight service, and practically all classes of business are accepted. The United States express service is operated from Chicago over the Aurora, Elgin & Chicago line and the connecting Elgin & Belvidere road to Rockford, on the Rockford & Interurban Railway lines, and thence to Beloit and Janesville, Wis.

While freight has been handled on the third-rail division since the road began operation, only recently has the service been inaugurated on the Fox River trolley division. The company is now negotiating with connecting lines in Aurora and Elgin with a view to handling local express and merchandise freight business on through billing, and if these arrangements are made the service will make available a new territory for interchanging of shipments, covering all the cities and towns of importance from Janesville, Wis., on the north to Kankakee, Ill., on the south, and with Chicago connections over the third-rail division. It is quite possible that this service will be extended to the Illinois Valley line of the McKinley traction system when that company has completed the connecting link which is now being graded between Morris and Joliet, Ill. A recent campaign of solicitation by the express and freight department has considerably increased the freight revenue.

In addition to the passenger and freight and express service, a milk train is operated, which during the year 1910 handled more than 200,000 cans of milk and cream from the farming district west of Wheaton into Chicago. The railway company collects a revenue of 15 cents per can between any two stations. The details of this service were described on page 622 of the *ELECTRIC RAILWAY JOURNAL* for Oct. 8, 1910.

#### EMPLOYEES' MEETINGS

Three hundred trainmen are employed in operating the service of the Aurora, Elgin & Chicago Railroad, including its street-car service in Aurora and Elgin. On the inter-urban divisions steam railroad practice is closely followed in dispatching and protecting trains in service. Because of the high speed at which trains are operated and the short headway extraordinary efforts are made to keep the personnel of the operating force at a high standard. The requirements for admission to train service are strict, and the men, in addition to a thorough practical training on the main line and the branches, are required to pass written examinations of 95 per cent or better on the books of rules. Also, the department heads hold open meetings regularly with the trainmen and consider such subjects as the prevention of accidents, contact with the public, avoidance of controversies, etc. At these meetings papers are read and discussed by the employees. This feature of the work has been received with considerable interest by the men and has resulted in a notable improvement in service conditions.

#### SECOND ARTICLE

In a second article, to appear in this paper, full particulars will be published of the power station, rolling stock, shops and other portions of the equipment of the Aurora, Elgin & Chicago Railroad.

## ELECTRIC RAILWAY LEGISLATION IN MASSACHUSETTS

The Massachusetts Legislature just adjourned enacted considerable legislation affecting street railway interests. The most important of the bills passed concerned Boston. Early in the session a bill was passed providing for the merging of the Boston & Northern Street Railway and the Old Colony Street Railway. This merger has since been carried out.

The bill providing for the consolidation of the West End Street Railway and the Boston Elevated Railway resulted in a contest. The stockholders of the West End Street Railway held out for an 8 per cent guaranteed dividend in case the roads were merged. The Governor held that 7 per cent was enough. The law as finally enacted provides that the companies shall vote on consolidation on or before Sept. 15, 1911. If the stockholders of the West End Street Railway consent to the proposition of selling its franchises, property and rights to the Boston Elevated Railway the common stockholders will get 7 per cent in perpetuity; or, if they so decide, they may take 7 per cent until 1922 and then have a commission appointed by the Supreme Court to decide whether the dividend should be increased to a percentage not to exceed 8 per cent.

As an accompanying proposition the bill for constructing three new subways and tunnels was enacted late in the session.

The amendment providing that employees of street railways should not work more than nine in eleven consecutive hours instead of twelve, as at present, was defeated.

The bill to give the Boston & Eastern Railway a certificate of exigency and the right to construct a tunnel under Boston Harbor was passed and signed by the Governor.

Authority was given Plymouth and Sandwich to purchase shares of the capital stock, bonds and notes of the Plymouth & Sandwich Street Railway, or any other electric railway company authorized to construct a line between these two towns, up to a maximum of \$50,000 if two-thirds of the legal voters voting at town meetings called for the purpose within five years shall so decide. It is required by the act that the Railroad Commission shall certify that the road has funds sufficient to insure its completion.

An act was passed that authorizes the Railroad Commission to modify or suspend the restrictions relative to operating street cars across railroad crossings.

By a new statute a maximum fine of \$1,000, or a year's imprisonment, or both, is imposed as the penalty for making false returns to the Gas and Electric Light Commissioners, the Railroad Commissioners, the Highway, the Bank and the Corporation Commissioners.

A new act prohibits common carriers from requiring passengers to enter or leave cars at their own risk, and allows passengers to recover damages in spite of such a rule.

A new law provides that, in the taxation of legacies and securities, the property of a non-resident decedent shall include "so much of each share of street railway, railroad, telegraph or telephone company stock of any company incorporated under Massachusetts laws and also under those of some other state or country as is proportional to the part of such company's line lying within the Commonwealth."

Nothing came of the promises of improvements made by the New York, New Haven & Hartford Railroad and the Boston & Maine Railroad on condition that the Legislature should pass the necessary legislation. The most important bill reported was one which called for the electrification of the Boston and Providence division of the New York, New Haven & Hartford Railroad as far as Readville. Another bill reported provides for the electrification of the Boston & Maine Railroad from the city terminal to Beverly.

The plan of Governor Foss to substitute a public service commission for the commissions that have to deal with the affairs of public service corporations failed.

The annual outing of the employees of the Urbana & Champaign Railway, Gas & Electric Company was held on July 15, 1911, at Homer Park on the Illinois Traction System. About 400 employees of this local property of the Illinois Traction System and their families attended as the guests of Mr. McKinley and the company.

# Schöneberg-Berlin Underground Railway

This Line Has Been Constructed by the Municipality of Schöneberg, One of the Western Suburbs of Berlin. It Is Operated Under a Traffic Agreement with the Privately Owned Berlin Elevated & Underground Railway.

On Dec. 1, 1910, Schöneberg, one of the important western municipalities adjoining Berlin, Germany, opened a municipally owned underground electric railway 2990 m (1.85 miles) long. The first object of this line was to secure rapid transit from the city of Schöneberg to the heart of Berlin, via transfer to the present privately owned elevated and underground railway (Berliner Hoch-und-Undergroundbahn), which extends east and west throughout Berlin. The second object was to encourage the development of sparsely settled territories in this municipality. The accompanying map shows the portion of the line already built, the proposed continuation of 1650 m (1.02 miles) through Schöneberg and also the proposed extension of 3300 m (2.04 miles) into Berlin, which would make unnecessary the present two-level transfer stations at Nollendorfplatz. Passengers from one line to the other must now use a combined ramp and stairway as the difference in level is about 22 ft. According to the agreement with the municipality, the operation of the Schöneberg line will be in the hands of the contractor for the first year and in those of the Berlin Elevated & Underground Railway

there would be required 426 trains a day, as the distance between the terminals is 2,745 km (1.7 miles). The annual number of car kilometers would be 853,700, the product of  $2 \times 426 \times 365 \times 2,745$ . This would make an average of seven passengers per car kilometer (ten passengers per car mile). The actual traffic, however, has amounted to about 24,000 a day, or 9,000,000 a year. Consequently six cars are to be added to the present equipment to permit the operation of three-car trains at the present schedule, or two-car trains every  $3\frac{1}{2}$  minutes. The schedule speed is 25.3 km (15.7 miles) an hour, and the maximum speed 47 km (29.1 miles) an hour.

There are two classes of fares, as on the Berlin Elevated & Underground Railway. The minimum third-class fare is 10 pf. (2½ cents) and the maximum 20 pf. (5 cents). The lowest second-class fare is 15 pf. (3¾ cents) and the highest is 30 pf. (7½ cents). The maximum fares are to subway stations outside the Schöneberg system.

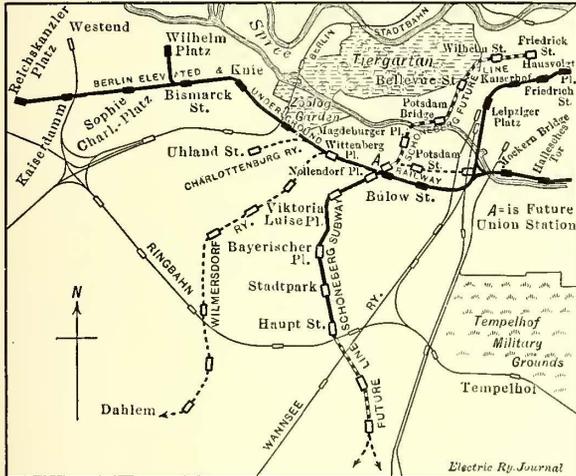
### CONSTRUCTION OF THE SUBWAY

The section through which the Schöneberg subway is built is thickly populated. Consequently some of the streets contained so many water, gas, electric and other mains that it was not always possible to avoid curves. Furthermore, the soil of Berlin is so sandy and so permeated with water that the effective waterproofing of the concrete walls and flooring proved one of the most important features of construction. The work of excavation began on Sept. 8, 1908, and despite the many physical difficulties, the present route was completed on Dec. 1, 1910, as previously mentioned. The contractor for practically every feature of construction and operation, except the drainage, was the Siemens & Halske Company. It is interesting to add that this noted electrical company consistently employed electrical machinery throughout, with the exception of the narrow-gage gasoline locomotives which were used to haul the loaded dirt cars.

The present subway is of the so-called shallow type, but it is planned to build a part of the suburban extension as an open cut. The usual distance between the roof of the tunnel and the top of the street pavement is 70 cm (2.3 ft.) except at the stations, where it is 40 cm (1.3 ft.), in order to reduce the number of steps for passengers. The difference between the highest and lowest point of the subway floor throughout the system is only 6.6 m (21.6 ft.). The sharpest curve on the free-running section has a radius of 105 m (344 ft.) and at stations of not less than 200 m (656 ft.).

The tunnel clearances are the same as those used in the Berlin private subway. Between stations the usual width of the tunnel is 6.24 m (20.5 ft.) and the clear height from the top of the rails to the roof is 3.3 m (10.8 ft.). The distance between rail centers on the tangents is 3.24 m (10.6 ft.), but larger clearances are provided at curves. The walls of the tunnel are arranged to carry conduits and have niches for cable boxes every 50 m (164 ft.). At stations, however, the cables are carried under the platforms because the walls opposite the platforms are used for advertisements.

About three-quarters of the present line was built through water-soaked ground. Where this was the case the side walls were covered with a triple layer of waterproofed asphalt paper, but otherwise only two layers were used. The concrete floor of the tunnel contains two longitudinal gutters which lead to a sump whence the drainage is pumped by hand into the city sewers. While the presence of water proved inconvenient during the construction



Schöneberg Subway—Rapid Transit Lines in Berlin

for the four years following. The present traffic agreement with the latter company permits a passenger to ride the same number of stations for a given fare, whether the stations are on the municipal or the private system.

The present northern terminal of the Schöneberg subway is the station at Nollendorfplatz. It is planned to build eventually a new station near this place, which will be used in common by the two present undertakings and also by the subway lines which will be built by the neighboring communities of Charlottenburg and Wilmersdorf. The present Schöneberg stations and their distances apart are given in the following table:

STATIONS.			
No.	Name of Station.	Distance in Meters.	Feet.
1.	Nollendorfplatz	740	2,427
2.	Viktoria-Luisen Platz	840	2,755
3.	Bayerischer Platz	675	2,214
4.	Stadtpark	500	1,640
5.	Hauptstrasse		
		2,755	9,036

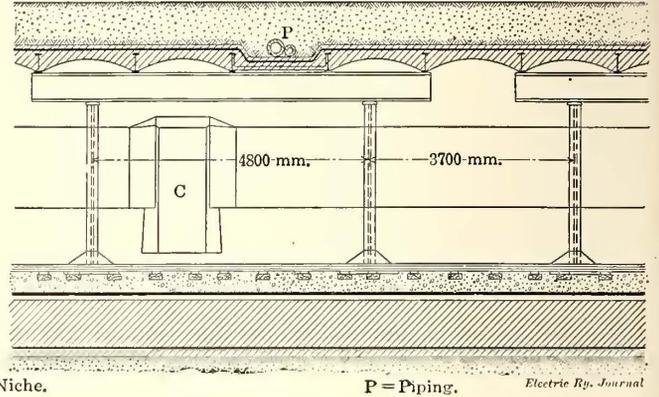
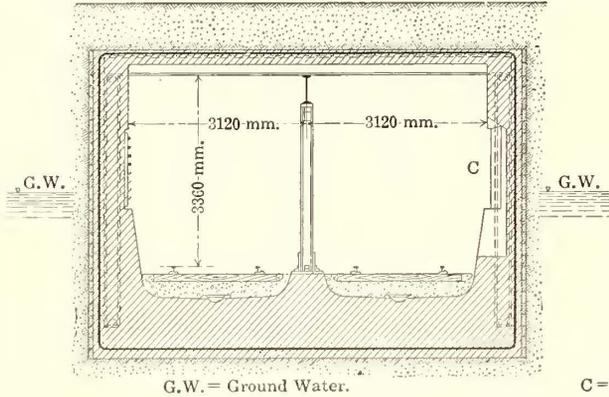
### TRAFFIC AND FARES

It was estimated that 5,670,000 passengers would be carried the first year. Assuming the use of two-car trains at intervals of 10 minutes for four hours a day and at intervals of 5 minutes for fifteen and three-quarter hours a day,

period, it is not undesirable in operation because it tends to keep the tunnel at an agreeable uniform temperature throughout the year.

Three-fourths of the total construction cost, namely, 7,919,200 marks (\$1,979,800), was required for the building of the tunnel structure. The unit cost, however, was lower than for the original Berlin subway owing to the use

(39.37 in.). The floor was then covered with 5 cm (2 in.) of sand, which served as a cushion for the final concrete covering 80 cm (31.5 in.) thick. This concrete was applied with pneumatic rammers. The next work was the erection of the concrete piers for the center line of tunnel columns, the triple waterproofing of the tunnel walls to 1 m above the ground water line, and the double waterproofing of the



Schöneberg Subway—Cross-Section and Longitudinal Section

of reinforced concrete for the walls. The walls of the older subway, which were of concrete, were 1.1 m (3.6 ft.) thick, whereas the Schöneberg walls are only 0.55 m (1.8 ft.) thick. This reduction in over-all width greatly reduced the expense of shifting underground piping.

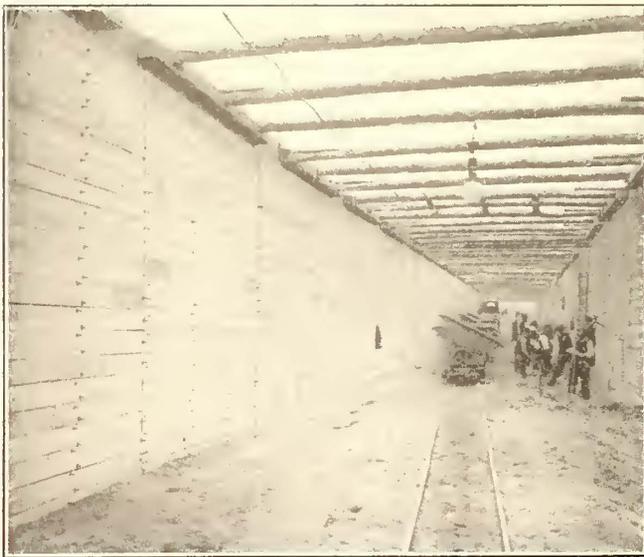
METHOD OF CONSTRUCTION

The first step in the construction of the line was to drive I-beams at intervals of 1.7 m to 2 m (5.6 ft. to 6.6 ft.) in line with the side boundaries of the subway. No fencing was erected nor was excavation begun until the piles had been driven in place throughout. After the removal of the paving, the soil between the lines of I-beams was removed to a depth of 3 ft. to 6 ft. Then planks were dropped on the outer side of the I-beams, while stiffening beams and wedges were placed between the opposite beams. Thereupon the excavation was continued until the proposed floor level was reached except where the presence of ground water required other methods. The floor level was covered

rest of the walls. When this was completed the tunnel was ready for the deck girders and the structural steel columns (the latter placed 5.6 ft. centers), the outer rows of which became the reinforcement of the final concrete walls. The deck was concreted by means of wooden forms which were suspended between the deck girders. The roof was then waterproofed and covered with a protective layer of sand concrete 10 cm (3.9 in.) thick.

When the I-beam piles had served their purpose they were pulled out instead of being left in the ground as a part of the final structure. This withdrawal was made possible because the inner line of wooden planks was attached to the I-beams by means of hook bolts, while the webs themselves were free of concrete.

The tunnel is ventilated by six side openings of the type shown in one of the views on the next page. These air shafts have stairways which lead to the sidewalk and thus they serve also as emergency exits. The top of the



Schöneberg Subway—Planking Bolted to the I-Beam Piles with 15 cm (6 in.) of concrete as soon as the excavation was completed. At the same time the inner sides of the I-beams were boarded and concrete plates 8 cm to 10 cm (3.2 in. to 4 in.) thick were rammed between the two walls of planking, but only as far as the flanges of the I-beams. Following this a triple waterproofing layer was placed on the floor and also on the sides to a height of about 1 m



Schöneberg Subway—Erection of Structural Steel Work shaft is covered by grill work, which can be easily opened from below. The wide stairways at stations also are an appreciable factor in the ventilation of the subway. However, the most effective means for introducing fresh air en route is presented at the Stadtpark station, where the line passes through what is practically an open cut for 70 m (230 ft.).

THE STATIONS

The stations differ from those of the Berlin system in being of the island type. The platforms are 7.6 m (25 ft.) wide. The advantages of an island station are that only one stairway is required, that it is more convenient for passengers and that there is considerable saving in station attendance labor. With the exception of one station the

way. The station platforms are divided by a row of ornamental columns. The walls opposite the station platforms are treated with tile. The color treatment and artistic style of every station is different, so that regular passengers have no difficulty in recognizing their alighting place even if they fail to see the name of the station. No station toilets have been built for the passengers, as there are



Schöneberg Subway—Waterproofing the Outer Concrete Walls

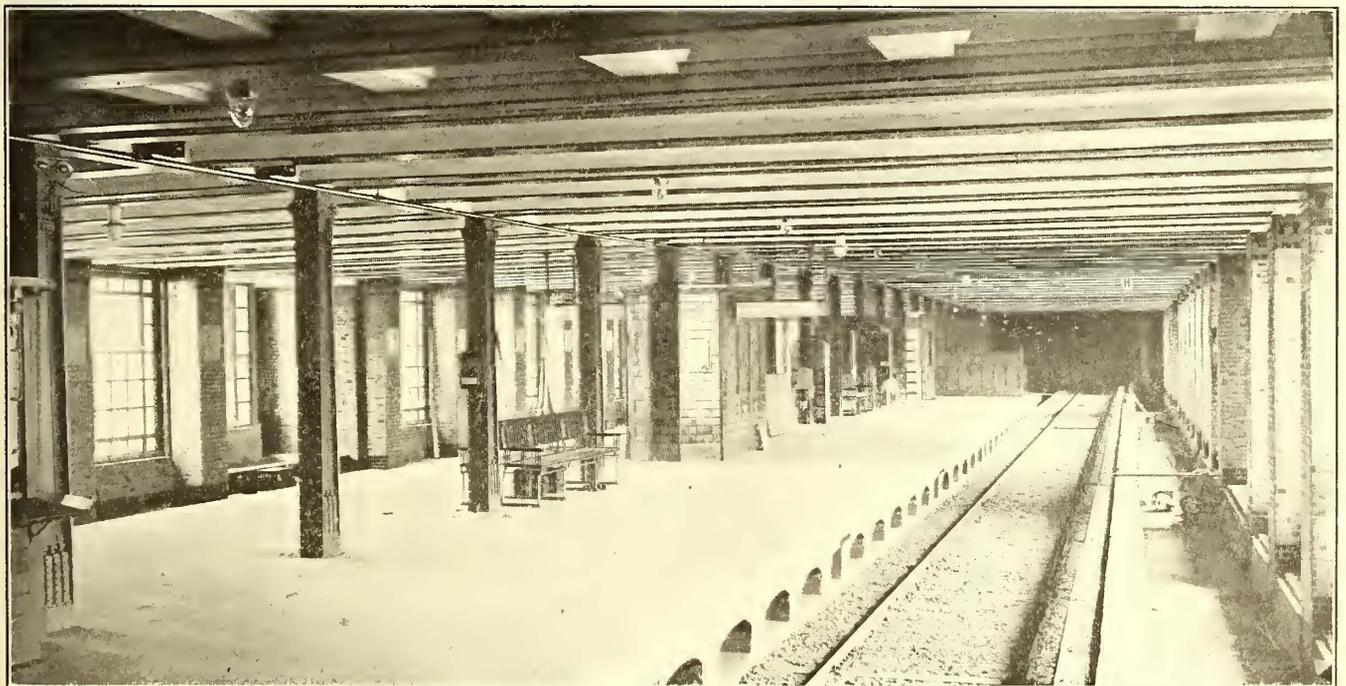


Schöneberg Subway—Emergency Exit and Ventilating Shaft Combined

platforms are 45 m (148 ft.) long to accommodate three-car trains. Provision is made, however, to extend the platforms to a length of 95 m (312 ft.) to accommodate seven-car trains, and also for the construction of a second stairway at each station. There is usually a clearance of 5.2 m (17 ft.) between the platform and roof. The platforms are

many public toilets in Schöneberg. The toilets which are provided for employees are drained into the city sewers above by means of hand pumps.

Special attention was paid to the architectural treatment of the portals of the station stairways, every one being planned to harmonize with the architecture of the neighbor-



Schöneberg Subway—Interior of Stadtpark Station Built Through a Cut in a Public Park

80 cm (2.6 ft.) above the head of the rails. The average over-all width of a platform is 13 m (42.6 ft.) except at the Stadtpark station, where it is 16.2 m (53 ft.). The platforms are of reinforced concrete with an asphalt finish and granite edges. The station stairways are 4 m wide (13 ft.). The portals have an illuminated sign ("U-tergrundbahn"), indicating that the stairway leads to the sub-

hood. Thus the portal at Hauptstrasse is along very simple lines because this station is in the heart of a business section. On the other hand, the portal at Bayerischer Platz is very ornate, owing to the fact that it is located in a park district. The general treatment there is like that of a pergola and baskets containing flowers are sculptured on the individual columns. The Victoria-Louise portal is

distinguished by the use of two great lanterns, while the separate columns are treated with various allegorical sculptures which typify Power, Energy, Electricity, etc.

The most remarkable station construction is that at Stadtpark. At this place it was necessary to cross a public park alongside a lake without injuring the topographical beauty of the surroundings. It was decided to run the line in the open, but to flank the tracks by a metal and stone

in minimizing dead mileage. This station will be so arranged that all trains of all electric underground and elevated railways going to Berlin will be at one level, while all trains coming from Berlin will be at another level. If this plan is carried out it will also be possible to operate trains from one system over the lines of another.

#### TRACK CONSTRUCTION

The track construction is similar to that on the Berlin



Schöneberg Subway—Side View of Open Cut Station Through the Stadtpark, Showing the Artistic Treatment of the Structure, Stairways for Crossing Over the Railway, Statuary, etc.—The Subway Portal Is at the Extreme Left

frame with movable sash, the whole being surmounted by groups of statuary and crossed by wide, ornamental stairways for pedestrians who wish to cross the railway. The columns between the windows are rather deep to give the desired effect of massiveness in proportion to height. This construction, together with the railway station portal, is shown in one of the accompanying illustrations. It will be noted also from the view of the interior of this station that passengers standing in the station or riding by it may enjoy

subway system. The standard rail is a Haarmann T-section 115 mm (4.5 in.) high, 58 mm (2.3 in.) wide at the head, 90 mm (3.8 in.) wide at the base, weighing approximately 54 lb. per yard and laid in lengths of 12 m (39.4 ft.). Bessemer steel is used for tangents, and for all curves exceeding 200 m (656 ft.) radius. Steel rails containing 3 per cent nickel are used on curves of less than 200 m radius and on braking sections. The guard rails on the large radius curves are of the same section as the run-



Schöneberg Subway—Speyer St. Portal, Bayerischer Platz

excellent views of the park, which are a welcome contrast to underground travel.

When the proposed union station at Nollendorfplatz is built the tracks at the present terminal will serve for car storage. As a certain amount of tripper service probably will be required when the Schöneberg line is extended into the heart of Berlin, these storage tracks will prove useful

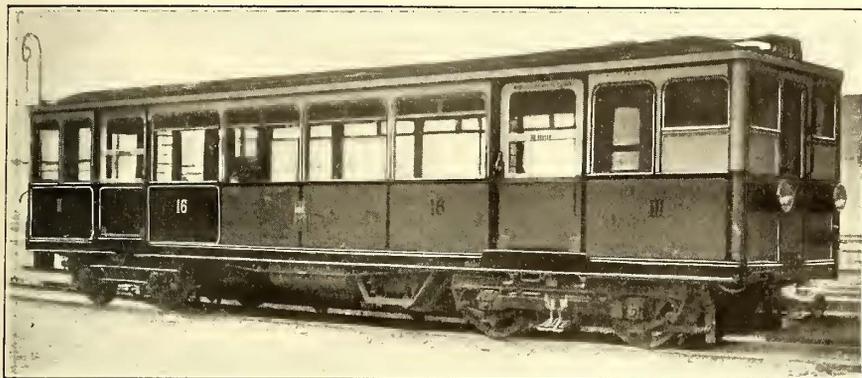


Schöneberg Subway—Portal at Viktoria-Luisen Platz

ning rails. Suspended joints and lipped tie plates 10 mm (0.39 in.) thick are standard. There are eighteen ties per 12 m (39.4 ft.). These ties are 15 cm (5.9 in.) high and 23 cm (9 in.) wide. The ties are of fir. Those placed in the tunnel were treated with zinc chloride, because this preservative is odorless. The ties are laid in gravel or broken stone ballast 40 cm to 45 cm (16 in. to 17 in.)

thick. One of the accompanying views taken at a station shows the zig-zagged angle irons which are screwed into the ties at curves to help to maintain the gage.

The contact rail, which is of soft iron of T-section, is placed on vulcanized-rubber insulators having a cast-iron base. As different clearances are used for the third-rail in the tunnel and in the yard, it is possible to use automatic means for cutting the lines in and out of circuit.



Schöneberg Subway—Standard Motor Car

#### ROLLING STOCK

The present rolling stock consists of twelve motor cars, each of which has twelve seats in the second-class compartment and eighteen seats in the third-class compartment in addition to a small compartment for the motorman. Each car also has standing room for twenty-five passengers, so that the maximum load of a standard two-car train is 110 passengers. One of the two cars is for smokers. The conductor is stationed in the third-class compartment next to the cab of the motorman so that he can observe the latter through a small window. The principal

The electrical equipment of each car consists of two 750-volt, 40-hp d.c. motors. Multiple-unit control is used. The brakes consist of a hand equipment and Siemens-Schuckert air brakes, which can be operated by the passengers in case of emergencies. Short-circuiting brakes are also available in case of failure of the air brakes. The weight of a motor car without passengers is 20 metric tons. Each car is illuminated by sixteen 40-watt tantalum lamps.

The ends of the car body are also provided with reflectors each of which contains a red and a white incandescent lamp. The white lamp burns at the forward end and the red lamp at the rear end. The cars are painted in conformity with the Berlin system, namely, yellow for the third-class section and red for the second-class section. The sides of the car are ornamented with the coat-of-arms of the city of Schöneberg.

All of the cars are equipped with Hartmann & Braun current clocks. These clocks are widely used in Germany and have recently been introduced in this country. The clock operates only when current is in the motor circuit. It has been found on the Schöneberg system that after these clocks were introduced the current consumption had fallen about 10 per cent. In registering the motorman's records allowance is made for the condition of the car operated and for other factors which would influence the value of the indication.

#### ENERGY SUPPLY, LIGHTING, TELEPHONES, ETC.

Energy for the operation of the line is purchased from a private company under a ten-year contract. It is transmitted at 6600 volts to the substation, shown in one of the



Schöneberg Subway—Substation with Carhouse and Shops in the Background on the Left

doors are in the sides of the car and are of the sliding type. The end doors are for the regular use of the crew and for the emergency use of the passengers. The cars are 12.77 m (41.9 ft.) over all in length, 2.36 m (7.7 ft.) over all in width and 3.18 m (10.4 ft.) high from rail to roof. The car bodies are carried on two trucks of 1.8 m (5.9 ft.) wheel-base. The wheels are of 850 mm (33 in.) diameter.



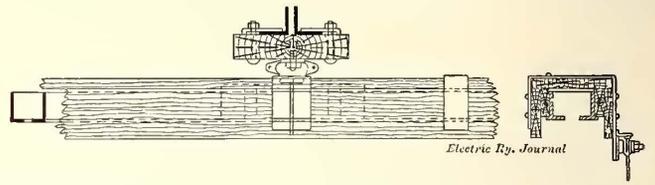
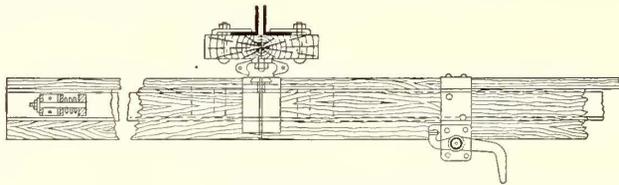
Schöneberg Subway—High-Tension Substation Apparatus in Castor-Mounted Cabinets for Quick Disconnection

accompanying views. The present equipment of the substation consists of two 750-kw motor-generator sets which change the 6600-volt alternating current directly to 780-volt direct current and a 375-cell storage battery which has a discharge capacity of 888 amp-hours in circuit with a reversible booster. The battery also supplies 750-volt lighting current through two independent circuits for the

tunnels and stations. The substation is built of ornamental burnt brick. It contains the high-tension switching apparatus in the cellar, the d.c. switching apparatus on the ground floor and the rest of the machinery on the two upper floors. The mezzanine floor on the d.c. switch floor contains the instrument board and general offices. The living rooms of the attendant are on the fourth floor. Provision has been

made for the installation of two future motor-generator sets and another booster. As previously noted, the lighting of the tunnel and stations is effected by two independent circuits. One of these is a bare copper wire, which is carried on porcelain insulators so that it is easy to tap the line at any point for lighting and power. The third lighting circuit, which supplies a number of lamps at and near every station and in the ticket offices, is in the system of the local lighting company. Thus it would still be possible for passengers to find their way out of the stations even if all railway circuits broke down entirely.

Operation of the tunnel service is greatly assisted by the use of a private telephone system. An elaborate clock synchronizing system is also installed to insure the same time at all stations. The clocks are operated electrically in half-minute impulses, which are in synchronism with the master clock. A relay system is used wherever the distance from the master clock would be too great to insure absolute synchronism. The clocks are regulated to keep the same time as those of the Berlin subway system.

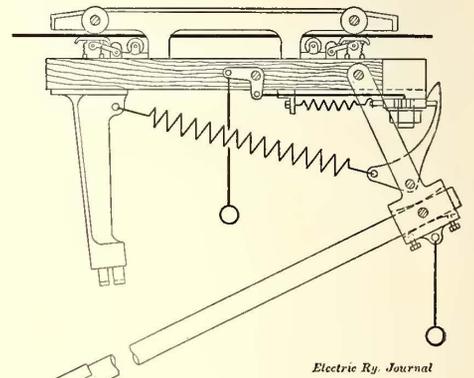


Schöneberg Subway—Overhead Conductor and Trip for Third-Rail Cars

made for the installation of two future motor-generator sets and another booster.

Operation of the tunnel service is greatly assisted by the use of a private telephone system. An elaborate clock synchronizing system is also installed to insure the same time at all stations. The clocks are operated electrically in half-minute impulses, which are in synchronism with the master clock. A relay system is used wherever the distance from the master clock would be too great to insure absolute synchronism. The clocks are regulated to keep the same time as those of the Berlin subway system.

Operation of the tunnel service is greatly assisted by the use of a private telephone system. An elaborate clock synchronizing system is also installed to insure the same time at all stations. The clocks are operated electrically in half-minute impulses, which are in synchronism with the master clock. A relay system is used wherever the distance from the master clock would be too great to insure absolute synchronism. The clocks are regulated to keep the same time as those of the Berlin subway system.



Schöneberg Subway—Contact Shoe to Engage with Contact Piece on Car



Schöneberg Subway—Contact Rod and Shoe Free

Schöneberg Subway—Contact Rod and Shoe in Use

CARHOUSE AND SHOPS

The carhouse and shops are reached over a single-track siding near the Hauptstrasse station. The present yard layout permits the handling of five-car trains. A novel feature in German carhouse practice is the use of depressed pits. The various shops are in two buildings adjoining the carhouse, one of which is used for truck work, electrical repairs, blacksmith shop, and the other building for car-

plished by using an overhead trolley carriage one side of which has a collecting mechanism running in an overhead contact trough and the other a pair of wheels which run on an overhead track parallel to the trough. The current passes from this overhead collector through the carriage rod, which carries a contact shoe at its lower end. This rod is under tension in order to keep the shoe free of the car roofs when not in use. When the rod is pulled down

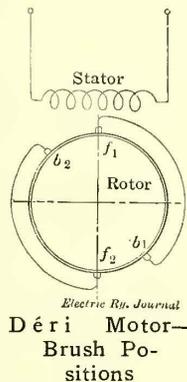
by means of a string the shoe makes contact with a recessed casting on the top of the car. As soon as the shoe is interlocked in this way the car can be moved along until it strikes a stop in the trough. This stop breaks contact automatically when the car reaches the third-rail section. The former method was to have a man use a contact rod which was hooked over the trolley. Of course, this made it necessary for him to follow the car until it had entered the third-rail section. The great advantage of the new method is that the car or train can leave the building without regard to the location of the current conductors.

**DÉRI MOTOR ON MARTIGNY SINGLE-PHASE RAILWAY**

A recent article in the *Schweizerische Bauzeitung* describes a new single-phase railway in Switzerland 19.3 km (12 miles) long, extending from the Swiss government railroad at Martigny to Orsières. Its maximum grade is 3.5 per cent. The line was built for electric operation with trains consisting of one motor car and one or two trailers having a maximum weight of 70 metric tons and carrying about 100 passengers at a speed of 30 km to 45 km an hour (18.6 m.p.h. to 27.9 m.p.h.) and with freight trains made up of a maximum of 80 tons in motor-car weight and 50 tons in trail-car weight for operation at speeds of 15 km to 25 km an hour (9.3 m.p.h. to 15.5 m.p.h.). The freight motor cars are available for passenger service when required.

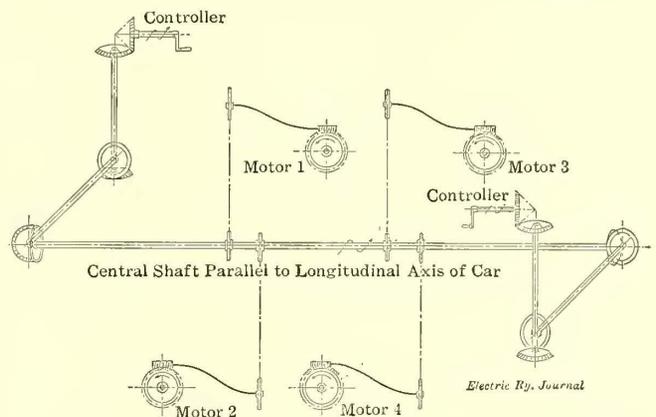
Direct current at 2400 volts was first considered for the line, but the final decision was in favor of an 8000-volt, single-phase trolley. It was intended to use twenty-five cycles, but the frequency was changed to fifteen cycles to harmonize with the officially recommended frequency limits for the electrification of the Swiss trunk lines. Energy for operation is obtained from the station of an electrochemical company.

For reasons of economy catenary construction could not be used for the overhead line except for certain sections where extra safety is required. The trolley wire of the entire line consists of hard-drawn round copper wire of 50 sq. mm (No. 0 wire) cross-section. The brackets in open country are carried on wood poles spaced 35 m. (115 ft.). The normal clearance between the trolley wire and the head of the rails is 6 m. (19 ft. 8 in.), but rises to 7 m. (22 ft. 11 in.) at street crossings, and drops to 4.8 m. (15 ft. 9 in.) in tunnels. The insulation between the trolley and the brackets is threefold, namely, two trolley insu-



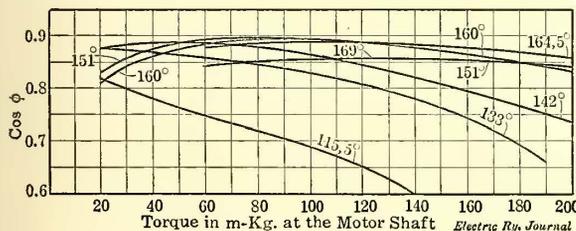
which wire bonds are installed about every 100 m (328 ft.). The present rolling stock consists of two passenger motor cars, two freight motor cars, three passenger trailers and four ballast cars. All of the motor cars have two plate-frame trucks of 2500 mm (8 ft. 2 in.) wheelbase and wheels of 1150 mm (45 in.) diameter. Every car, whether motor or trailer, carries a hand brake, straight air brake and an automatic brake. A separate system of brake levers is installed at each end of the car to leave the rest of the underbody free for the electrical equipment. A connection is provided between both sets of levers to permit the operation of all brakeshoes from either platform.

The motor cars are of particular interest, as they have been equipped with the Déri single-phase commutator motor furnished by Brown, Boveri & Company. This motor is of the repulsion type, and therefore has a common winding in its stator for compensation and excitation. The stator receives constant voltage and is connected to its rotor only by lines of magnetic force. As shown in the accompanying diagram, the rotor of a two-pole motor has two sets of brushes,  $f-1$  and  $f-2$ , which are fixed per-

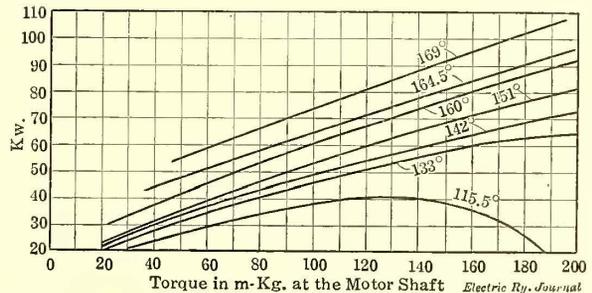


**Déri Motor—Transmission for Shifting the Brushes**

manently in the axis of the stator field, and  $b-1$  and  $b-2$ , which can be turned around the commutator. One brush of the fixed and one of the movable set are connected by flexible cables. The other two brushes are similarly connected. When the motors are at rest both the movable and fixed brushes are in the axis of the stator field. A displacement of the movable brushes from zero position will cause the motor to turn. The rotor revolves in the direction opposite to the movement of the brushes and its speed increases according to the degree of brush displacement from zero position.



**Déri Motor—Variation of Power Factor for Different Brush Positions**



**Déri Motor—Kilowatt Output for Different Positions of the Brushes**

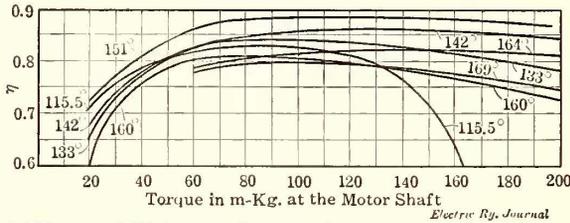
lators of vulcanized rubber and porcelain and one grooved porcelain span insulator. The catenary brackets are furnished with double bell-type porcelain insulators which carry a 17-strand steel catenary. The trolley wire on the catenary section is suspended at intervals of 3 m. (9 ft. 10 in.). The spacing of the poles on the catenary section is 50 m (164 ft.), except at curves and switches. The rails are bonded with Brown's metallic alloy, in addition to

This motor has series characteristics, inasmuch as its speed drops with an increase in torque, but it also has shunt characteristics, because its speed increases with an increase in the shifting of the brushes. Ordinarily motors of this type which have not been specially dimensioned for heavy starting currents will operate sparklessly with a starting current equal to about 2.5 times the normal output. Good commutation is secured for full-load running within limits

varying from 50 per cent to 125 per cent of the synchronous speed.

The regulation of the Déri motor by mechanical brush shifting instead of voltage control constitutes its great difference from other single-phase commutator motors. The characteristics of this motor may be summarized as follows:

It is always operated at constant voltage, hence the car

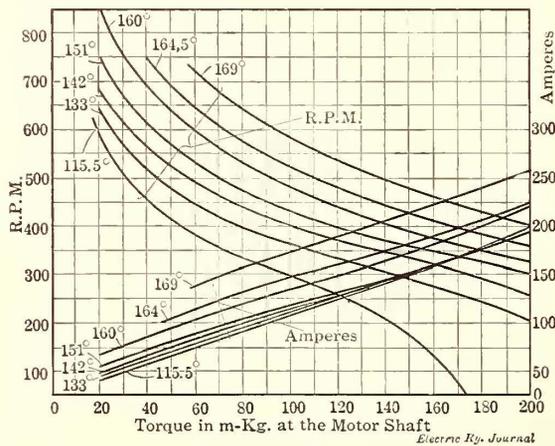


Déri Motor—Efficiency Curves (Without Gearing Losses)

transformer has only one secondary tap. Regulation is not effected by means of voltage steps, but by a change in the position of the brushes. Hence it is continuous, and the motor really has an infinite number of running positions. No special reversing means are required, as the direction of rotation is changed simply by reversing the direction in which the brushes are turned. As this is a repulsion machine with a rotor independent of external circuits, it is especially suitable for high-voltages lines because the voltage due to induction and speed can be kept very low under all conditions. If desired, the motor may be permanently connected in the zero position of the brushes, in which connection it consumes wattless magnetizing current only.

The prejudice against a motor of the brush-shifting type has hitherto prevented its use on railways, although small sizes have been built for cranes and mill work. The result of a year's satisfactory experimenting on the Stansstad-Engelberg Railway led to the introduction of this motor on the Martigny line. The manufacturers are now building 800-hp motors of this type for a number of important European lines, including the Dessau-Bitterfeld section of the Prussian-Hessian State Railways, the Bavarian State Railways and the Midi Railway of France.

The Martigny design is a four-pole motor built for single-phase operation at 500 volts, 15 cycles. Its hour rating is 90 hp, and its synchronous speed 450 r.p.m. The weight of the motor, gearing and gear case is 2500 kg (5500 lb.). Four motors are carried on each car, but the



Déri Motor—Amperage at the Brush Holders and R.P.M.

gear ratios differ in accordance with the speed requirements for passenger and freight service. The accompanying diagrams show the operating characteristics of this motor.

Current is collected at 8000 volts and transformed to 500 volts by transformers on the car. Pneumatically operated stator switches are provided to cut the motors out of circuit without interfering with the transformer connections for

the lighting and compressor circuits. The brushes are shifted by a combination of bevel gears, a central shaft parallel to the axis of the car, driving chains and flexible shafting, all as shown on page 235. The brushes may be moved from zero to full-load position by no more than six turns on the controller handle. It is stated that the brush shifting is practically synchronous and uniform on all motors, and that the motors have operated successfully even when the line potential has dropped to 4000 volts.

### ANNUAL REPORT OF THE VIENNA TRAMWAYS

The report of the Vienna Tramways for the year 1910, as issued by Director Spängler, shows that 271,584,931 passengers were carried, as compared with 267,449,171 passengers in the year 1909. This represented an increase of 1.5 per cent as compared with 9.1 per cent for the preceding year. This unfavorable condition was due partly to an increase in fares and partly to poor weather. There were operated 80,358,302 car km (49,822,147 car miles), an increase of 5.84 per cent. The gross earnings were 42,193,738 kroners (\$8,565,329), an increase of 13.9 per cent. On the electrically operated lines of the system the operating expenses exclusive of welfare work constituted 60.9 per cent of the gross earnings as compared with 61.1 per cent in 1909. The average earnings per car kilometer were 52.5 hellers (15.4 cents per car mile), an increase of 7.6 per cent. The average income per passenger was 16.13 hellers (3.22 cents), compared with 14.44 hellers (2.9 cents) in 1909. The total mileage of the system, measured as single track, was 503.3 km (312 miles). The 9786 employees of the company received 17,532,963 kroners (\$3,559,191) in 1910, an increase of 14.5 per cent over the year before. This sum was equivalent to 40 per cent of the gross earnings. In addition 6 per cent of the gross earnings was set aside for employees' welfare purposes, such as pensions and sick benefits.

The use of current clocks has produced a steady decline in the current requirements per car kilometer. In one case the clocks showed a difference of 68 per cent in the efficiency of two motormen who were operating under the same speed conditions over a given route. In another test it was found that a good motorman maintained the schedule for 312 days with 33,200 current-minutes, whereas a poor motorman required 55,070 current-minutes. Premiums for current saving were awarded to the amount of 54,940 kroners (\$11,528) for a total of 6433 cases. The improvement of the motormen is shown by the fact that 28 per cent received premiums in 1910 as compared with 15 per cent in 1909. The current clocks on the cars are supplemented by clocks which have been installed at forty-eight time points. These clocks have been found very effective in spurring the motormen on to maintain their schedules, in reducing energy consumption and in aiding statistical work, such as mileage determinations. At the end of the fiscal year there were 1201 motor cars and 1348 trailers in service. The latest rolling stock, numbering ninety-nine motor cars and 205 trailers, is of the vestibule type with separate passages for entrance and exit, as in American prepayment cars. These cars have reduced the length of stops by some 25 per cent. The new motor cars use interpole motors which are large enough to haul two trailers. The running and braking resistance grids are placed under the seats for use as heaters.

At a recent special meeting of the representatives of six companies leased by the East London Railway, London, England, a resolution was passed which practically insures the immediate electrification of the company's lines. The cost was estimated by the engineers at not more than £65,000.

# Instruction Methods of the Second Avenue Railroad, New York

This Course Is of Particular Interest to Small Companies Which Cannot Afford Elaborate Equipment

The Second Avenue Railroad Company, New York, has recently opened a school for motormen and conductors in its carhouse at Second Avenue and Ninety-sixth Street. It is in a well-lighted corner room, 70 ft. long by 21½ ft wide, and is equipped with three GE-1000 motors and motor parts, K-27, K-39-A and K-39-B controllers, cast grid rheostats and parts; also typical conduit layouts, such as full-size portions of straight track, interrupted contact rail and an automatic track switch. Four controllers and brake equipments are placed on stands at one end of the room in connection with circuit breakers, hood-switches and signal bells to simulate operating conditions when recruits are

pared students for road experience in about ten days to three weeks.

A special course consisting of four one-hour talks and demonstrations is being given on alternate days to motormen who were employed by the company before the opening of the present school. The instruction for these men is given mainly to minimize the abuse of apparatus. Conductors are also given instruction in the handling of car equipments, such as the application of the rear brake and throwing of the overhead switch on three bells, how to back cars, handling of lighting circuits, etc. They are also taught how to trip and reset circuit breakers when cars are



Second Avenue Railroad—General View of the Instruction Room

being drilled. The rest of the room contains demonstration devices and large simplified wiring diagrams of the company's standard equipment, which consists of K-39-A controllers and two GE-216 motors per car.

Applicants who have successfully passed the physical examination for motormen are supplied with a handbook of motor equipment of cars and placed at the controller stands, where they are taught to go through all of the customary platform operations. When this work has been mastered the instructor gives them a series of lectures on the behavior of equipment and by means of experimental equipment shows the results of improper operation and what emergency repairs and replacements can be made on the line. An unusual feature of the course is that the men are taught how to telephone accurately any equipment troubles which they are unable to repair themselves; also to telephone accidents and blockades. Twelve men are usually tutored at one time. The instruction course pre-

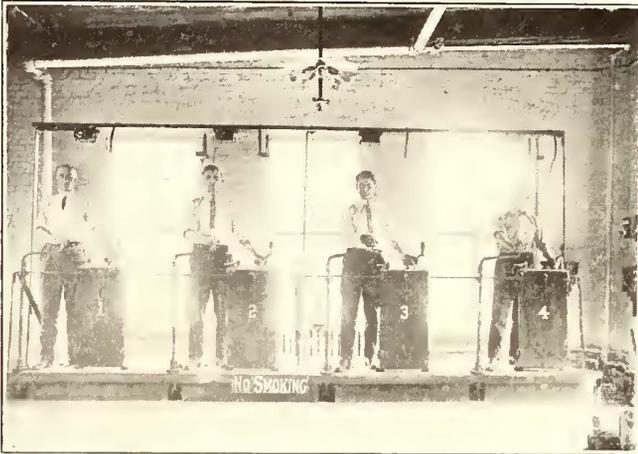
paring up grades because the motormen are not allowed to leave the platform. These circuit breakers are completely inclosed in transite-lined cabinets except that a hand-hole is provided at the bottom for operation.

The several demonstration devices are of the simplest possible kind, in view of the fact that the average applicant has little or no understanding of electricity. Thus the torque or twisting action of a motor is illustrated in a homely way by means of a pan filled with nails and other iron odds and ends. This pan is placed on one of two field coils, which, when magnetized, draw the nails up and toward the source of attraction. Another method of illustrating torque is obtained by using a single armature coil which is placed on a wooden form. When this outfit is set between a pair of magnetized field coils it will revolve a little each way.

The damage caused by reversing is shown experimentally by the flashing at commutator bars. The principle of the

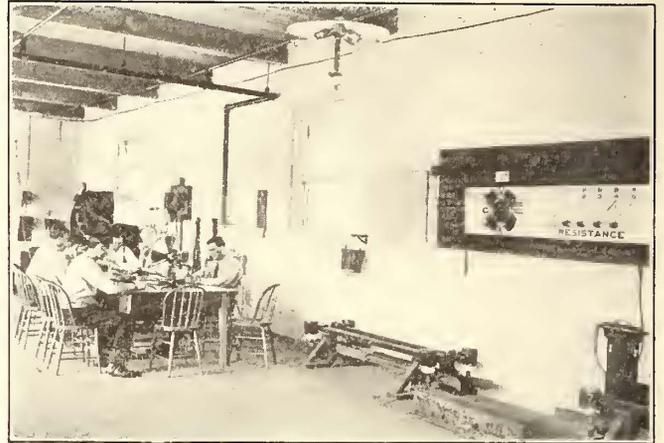
blow-out magnet is made clear by permitting two live wires to come into contact and then extinguishing the arc by placing a blow-out magnet over the same. It is also shown how a change in the position of the blow-out deflectors alters the direction in which the arc is extinguished. This

of a cast grid rheostat which is placed in a transite-lined box opened on one side and painted black inside for the sake of contrast. The rheostat is placed in circuit with a controller and brought up to white heat in from 20 to 25 seconds and sometimes is even entirely destroyed. The ne-



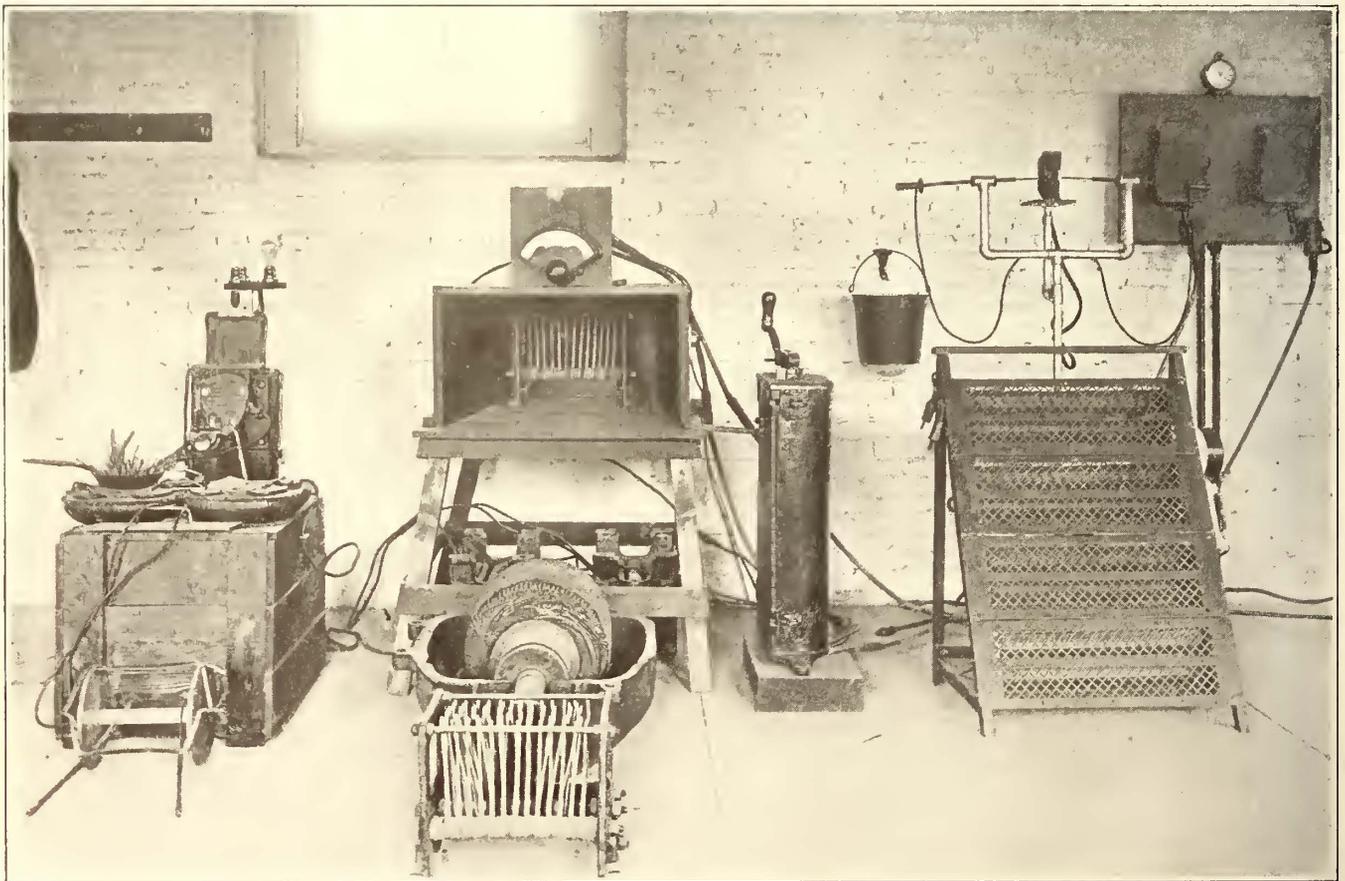
Second Avenue Railroad—Motormen's Instruction Stands

device shows how arcs are blown between controlling contacts and why the circuit is opened at all breaks in the conductor rails. To explain this feature there is provided a fully wired plow with a section of contact rail to show the breaks at switches and crossings. If the plow leaves the



Second Avenue Railroad—A Part of the Instruction Room

necessity for having circuit breakers on cars is made clear by the melting of wires and fuses. The frequent cause of plow fuse trouble is shown by cutting out resistances too fast when starting under severe track conditions and improper use of brakes. This very important feature is fully



Second Avenue Railroad—Demonstration Apparatus Such as Field Coils, Damaged Armature, Overheated Resistance and Magnetic Blow-Out

rail at these points with the circuit closed, the arc thus formed will be intense enough to heat the highly tempered plow springs to such a degree that they lose their elasticity.

Burnt-out armature coils are exhibited to explain the effect of cutting out resistances too fast. The danger of running too long on resistance points is shown by means

demonstrated with a service contact plow, conductor rails, one K-27 controller, two cast grid rheostats and one 35-hp motor with drum and brake attached.

The instructor and inspectors meet once a month to discuss ways and means to prevent accidents and minimize the abuse of the company's equipment. Each day several

conductors and motormen are questioned about their duties by the inspectors while riding over their posts. A copy of the questions asked and the answers given is sent to the superintendent's office with the inspector's daily report.

An important improvement has been made in the controllers. Formerly when it was necessary to employ a hand-plow in emergencies the flexible ends of the plow connections were hooked to the T-1 and T-2 terminals of the K-39-A, K-8 and K-27 controllers. This connection made it possible to use only the rear controller because the blow-out magnet was not in circuit. It is now possible to use either controller as a special connection has been made between the blow-out magnet and the T-2 contact.

The Second Avenue Railroad is now operating 287 motor cars on 23.20 miles of track under George W. Lynch, receiver, and J. Henshaw, superintendent. The instruction work is in charge of Joseph H. Guise.

### ELECTRIC RAILWAYS IN BUENOS AIRES

An article by H. Wulff in a recent number of the *Elektrotechnische Zeitschrift* describes electric railway conditions in Buenos Aires, Argentine Republic. This city has grown from a population of 177,000 in 1868 to 1,314,063 at the end of 1910. The present street railway mileage is 606 km (376 miles) without considering several out-of-town lines which run into the city. The two city companies are the *Compañía de Tranvías Anglo-Argentina, Ltd.*, which operates 522.3 km (324 miles), and the *Compañía de Tranvías Lacroze de Buenos Aires, Ltd.*, which operates 83.7 km (52 miles). Three other companies serve harbor and suburban traffic under franchises of the national government. The *Compañía de Tranvías Electricos de Buenos Aires y Quilmes* operates suburban service exclusively, except for some freight business over the lines of the Anglo-Argentina company from the Quilmes brewery to distributing depots in the city. The *Compañía Electricos del Sud* has 14.7 km (9.1 miles) of track in the city and operates to the southern suburbs of Lanus, Banfield, Lomas and Temperley, the last of which is 19 km (11.8 miles) distant from Buenos Aires. The *Compañía de Tranvías del Puerto y Ciudad de Buenos Aires* is exclusively for harbor traffic, but already has 26.3 km (16.3 miles) within the city limits.

#### PRINCIPAL CITY SYSTEMS

The Anglo-Argentina company was formerly an English undertaking, but it is now owned by the *Compañía General de Tramways de Buenos Aires*, with headquarters in Brussels, Belgium. This company is a fusion of several systems, the final consolidation having been effected about the middle of the year 1909. The comparative figures for the year 1908 and 1909 and for the first six months of 1909 and 1910 respectively are as follows:

#### COMPARISON OF THE YEARS 1909 AND 1908.

Year.	Gross Earnings in Francs.	Operating Expenses in Francs.	Surplus in Francs.	Ratio Operation to Gross.	Car Kilometers.	Traffic.
1909	53,371,000	31,651,000	21,720,000	59.30	61,835,000	243,185,000
1908	50,289,000	31,046,000	19,243,000	61.73	59,332,000	227,040,000
Increase for 1909, in francs	3,082,000	605,000	2,477,000	—	2,503,000	16,145,000
In per cent.	6.13	1.95	12.87	—	4.22	7.11

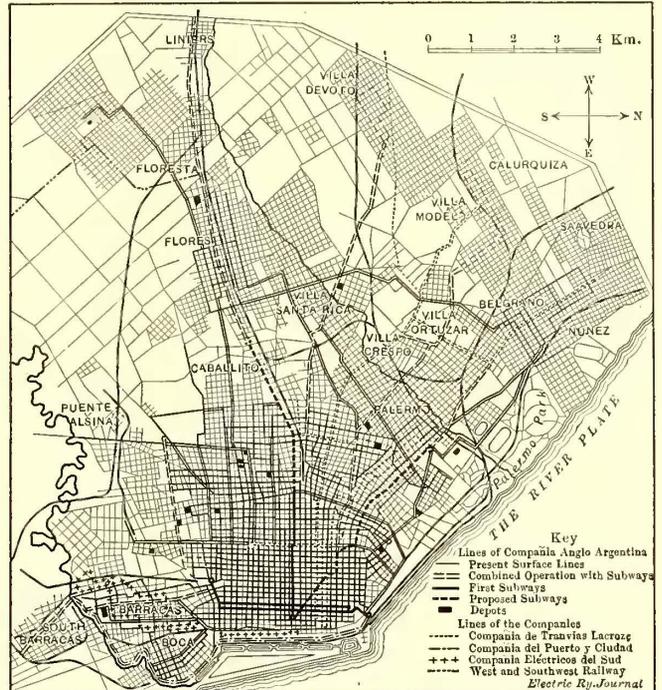
#### FIRST SIX MONTHS OF 1910 AND 1909.

Year.	Gross Earnings in Francs.	Operating Expenses in Francs.	Surplus in Francs.	Ratio Operation to Gross.	Car Kilometers.	Traffic.
1910	29,381,000	17,171,000	12,210,000	58.44	33,189,000	133,706,000
1909	26,114,000	15,586,000	10,528,000	59.86	30,292,000	118,761,000
Increase for 1910, in francs	3,267,000	1,585,000	1,682,000	—	2,897,000	14,945,000
In per cent.	12.51	10.17	15.98	—	9.57	12.58

The increase in business for 1910 was due partly to the Centennial Fair celebrating the independence of the Argentine Republic and the World's Fair which was held in connection therewith. It is expected, however, that the business for the year 1911 will exceed even that of 1910. The stockholders of this company received a dividend of 6 per cent in 1909. The profits for 1910 permitted a dividend of

7¼ per cent on the common stock and 10 per cent on the preferred stock.

The Anglo-Argentina company when it electrified its lines in 1904 built its own power station and substations. Later it sold the generating plant to the *Deutsch-Überseeische Elektrizitäts-Gesellschaft*, from which it buys energy at 2.8 cents per kw-hour. In 1910 the company purchased 64,000,000 kw-hours, which was equivalent to an



Electric Railways of Buenos Aires

average of 0.77 kw-hour per car kilometer (1.12 kw-hours per car mile). This figure included the energy used in the carhouses and for other auxiliary purposes incident to transportation. In the mileage calculations, two trailers are considered equivalent to one motor car. The high average energy consumption per car kilometer is due in part to the condition that many of the older streets are very narrow and so congested that the motorman must frequently operate on resistance points when running between the regular stops, which are 125 m (410 ft.) apart. The narrow streets also have many short radius curves. A third reason is the difficulty of getting competent motormen. Buenos Aires is a city with a rapidly shifting cosmopolitan population. During the harvest season many employees resign for the sake of earning higher wages for a few months in the fields. The Anglo-Argentina company now

employs 7650 motormen and conductors. It has 1466 motor cars, 700 trailers and sixteen carhouses. The car inspection depots employ 765 men. Owing to the uncertainty of shipments from Europe extensive shops have been built for the manufacture of armatures, fields, controller parts, resistances and castings of all kinds. Occasionally the company also builds cars complete. The shops employ

750 men for manufacture and repairs. This large number is required because of the great diversity in equipment which the company took over from the consolidated lines.

The feeder and overhead line department has 130 men and eighteen tower wagons. One of the difficult problems of the company has been the maintenance of the track. Much of the old track was unsuitable for electric operation, but it was not practicable to change all of it at once because the city had just undertaken an extensive paving program. At this time asphalt and wood paving are used to a fairly equal extent in the city. Even the most substantial sub-structure, especially in asphalt, has proved unsatisfactory owing to the heavy traffic in the narrow streets. The track department employs about 850 men.

The Lacroze company operates 250 motor cars and trailers. The motor cars are of modern United States construction, but the trailers are rebuilt horse cars. This line was electrified during the years 1905 to 1907, and has its own power station. The following table shows the comparative earnings of the Anglo-Argentina company and the Lacroze company for the years 1906 to 1910, inclusive:

COMPAÑIA ANGLO-ARGENTINA.		
Year.	Gross Earnings, in Francs.	Passengers Carried.
1906	41,586,000	186,376,000
1907	45,545,000	216,403,000
1908	50,289,000	227,040,000
1909	53,371,000	243,185,000
1910	59,264,000	274,956,000

COMPAÑIA LACROZE DE BUENOS AIRES.		
Year.	Gross Earnings, in Francs.	Passengers Carried.
1906	3,362,000	14,205,000
1907	4,248,000	18,348,000
1908	6,250,000	26,981,000
1909	6,845,000	29,758,000
1910	9,172,000	40,955,000

#### SUBWAY LINES

In September, 1909, a subway franchise was granted to the Compañia Ferro-Carril Oeste de Buenos Aires, Ltd., for a line 3.5 km (2.2 miles) long crossing the city from west to east. The principal purpose was to have a freight line from the harbor to the terminal of this company, but it was also intended to have a passenger line with two city stations. The Anglo-Argentina company, believing its interests threatened, thereupon secured franchises for a subway system to be connected to its surface lines. This franchise was granted on Dec. 28, 1909. The first subway company then obtained a revised franchise for underground lines to be used for freight service exclusively and to be built below the level of any lines constructed by the Anglo-Argentina company. The two companies now have a traffic agreement which will permit passengers on the Anglo-Argentina underground railway to purchase through tickets for the suburban lines of the other system.

According to the new franchise, the Anglo-Argentina company is to build a line 17 km (10.5 miles) long from east to west, one line 4 km (2.5 miles) long from north to south, and one 6 km (3.7 miles) long from southeast to northwest to join the Plaza de Mayo with the Plaza Italia in Palermo. Subway passengers will ride over the connecting surface lines without charge. The franchises are granted for eighty years, at the end of which period all rolling stock, carhouses, yards, tunnels and other structures become the property of the city. The fare is to be 10 cents for a ride on either the surface or subway line alone, and 15 cents for a combination ride. Workmen's tickets are sold at reduced rates during certain hours of the day. The railway must pay annually to the city 6 per cent of its gross earnings. Should the annual earnings exceed 50,000 pesos per kilometer (\$70,000 per car mile) of single track the company must also pay 12 per cent of the excess gross earnings. There are also some minor taxes, but no new taxes or increases are to be imposed during the life of the present franchise. The stations of the subway lines will be 400 m (1312 ft.) apart. It is expected to have the first 3.5 km (2.2 miles) of the subway ready by March, 1913.

## METROPOLITAN STREET RAILWAY REORGANIZATION

At the final hearings before the New York Public Service Commission for the First District, upon the plan for the reorganization of the Metropolitan Street Railway Company of New York, little new testimony was given by the witnesses for the committee of bondholders. The commission introduced as a witness E. G. Connette, its transportation engineer. Mr. Connette presented an estimate of the cost of reproduction and present value of the physical property of the Metropolitan system. This estimate is published on the opposite page.

Mr. Connette testified that the figures were computed from data in his department prepared by Bion J. Arnold, supplemented by investigations made to complete the information and complete the various percentages and the depreciation.

#### CONTRACTOR'S PROFIT

In this statement no contractor's profit was allowed on removal of obstruction, including pavement, because of the statement of the engineer who valued this part of the property that the amounts allowed were liberal enough to include any possible percentages for contractors' profits, sub-contractors' profits, contingencies, engineering, incidentals, etc. No general contractors' profit was allowed on cars, as equipment could be ordered by a company from specifications furnished by the manufacturing company and the intervention of a contractor was unnecessary. Contractors' profits were not allowed on fixed tools and appliances, Fourth Avenue tunnel stores and supplies, office furniture and fixtures and floating tools. Fixed tools and appliances were generally installed after the company found what would be required, and Mr. Connette could not assume that a general contractor would be permitted to provide these. The Fourth Avenue tunnel was not appraised by the commission and the figures of Ford, Bacon & Davis on this item were accepted. It was not customary to allow a general contractor's profit on stores and supplies and the same argument that applies to tools and appliances would apply also to furniture and fixtures. Floating tools would be purchased from time to time. For similar reasons no allowances were made for engineering, incidentals, administration, etc., for these items.

The allowance for incidentals, administration, engineering, etc., was 15 per cent, except in the case of electric and horse cars, for both of which it was 5 per cent.

In the calculation of depreciation, Mr. Connette said, the estimated life of the various elements, based upon obsolescence, inadequacy and age, was taken. The expired life of the various elements, in accordance with the testimony introduced on behalf of the joint committee of bondholders, was accepted. Depreciation was computed on the straight line plan.

#### LIFE OF APPARATUS

Under cross-examination by Charles F. Mathewson, counsel for the joint committee of bondholders, Mr. Connette testified that he estimated the life of the power plant at twenty years, the electric cars at twenty years and the horse cars at thirty-three years. So far as electric motors for cars were concerned, the progress of the art was not effecting changes as rapidly now as it had done in the past.

Street railway companies, after operation for a period of years and with proper maintenance, carried a constant factor of depreciation of from 20 per cent to 25 per cent, which in the opinion of Mr. Connette did not interfere with operation at 100 per cent efficiency so far as the public was concerned.

Mr. Connette testified that he did not know of any street railway company in the country which had set aside a cash sum for depreciation equal to the depreciation computed on the straight line basis, as presented by him in this case.

In answer to a question by Mr. Mathewson, it was stated by Mr. Connette that in rate cases only the elements that

METROPOLITAN STREET RAILWAY COMPANY PLAN FOR REORGANIZATION  
COST TO REPRODUCE, DEPRECIATION AND PRESENT VALUE AS PREPARED BY ENGINEERS OF PUBLIC SERVICE COMMISSION.

Item.	Net Cost.	Contractor's Profit.	Net Cost Plus Contractor's Profit.	Incidentals, Administration, Engineering, etc.	Cost to Reproduce.	Salvage Value.	Wearing Value.	Depreciation.	Present Value.
Electric track:									
Removal of obstructions incl. pavement	\$3,234,070.00		\$3,234,070.00	\$1,210,608.30	9,281,330.30	\$534,047.75	\$3,234,070.00	\$1,602,794.83	\$3,234,070.00
Foundation and excavation	7,337,020.00	\$733,702.00	8,070,722.00	345,946.10	9,281,330.30		8,747,282.55	1,326,126.70	8,218,535.47
Paving in track	2,096,643.00	209,664.30	2,306,307.30	256,105.91	1,963,478.61		2,652,283.40	1,805,644.72	1,157,833.89
Tram rail, straight track	1,552,157.00	155,215.70	1,707,372.70	90,707.60	1,695,424.90		1,611,289.45	254,796.73	1,440,628.17
Slot rail	549,743.00	54,974.30	604,717.30	80,382.06	616,262.46		547,592.33	273,796.17	332,466.29
Conductor lines	487,164.00	48,716.40	535,880.40	192,743.27	1,477,698.37		1,314,590.02	657,295.01	820,403.36
Special work and paving	1,168,141.00	116,814.10	1,284,955.10						
Horse track and special work:									
Ducts	1,123,791.00	112,379.10	1,236,170.10	185,425.52	1,421,595.62	76,865.68	1,344,729.94	672,364.97	740,230.65
Cables	2,444,899.00	244,489.90	2,689,388.90	403,408.34	3,092,797.24		3,092,797.24	375,774.86	2,717,022.38
Power plant and sub-stations	3,522,689.00	352,268.90	3,874,957.90	581,243.69	4,456,201.59	1,270,730.45	3,185,471.14	1,600,699.25	2,855,502.34
Buildings	4,276,177.00	427,617.70	4,703,794.70	705,569.21	5,409,363.91	1,081,872.78	4,327,491.13	1,525,440.62	3,883,923.29
Buildings—Equipment	8,439,606.00	843,960.60	9,283,566.60	1,392,534.99	10,676,101.59		10,676,101.59	1,740,204.56	8,935,897.03
Electric cars	244,387.00	24,438.70	268,825.70	40,323.86	309,149.56		247,319.65	40,313.10	268,836.46
Horse cars	8,546,112.00	854,611.20	9,400,723.20	(5%) 427,305.60	8,973,417.60	347,719.93	8,625,697.67	3,730,614.24	5,242,803.36
Fixed tools and appliances	677,830.00	67,783.00	745,613.00	(5%) 33,891.50	711,721.50	5,515.84	706,205.66	64,000.25	68,721.25
Fourth Avenue tunnel	137,798.00	13,779.80	151,577.80	69,953.40	137,798.00	27,559.60	110,238.40	27,559.60	110,238.40
Stores and supplies	466,356.00	46,635.60	512,991.60		536,309.40		536,309.40		536,309.40
Office furniture and fixtures	1,623,519.00	162,351.90	1,785,870.90		1,623,519.00		1,623,519.00		1,623,519.00
Floating tools	106,052.00	10,605.20	116,657.20		106,052.00		106,052.00		79,539.00
	130,694.00	13,069.40	143,763.40		130,694.00		130,694.00		98,020.50
	\$48,164,848.00	\$3,324,241.70	\$51,489,089.70	\$6,016,149.35	\$57,505,239.05	\$4,175,941.02	\$53,329,298.03	\$14,795,612.11	\$42,709,626.94

were actually used in the manufacture of the product were taken into consideration. In capital cases all the property owned by the company was generally included. Sometimes properties were bought upon the basis of their earning value.

On July 20 Mr. Connette stated that the appraisal of the Third Avenue Railroad property was checked very carefully and adjustments made between the values determined in the two valuations made respectively by Bion J. Arnold for the commission and Henry Floy for the committee of bondholders. Because of these adjustments only 10 per cent was allowed for contingencies, etc. In the Metropolitan case the inventory was not checked and rechecked so that it was believed to be reasonable and proper to allow an additional 5 per cent to cover omissions and inaccuracies.

After the completion of the testimony of Mr. Connette the hearing was closed by the commission.

Final arguments of counsel were heard by the commission on July 21.

E. J. Kohler, of counsel for the bondholders of the Fulton Street Railroad, urged that the commission require some substantial provision for that company in the plan of reorganization.

Gilbert H. Montague, receiver of the Fulton Street Railroad, said that he would file a brief.

GOVERNMENT BULLETIN ON COST OF MATERIALS

The United States government has just issued Bulletin No. 93 on the cost of materials. This is a supplement to its previous reports, Nos. 77, 81 and 87, and brings the statistics published in these reports down to January, 1911.

As in the previous bulletins, a series of tables is published showing the average wholesale prices of 257 commodities, and these are further divided into raw commodities and manufactured commodities. The average price for these commodities for the period from 1890 to 1899 is taken as 100. On this basis the average for 1910 of the raw materials was 139.7, as compared with 136.8 in 1909, the highest figure up to that time. For the manufactured commodities the average price during 1910 was 129.6, as compared with 128.6 in 1907, the next highest yearly average. In 1909 the yearly average was 123.9. The total average for all commodities, raw and manufactured, was 131.6, as compared with 129.5 in 1907, the next highest yearly figure. The figures by months during 1910 show comparatively little variation. March was the highest month for the total of all commodities and August the lowest.

The bulletin also contains a report of cost of living in the United States. This is taken from the report made by the British Board of Trade, and contains a comparison of the American with British figures. Twenty-eight cities were covered by the investigation, which was confined almost entirely to families in which the total weekly income was \$30 or less. With one or two exceptions the price of food was found to be the highest in the cities in the Southern States and in the New England States, and lowest in the cities in the Central West. New York occupied exactly a middle position. Rents were highest in the Borough of Manhattan, New York. St. Louis came next and Greater New York third. There was no marked difference in rents between the Eastern, Western and Southern sections of the country, although there was a marked difference between some individual cities in those sections.

The average incomes of workmen in the same industries in Great Britain were considerably less than in the United States, and the classified expenditures showed that the amount spent on food in the average American workman's family begins at a figure a little higher than that at which the British maximum of the corresponding kind stops.

## ELECTROLYSIS SITUATION IN CHICAGO

Mayor Harrison of Chicago has approved the appointment of Ray Palmer, a Chicago engineer, to investigate the city underground structures in so far as they may or may not be affected by electrolytic action. Mr. Palmer has been engaged on similar work in Milwaukee. He is to be paid a salary of \$750 a month and employ his own assistants. The present appointment follows conferences on electrolysis which have been called by L. E. McGann, commissioner of public works of Chicago. At these conferences two reports have been considered, one of a preliminary nature presented by Bion J. Arnold, chairman of the board of supervising engineers of Chicago traction, and the other by the Chicago Bureau of Public Efficiency. This bureau is privately supported and was organized for the purpose of making constructive suggestions for improvement in the accounting and purchasing methods and the handling of the payrolls of the local city government and for co-operating with public officials in the installation of new methods. It also proposes to furnish the public with exact information regarding public revenues and expenditures and thereby promote efficiency and economy in public service. The report on the electrolysis situation which this bureau has just issued was conducted under the charge of A. J. Hammond, chief engineer of the bureau, and H. J. McDargh, assistant engineer. The report comprises seventy-two pages and an inset map.

The preliminary report by Mr. Arnold announces the reasons for and the lines of study followed in the preparation of an exhaustive investigation of electrolysis in Chicago which has been made by a sub-committee of the board of supervising engineers. This report has not yet been issued, but it is described in a letter written by Mr. Arnold to the commissioner of public works on July 27. An abstract of this letter follows:

"Soon after the board of supervising engineers came into existence the question of the prevention of electrolysis was discussed and it was decided that the reconstruction of the surface car-line tracks should be so done as to eliminate, so far as practicable, the escape of current from the rails. This was done by supplementing the rails on all new track work with a return copper conductor or conductors, the function of this return copper being to assist the rails in carrying the return current to the power stations or substations. Where the cars are a considerable distance from these power stations or substations and the traffic is light a small amount of copper in addition to the rails is sufficient; but in order to meet the probable future increase in the number of cars and to provide a path for the current in case of broken joints, we decided that no track should be laid unless it was supplemented with a return conductor and that for double track a conductor not less than 500,000 circ. mil should be used. Furthermore, as the flow of current is greater near the substations and power houses and the traffic is heavy there, this supplemental conductor has been increased in proportion to the work so that in many instances there have been from two to twelve 1,000,000 circ. mil cables laid to supplement the rails.

"The present ordinances, upon the advice of the writer given during their formative period, require that the joints of the rails shall have a conductivity equivalent to the conductivity of the rail itself, and the board of supervising engineers has seen that this provision is strictly carried out by providing welded joints in all new track and by testing each joint to see that it complies with the above stipulation. At a few points, such as on track special work, where it has been impracticable to weld the joints, copper cables connecting the main rails through all such special work have been provided. The rails have also been connected together and to the supplemental return cables with copper cross bonds at frequent intervals in order to equalize potentials and to utilize the full carrying capacity

of all the rails. Thus the board has seen that all new construction of surface lines has been done in such a manner as to prevent, to the greatest degree practicable, electrolysis due to the existence of the tracks of the surface car-line companies.

"After adopting our standard plans it became evident that the necessary information upon which to base conclusions regarding what should be done with other structures to prevent, so far as practicable, the destructive effect of electrolysis upon the underground utilities in the city could best be accomplished by co-operative action on the part of the public utility companies of the city and the board of supervising engineers. It was thought by this method much duplication of work would be saved and that the results thus obtained would be more valuable than would be secured if each company endeavored to conduct independent investigations of its own. The result was that a sub-committee on electrolysis, consisting of representatives of the board of supervising engineers and of each of the public utility companies of the city, was appointed, and this sub-committee, consisting of the best talent of the respective companies and of the board of supervising engineers for handling this subject, has been investigating the subject for over three years and has compiled many useful data and arrived at conclusions which should be of great benefit to the public utility corporations and the city of Chicago when these recommendations are put into effect.

"The method of the committee is to treat the subject purely from a scientific and practical standpoint, discussing all matters freely and frankly, the object being to ascertain and recommend a practical method for the prevention of electrolytic action between the various underground metallic surfaces within the city of Chicago likely to be affected by return currents of any grounded system. A brief outline of the work of this sub-committee is as follows:

"The committee has investigated and reported upon the conductivity of cement, concrete and earth materials. It has made measurements of resistances, cables and conduits to rails, water pipes and gas pipes; reported extensively upon methods employed to protect the lead sheaths of the cables, studying the relation of the voltage to the electrolytic corrosion of iron; made an extensive study and prepared a bibliography of the work previously done; made extensive electrolytic surveys and improved local conditions at many places; carried on two years' experimental work of electrolytic observations of sample track of the board of supervising engineers' standard construction; prepared formal reports recommending certain policies, such as the desirability of interconnecting return system installations, drainage system, etc.

"The committee is at present trying out an extensive drainage system for protecting pipes in power stations.

"The committee's final recommendations are just about to be formulated and, in the meantime, certain physical connections have been made between the tracks of the surface companies and of some of the elevated companies with marked effect in the reduction of the flow of current and consequently a reduction in electrolytic effect.

"Many more localized interconnections have been installed and are being watched for the character of the results. Where trouble develops at any location the committee determines what shall be done to remedy the situation as the local condition requires.

"It has been my intention, as soon as this committee made its formal recommendations, to take the subject up with the city officials with a view of securing their co-operation in carrying out a definite policy for the bettering of conditions, provided this method is agreeable to the various utility companies represented on the committee, believing that the information compiled by this committee under the guidance of the board of supervising engineers, at considerable expense to the companies, would be of

value, not only to the companies, but also to the city, provided a spirit of co-operation between the various utility companies and the city, having for its object the rectification of faults rather than the fixing of the legal responsibility for these faults, can be agreed upon."

REPORT OF BUREAU OF PUBLIC EFFICIENCY

The report made by the Chicago Bureau of Public Efficiency is dated July, 1911, and is entitled "Electrolysis of Water Pipes in the City of Chicago." Herbert R. Sands, a director of this bureau, says it is believed that at least two-thirds of the water pumped into the city mains is wasted and that a large part of this waste is attributed to leaky water pipes, which possibly may be impaired by electrolysis. Because of this condition the bureau had its engineers make a preliminary study of the electrolytic conditions as affecting the Chicago water mains.

The report recommends that a complete electrolysis survey of the entire city should be made by the city authorities. Such a survey should include (1) location of all positive and negative territories; (2) examination of all water pipes found to be carrying current, ascertaining whence the current comes, its point of departure and where it goes; (3) analysis of soil in positive districts; (4) sufficient tests of railway track rails to determine their efficiency as conductors. It is asserted that the board of supervising engineers has collected considerable data on the subject, but that nevertheless much remains to be done.

The report goes on to consider the relation of electric railways to electrolysis and briefly refers to legal proceedings by cities and water companies, also dwelling on the importance of the subject in Chicago and the necessity for immediate action. Some "horrible examples" of electrolysis are cited, possibly the most interesting being the following:

"One of the large department stores in Chicago experienced the injurious effect of electrolysis through the failure of one of its 6-in. mains in the basement. This bureau received an invitation to investigate and found that current from the electric railways was entering the building by the water and gas service pipes and following the piping and structural steel of the building until it found its way to the rails of the Illinois Tunnel Company's track. This investigation disclosed a 6-in. pipe in the building carrying 59 amp of current."

The People's Gas Light & Coke Company, according to this report, has greatly reduced the damage to its system by bonding with copper wires the gas mains in positive territories to the track rails. Further, each joint in the gas mains was bonded with two No. 0000 copper wires. These joints are 12 ft. apart. In addition, at a number of places copper cables varying from 500,000 to 1,000,000 circ. mils were tapped into the gas mains and carried to negative busbars at power stations.

The report goes on to show how its survey was made and in an appendix is a long list of readings made at various locations with voltmeters and ammeters. Discussing remedies the report says that the double trolley system will be impracticable. Various methods heretofore suggested are mentioned, and while the Chicago Bureau of Public Efficiency does not recommend any particular one of these, it believes that means of relief are available.

### PROPOSED HIGH SPEED ELECTRIC LINE AT ROME

A provisional agreement has been entered into between the Syndic of Rome and Messrs. Berthelot and Gilbert Boucher, representing two groups of French capitalists, for building a high-speed electric railway from Rome to the sea. A company with a capital of \$4,000,000 has been formed for this purpose, and a first provisional deposit of \$16,000 has been made, which will be increased to \$160,000

as soon as the agreement becomes final. The line is to be doubled-track, to start from the new projected maritime suburb of Rome near Ostia, some 3 miles south of the mouth of the Tiber, and to reach Rome at the Porta San Paolo. Here the line is to be taken underground and is to reach the city terminus at Piazza Venezia. The speed to be maintained throughout will be about 44 m.p.h.

### EXHIBITS AT THE ATLANTIC CITY CONVENTION

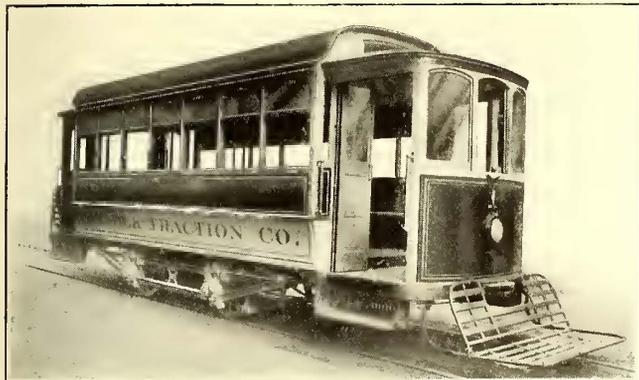
The committee on exhibits of the American Electric Railway Manufacturers' Association has completed the work of assigning space for exhibits at the convention this year to the first lot of applicants. The space required to supply the demand so far totals over 65,000 sq. ft., which is more than that needed at the same time last year. A list of the companies which up to date have signified their intention of exhibiting at the convention with the spaces to be occupied by them is published below.

- Acme Indicator Co., Cleveland, Ohio, (405)  
 Allis-Chalmers Co., Milwaukee, Wis., (21-23)  
 American Abrasive Metals Co., New York City, (437)  
 American Brake Shoe & Foundry Co., Mahwah, N. J., (302)  
 American Mason Safety Tread Co., Boston, Mass., (401)  
 American Railway Guide Co., Chicago, Ill., (10)  
 American Railway Supply Co., New York City, (403)  
 American Steel & Wire Co., Chicago, Ill., (358-359-360-361)  
 Anderson Mfg. Co., Albert & J. M., Boston, Mass., (221)  
 Archbold-Brady Co., Syracuse, N. Y., (402)  
 Atlas Railway Supply Co., Chicago, Ill., (172)  
 Automatic Ventilator Co., New York City, (226)
- Baldwin Locomotive Works, Philadelphia, Pa., (105-107-109-111)  
 Bayonet Trolley Harp Co., Springfield, Ohio, (271)  
 Brill Co., The J. G., Philadelphia, Pa., (1-3-5)
- Cambria Steel Co., Johnstown, Pa., (321-323)  
 Carnegie Steel Co., Pittsburgh, Pa., (362 to 373 inc.)  
 Chicago Pneumatic Tool Co., Chicago, Ill., (100-102-104)  
 Chicago Railway Equipment Co., Chicago, Ill., (438)  
 Chicago Varnish Co., Chicago, Ill., (425-426)  
 Cleveland Frog & Crossing Co., Cleveland, Ohio, (166)  
 Coe Manufacturing Co., W. H., Providence, R. I., (181)  
 Columbia Mach. Wks. & Mal. Iron Co., New York City, (185)  
 Consolidated Car Fender Co., Providence, R. I., (276-278)  
 Consolidated Car Heating Co., New York City, (376 to 379 inc.)  
 Crouse-Hinds Co., Syracuse, N. Y., (216)  
 Curtin Supply Co., Chicago, Ill., (380-381-382)  
 Cutter Electrical & Mfg. Co., Philadelphia, Pa., (174)
- Dayton Fare Recorder Co., Dayton, Ohio, (280-281)  
 Dearborn Drug & Chemical Co., Chicago, Ill., (7)  
 Detroit Steel Products Co., Detroit, Mich., (168)  
 Dixon Crucible Co., Jos., Jersey City, N. J., (19)  
 Drouvé Co., G., Bridgeport, Conn., (170)  
 Duff Manufacturing Co., Pittsburgh, Pa., (431-432)
- Eclipse Railway Supply Co., Cleveland, Ohio, (265-267)  
 Edwards Co., The O. M., Syracuse, N. Y., (325-327-329-331)  
 Electric Railway Improvement Co., Cleveland, Ohio, (386-388-389)  
 ELECTRIC RAILWAY JOURNAL, New York City, (2-4-6-8)  
 Electric Service Supplies Co., Philadelphia, Pa., (311)  
 Electric Traction Weekly, Chicago, Ill., (9)  
 Ellicon Co., New York City, (333)  
 Emery Pneumatic Lubricator Co., St. Louis, Mo., (219)  
 Eureka Tempered Copper Works, North East, Pa., (268)
- Flood & Conklin, Newark, N. J., (258-260)  
 Ford & Johnson Co., The, Michigan City, Ind., (269)  
 Forsyth Brothers Co., Chicago, Ill., (342-344)
- Galena-Signal Oil Co., Franklin, Pa., (39-42 inc.)  
 General Electric Co., Schenectady, N. Y., (25 to 38 inc.)  
 General Railway Signal Co., Rochester, N. Y., (420)  
 Globe Ticket Co., Philadelphia, Pa., (279)  
 Gold Car Heating & Lighting Co., New York City, (217)  
 Goldschmidt Thermit Co., New York City, (212-214)  
 Griffin Wheel Co., Chicago, Ill., (138-140)
- Hale & Kilburn Mfg. Co., Philadelphia, Pa., (421 to 424 inc.)  
 Hess-Bright Manufacturing Co., Philadelphia, Pa., (144-146)



## PERFORMANCES OF STORAGE BATTERY CARS

The Federal Storage Battery Car Company, New York, has issued some striking average figures on the daily performance of Beach cars equipped with Edison batteries. A double-truck car carrying 190 cells and four 15-amp, 200-volt motors ran 312.2 miles, made 1.9 stops per mile, propelled a weight of 16.8 tons at 20.2 m.p.h. over an average maximum grade of 1.84 per cent and required only 43.8 watt-hours per ton-mile. Its longest run on one charge was 135



Storage Battery Car for Suffolk Traction Company

miles over the tracks of the Erie and Pennsylvania railroads between West Orange and Atlantic City, N. J. The corresponding average figures for seven single-truck cars equipped with 90 to 110 cells and two 30-amp, 85-volt motors were as follows: 76.07 miles daily, 7.5 stops per mile, 7 tons total weight, 63.4 watt-hours per ton mile and grades up to 8 per cent. One of these seven cars, as furnished to the Suffolk Traction Company, is shown in the accompanying illustration. The individual record of this car is as follows: Ran 110 miles a day, made five stops per mile, carried seven passengers per car mile, operated over grades of 3.8 per cent to 4.5 per cent and required 63.4 watt-hours per ton-mile. The weight of this car is 7 tons, and its wheel-base is 8 ft. 6 in. It is geared for a schedule speed of 22 m.p.h. including stops. This car has taken the place of steam equipment on a branch of the Long Island Railroad. It makes eight round trips a day and is reported to effect a saving of \$35 a day in operating expenses.

## COLLAPSIBLE STEEL FORMS FOR CONCRETE CULVERTS

The Concrete Form & Engine Company, Detroit, Mich., is making collapsible steel forms for building concrete culverts, conduits, sewers, small bridges, trestles, tunnels and similar structures. The use of these forms is asserted to save from 25 per cent to 50 per cent in construction. They are made of No. 16 galvanized steel and are subjected

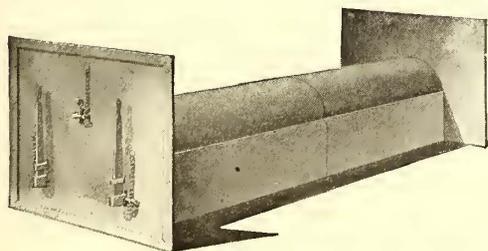


Fig. 1—Complete Form

to so little hard use during their application as to be practically indestructible. A complete form consists of two semi-circular tops, four side pieces and two end plates, as illustrated in Fig. 1. As shown in Fig. 2, the tops rest upon arms which are attached to the sides and extended at proper intervals, all controlled by a draw rod and lever.

By pulling the lever the top is lowered enough to permit its withdrawal. The sides are collapsed by releasing the swinging arms which connect and hold them rigid. The end plates are fastened to the top and sides by removable keys. The forms are withdrawn from the concrete in from twelve hours to twenty-four hours according to conditions.

As the tops and sides are interchangeable, the owner of a 24-in. complete form could build larger or smaller culverts simply by securing tops of appropriate sizes. Fur-

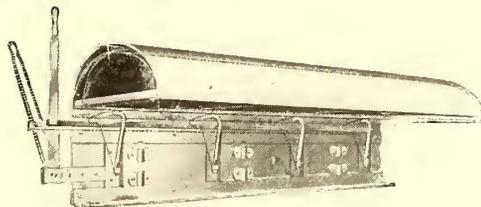


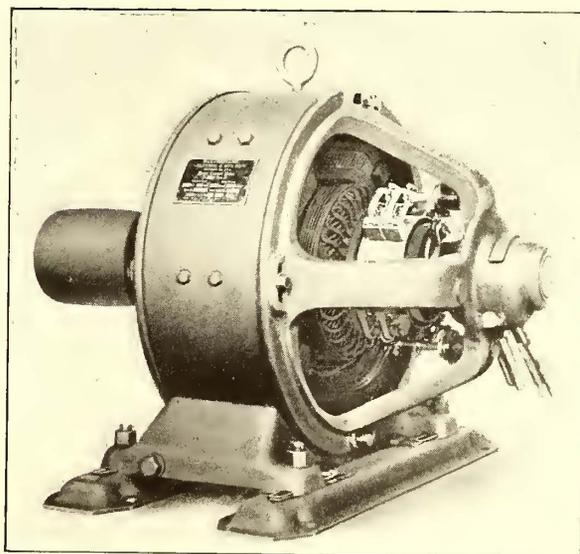
Fig. 2—Top and Side of Form

thermore, by building the foundation walls a little lower or higher the height can be controlled to suit the operator. The weight of complete forms varies from 375 lb. for the 12-in. size to 1000 lb. for the 72-in. size. No special hoisting apparatus is required, however, because the forms are removed in sections.

## INTERPOLE DIRECT-CURRENT MOTOR

The Westinghouse Electric & Manufacturing Company has announced a new direct-current motor for general power service, called "Type SK." One of its strongest features is the excellent commutation, which is obtained partly by the use of interpoles and partly by the careful design of the commutator, brushes and brush holders. Other important characteristics are the large dust-proof bearings and the efficiency of the oiling system. Large oil rings keep the bearing surfaces well lubricated whenever the motor is in operation, but the oil cannot leak or be thrown out of the oil well.

The motor frame is of a new design. It is a ring of open-hearth steel made by hot-rolling the slab into shape



Interpole Stationary Motor

and welding the ends together. The armature is so wound that wide spaces are left between the ends of the coils and ample ventilating ducts are provided in the core. The coils are form wound, laid in open slots and held by fiber wedges and bands. The shaft can be pressed out without disturbing the armature windings and com-

mutator connections. These motors are made for 115 volts, 330 volts and 550 volts, in capacities of from 1½ hp to 50 hp.

people experience in holding such circuits as a whole in mind. With the diagrams submitted all complications disappear and only a knowledge of the law of current preference is required.

### SIMPLIFIED CONTROLLER DIAGRAMS

BY E. C. PARHAM

### ALUMINUM CAR PANELS AND FITTINGS IN ZURICH

A car-wiring diagram when reduced to a drawing of convenient size has so many wires running to points apparently close together that it is hard to follow even a regular circuit from beginning to end with any degree of certainty, especially for one not familiar with such circuits. The substance of this article is to show a conventional but simple method of representing a car-wiring diagram in such a manner that the effect of a ground, open circuit or wrong connection and the irregular circuit thereby established becomes almost evident.

Through the courtesy of the management of the Zurich Municipal Street Railways some interesting information is available on the experience which this corporation has had with aluminum for car panels, roof members and other purposes. The reasons for adopting aluminum were twofold, namely, to save weight and to minimize the discoloration due to the rusting of metal parts. The light car colors used in Zurich made the latter question quite a serious one. Aluminum was first employed in the roof framing of twenty-five motor cars which were built in 1910. These cars showed so little oxidation that the next lot of cars ordered was equipped with aluminum roof members, panels and dashers, and aluminum was specified even for the grab handles and window guard bars. The aluminum trimmings are not as bright as the old nickel trimmings, but they are more satisfactory in the long run because there is no plating to wear off and expose a dull metal. The aluminum used is an alloy which contains a small amount of copper. It is sold by the Aluminium Gesellschaft, Berlin, under the trade name of "Dura-Aluminium." It is hard-drawn and forged and possesses great tensile strength. The panels on the latest cars are 2 mm (0.078 in.) and the dashers 2.5 mm (0.098 in.) thick as compared with 1.75 mm (0.69 in.) and 2.25 mm (0.88 in.) thickness on the first cars. These changes have added 17 kg (37 lb.) to the weight. The roof members are 4 mm (0.156 in.) or 6 mm (0.234 in.) thick, according to service requirements.

Fig. 1 is a wireman's diagram of four motors, controlled by a K-6 General Electric controller, or its equivalent, and the path of the current established by the first controller notch is indicated by the arrowheads. It will be noted that the main controller fingers are represented by circles inked in black; the reverse fingers by circles with dotted centers; the cut-out switch posts by circles with crosses, and the connecting-board posts by plain circles. All controller wires which are installed at the factory are indicated by dotted lines, and all wires which are to be installed by the wireman are indicated by full lines, after the method used in standard factory diagrams.

An extract from the specifications under which these cars were built states that the panels must be sand-blasted

Fig. 2 is a simplified reproduction of Fig. 1, and the conventional marks are so used that any given part of the circuit or all of it, as shown in either diagram, can be readily identified in the other. Fig. 2a is the circuit development for "series-ahead", Fig. 2b for "series-back"; Fig. 2c for "parallel-ahead," and Fig. 2d for "parallel-back." The most convenient layout for using such dia-

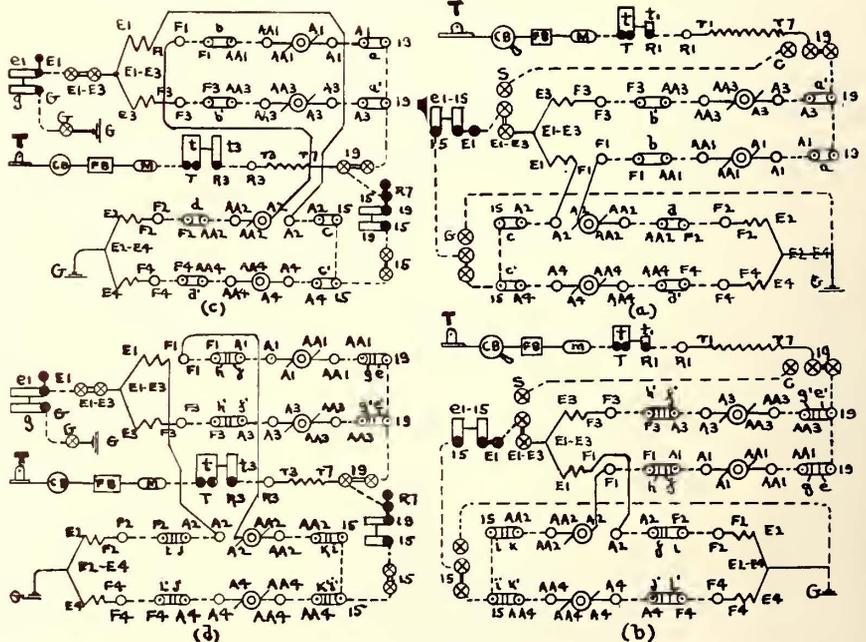
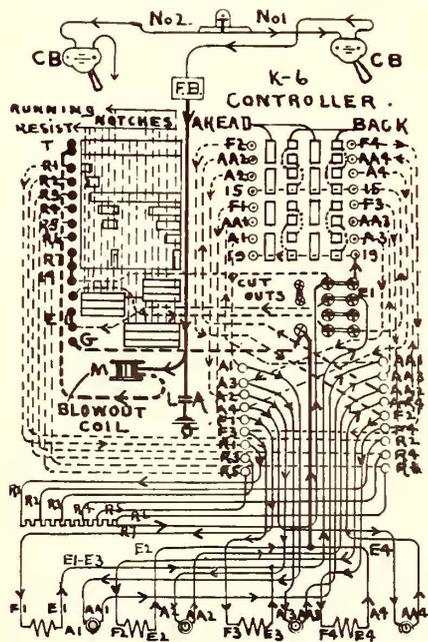


Fig. 1—Ordinary Controller Diagram

Fig. 2—Simplified Controller Diagrams

grams is to draw them on a slate so that connections may be readily erased and replaced by those to be studied. Thus the diagrams show clearly the effect, so far as the circuits are concerned, if the F1 and A2 wires are confused when the controller is connected up. They also illustrate the different conditions established when the controller is "ahead," "back" or in "series" or in "parallel." With an ordinary diagram satisfactory study of irregularities in a car circuit is difficult because of the difficulty which most

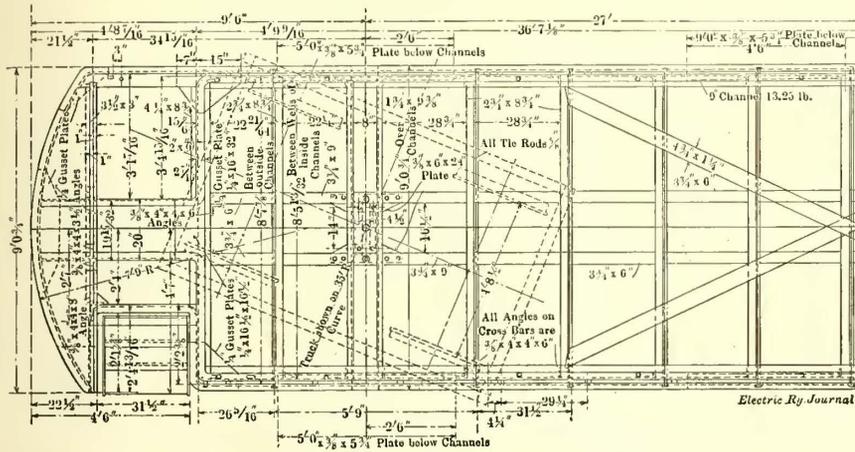
with fine sand before painting. After blasting the panels are cleaned with turpentine. The schedule is as follows: Primary coat, one day; puttying, one day; pause, two days; second coat, one day; pause, one day; third coat, one day; pause, two days; Ripolin varnish, one day; pause, two days; second coat Ripolin, one day; pause, two days; third coat Ripolin, one day; pause, two days; ornamentation and lettering, three days; pause, one day; total, twenty-two days.

**NEW CARS FOR ARKANSAS VALLEY INTERURBAN RAILWAY**

The Arkansas Valley Interurban Railway Company has recently constructed a high-speed trolley line from Wichita, Kan., northward through Valley Center and Sedgwick to Newton. The plans of this road contemplate further extensions northwest from Sedgwick to Hutchinson and from Wellington southward to Arkansas City, with branches to Wellington and Winfield. The road is being

46-ft. combination passenger, smoking and baggage cars for this railway company. These cars include some novel features of underframe design and interior arrangement. The general dimensions of the car are: Length of the car over bumpers, 46 ft. 0 in.; length over the vestibules, 45 ft. 2 in.; length inside the main passenger compartment, 23 ft. 7½ in.; length inside the rear vestibule, 4 ft. 0 in.; width inside between the wainscoting, 8 ft. 1¼ in.; width outside over the sheathing, 9 ft. 0 in.; extreme width, 9 ft. 2 in.; height from the track rail to the underside of the sills, 3 ft. 5 in.; height under the side sill to the top of trolley board, 10 ft. 0 in.; extreme height from the top of the track rail to the top of the trolley board, 13 ft. 7 in.; minimum curve radius, 35 ft. 0 in.

The new cars are divided into a baggage and smoking compartment seating seventeen passengers, a main compartment seating thirty-six passengers and a rear vestibule. Single-end operation only is provided for and a motorman's cab has been set off from the forward left-hand corner of the car. Just behind the motorman's cab a protected space has been arranged for a Cooper hot-water heater. The toilet room with its dry hopper is located on the rear



**Bottom and Side Framing of Motor Car for Arkansas Valley Interurban Railway**

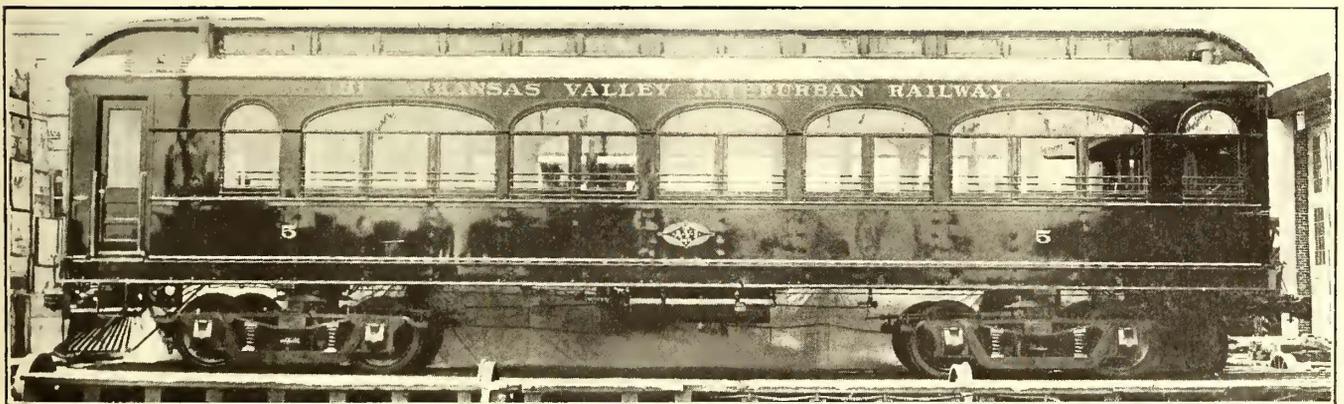
built by Wichita business men for the benefit of the city. The bonds have been sold largely in the Kansas farming communities. The first section from Wichita northward 18 miles to Sedgwick was opened for service Dec. 17, 1907. O. A. Boyle is vice-president and general manager.

The new road is built on a private right-of-way varying from 66 ft. to 80 ft. in width and located in a flat country which permits long tangents and few grades. All the important bridges are of concrete and steel. The tracks are laid with 70-lb. rails and Duquesne joints. The rail ends are bonded with No. 0000 twin-terminal bonds and the entire track and roadway construction conforms to the latest interurban standards for high-speed work. Energy for the operation of the road is obtained through a 33,000-

platform. The cars have but one passenger entrance and this is at the right-hand side of the rear vestibule. The bodies are mounted on the St. Louis Car Company's No. 23-B trucks with rolled-steel wheels. The dimensions relating to the wheels and trucks are as follows: Diameter of wheels, 34 in.; tread, 3 in.; flange, 1 in.; wheelbase, 6 ft. 6 in.; track gage, 4 ft. 8½ in., and diameter of axles, 5½ in.

**BOTTOM FRAMING**

The accompanying plan view of one-half of the underframing will illustrate its novel construction. The side sills consist of two 9-in. 13¼-lb. channels laid back to back and spaced with wrought-iron bars riveted between them. The channels have extensions over the upper flanges



**Standard Car of the Arkansas Valley Interurban Railway**

volt, 60-cycle current from the large new power plant of the Kansas Gas & Electric Power Company, of Wichita. The cars of the interurban line enter Wichita over the tracks of the local city system, the Wichita Railroad & Light Company, one of the McKinley syndicate properties. The Arkansas Valley interurban has its own terminal property which will accommodate both freight and passenger stations. This piece of property is located close to the business center of Wichita, which has a population of more than 55,000 and is reached by five steam railway systems.

The St. Louis Car Company has just completed five

into which the side posts are bolted. The outside channel on the left-hand side of the car extends in one piece from the center of the front bumper, along the side, and around the rear bumper to the steps on the right-hand side of the car. The outer channel on the right-hand side of the car begins at the right-hand end of the rear bumper, extends inwardly around the outline of the step opening and thence along the side of the car and around the front to join the other outer channel at the center of the front bumper, where they are spliced. These two channels completely encircle the outline of the car and are reinforced

### ENGLISH SEMI-CONVERTIBLE CAR

with gusset plates. The inside channels are bent around the end sills and carried toward the center of the car at each end to a point in line with the center sills, and thence extend forward and are connected with the buffer beams by gusset plates. The special forming of these inside channels, which are continuous from end to end of the car, affords substantial draft sills and center support for the buffer. The double-channel iron side sills are covered on the bottom by 6-in. x  $\frac{3}{8}$ -in. plates riveted to the lower flanges. The cross and end sills are of white oak trussed and tied to the inside channels. The truss plank is yellow pine,  $1\frac{1}{4}$  in. x 10 in. in section, screwed and bolted to the posts and side channels.

The body framing, which is of white ash ribbed and plated with long-leaf yellow pine, is sheathed on the outside with No. 16 sheet steel. The roof, which is of the steam-coach type, is supported by continuous steel carlines anchored to post rods. The intervening roof framing is made of ash.

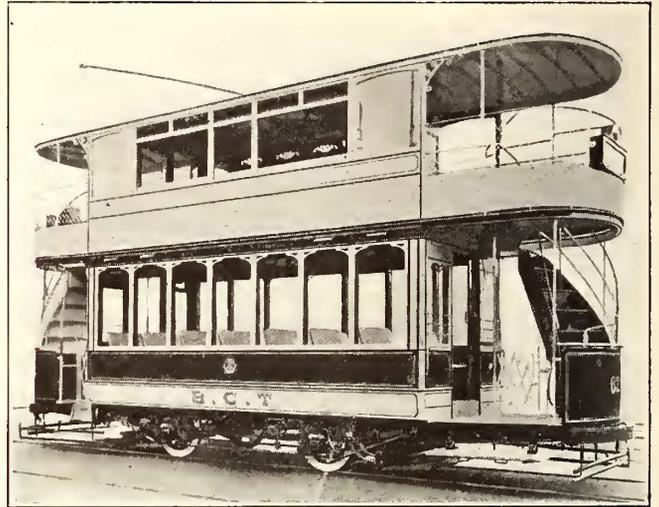
There are thirteen windows on each side of the body and one in the toilet room, located on the rear platform. The sashes are in two parts, the upper extending over two or three lower sashes to form a gothic window glazed with cathedral glass. The sashes are made of mahogany designed to rise not less than 22 in. They are fitted with Edwards O-D 13 fixtures. The deck sashes also are mahogany filled with cathedral glass. The windows are equipped with Pantasote curtains mounted on Edwards heavy spring rollers and having Curtain Supply Company ring fixtures. The interior finish of the cars is mahogany in the passenger compartment and oak in the baggage and smoking compartment. All the doors are made of solid mahogany, the rear end of the car having a sliding door in the center and the bulkhead between the interior compartments having a swinging door. The baggage compartment has a 36-in. sliding side door also equipped with a screen. The motor-man's cab has a swinging outside door and a creep door leading to the baggage compartment. The interior of the rear vestibule is finished in mahogany and the outside of both vestibules is plated with No. 14 sheet steel.

The single set of passenger steps at the right-hand side of the rear vestibule has three oak treads covered with Empire safety treads. The steps are supported by steel hangers and risers. The step opening is covered with a trapdoor so arranged that it cannot be lowered when the doors are open. Each car contains eighteen St. Louis Car Company stationary seats in the passenger compartment, one of which is longitudinal. The seats have 36-in. cushions and 25-in. backs and are covered with plush. The six seats in the smoking compartment are also stationary and upholstered in rattan. This compartment has two wood drop seats in the baggage end. All the cross seats in the car have arm rests and are provided with corner grab-handles, head rolls and adjustable foot rails.

Some of the specialties included in these cars are as follows: Peacock handbrake with vertical wheel, Globe ventilator over saloon, M. C. B. type couplers for radial operation, St. Louis continuous parcel racks and interior trimmings of bronze, Stempel fire extinguisher mounted on brackets, perforated rubber aisle matting, Westinghouse SML straight air-brake equipment with No. 2 compressor and form J governor and 10-in. brake cylinder with alarm whistle, St. Louis Car Company sanders arranged to sand rails on 35-ft. radius curve, and Knutson No. 2 trolley catcher and retriever. The front end of the car is fitted with an angle-iron pilot so arranged that the front coupler will intercouple with another or a car of the same length and same truck centers, and will be able to operate satisfactorily around curves of 40-ft. radius.

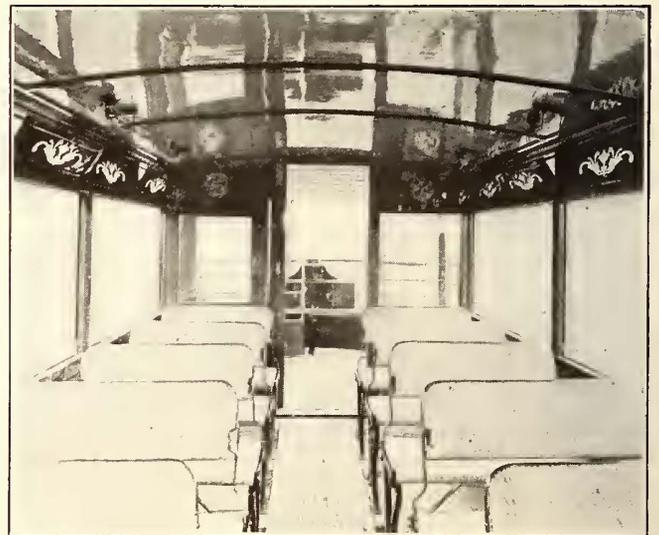
The line department of the Terre Haute, Indianapolis & Eastern Traction Company has installed foot-operated switches for controlling the lights in its telephone booths.

The United Electric Car Company, Limited, Preston, England, has recently delivered to the Blackpool Corporation Tramways the handsome double-deck, semi-convertible car shown in the accompanying illustrations. The clear opening when both windows are lowered is 3 ft. 9½ in., which gives practically the effect of an open car. A special feature of the body is the width of 7 ft. 6 in. over the



Double-Deck, Semi-Convertible Car for Blackpool

corner posts. This width permits the use of an aisle 17 in. wide and of a reversible rattan cross seat which seats two passengers comfortably. The interior of the car is most luxurious, the ceiling being of three-ply bird's-eye maple veneer, paneled out with embossed oak moldings. The lighting is by a neat four-light cluster in the center and four single-light fixtures. The framing of the body is of teak, with interior finish of quartered oak. The length of the platforms is 6 ft., or 9 in. longer than the recognized English standard. A special feature is the clear and wide



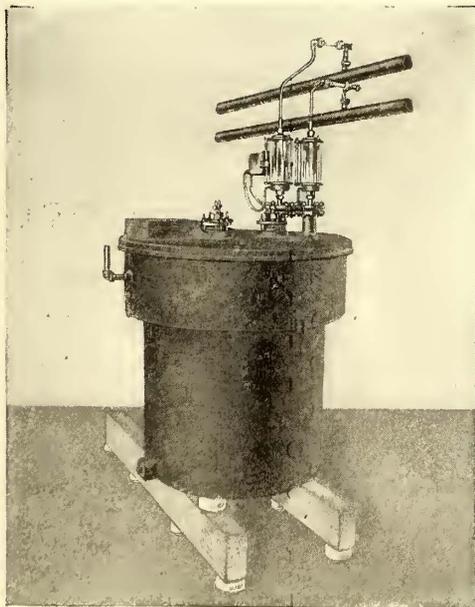
Interior View of Upper Deck, Blackpool Car

entrance or exit under the staircase to facilitate loading and unloading at the end of a journey. The staircase is very wide, easy to descend or ascend and follows the sweep of the dash. The interior of the upper deck is almost as attractive as the lower saloon. The seats and backs here are also of rattan. The side windows are of plate glass and are without frames. They operate independently with the aid of lazy-tongs.

The car is mounted on the Preston flexible axle yoke truck with a wheel base of 8 ft. 6 in. This truck is meeting with great favor. Some of the many advantages asserted for it are: Ease in turning sharp curves, long spring base, even wear on tires and longer life for tires and axles. The general dimensions of the car are as follows: Length of body over the corner posts, 18 ft. 10 in.; length of each platform, 6 ft.; length over the bumpers, 31 ft. 10 in.; width over the window posts, 7 ft. 6 in.; width over the roof, 7 ft. 8 in.; clear height inside at center (lower saloon), 6 ft. 10 in., and height from rail to top of trolley plank, 16 ft. 3/4 in. The total seating capacity is sixty-six passengers.

**ELECTROLYTIC HYDROGEN AND OXYGEN GENERATORS**

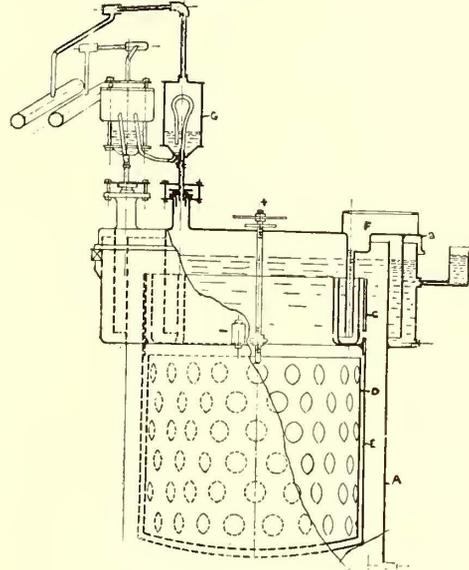
In order to produce the best results in welding or cutting with an oxy-acetylene or oxy-hydrogen torch it is essential that the purest gases should be used. Oxygen which contains the least impurities is the most efficient and economical as if it contains any appreciable amount of inert gases, such as nitrogen or chlorine, the efficiency of the flame produced by the torch is very much reduced. The International Oxygen Company, Newark, N. J., is now building electrolytic oxygen and hydrogen generators which produce these two gases free from all impurities. These generators are made in units and from five to ten units are operated together. The construction of the generators is very simple. An iron tank serves as the negative pole of the electrolytic cell. From the cover of this tank are suspended a hydraulic joint and a perforated iron tank, which forms the positive pole. An asbestos sack suspended from the hydraulic joint surrounds the perforated or positive electrode and divides the tank into two annular compartments. A solution of distilled water containing a small quantity of an inert alkali to increase its electrical conductivity is poured into the tank through a hole in the top and fills the tank and the hydraulic joint.



Electrolytic Oxygen and Hydrogen Generator

When a current of electricity is passed through the generator the water is decomposed into its constituent gases, hydrogen two parts and oxygen one part. The oxygen forms on the inner or positive electrode and the hydrogen on the outer or negative electrode. The two gases are thus produced in separate compartments formed by the asbestos sack and they are absolutely pure and unmixed. The hydraulic joint or water seal is an effective safety

device and prevents the accumulation of any dangerous pressure in either compartment of the generator. The gases as they form bubble up through the liquid electrolyte and are drawn off at the top of the tank. Two glass lanterns filled with water are attached to the top of the tank and the gases bubble through these before passing to the off-take pipes. By this means the action of the generator



Sectional View of Generator

may be ascertained at all times. No expert supervision or manipulation is required for these generators. It is only necessary to add daily sufficient distilled water to make up for the quantity decomposed. The generator may be operated continuously or intermittently as desired. Each unit requires a current of about 2 volts and from 300 amp to 400 amp. One kw-hour will produce about 3 cu. ft. of oxygen and 6 cu. ft. of hydrogen. One generator with a current of 350 amp will produce 65 cu. ft. of oxygen and 130 cu. ft. of hydrogen per day. One gal. of distilled water is required for 100 cu. ft. of oxygen and 200 cu. ft. of hydrogen. A group of ten generators will supply sufficient gas to operate from four to six cutting or welding torches. For groups of this size a low-voltage motor-generator is used to supply the current required. It is necessary, of course, to compress both gases for use in the torches.

**A NEW CAR HEADLINING**

A new car headlining made by Eugene Dietzgen Company, New York, has recently been installed by several electric railways in this country. The aim in developing this headlining was to turn out a light and strong material much lower in cost than other headlinings and yet free from the tendency to warp, crack or buckle. The material is rendered very pliable and resilient owing to the extreme length of its fibers. It therefore adapts itself readily to changes in temperature and atmospheric conditions. When curved, this headlining retains its shape permanently. It is made in four different thicknesses (1/8 in., 3/16 in., 1/4 in. and 5/16 in.) to meet the requirements of all grades and classes of construction. Headlining most suitable for street railway cars weighs only 11 1/2 oz. per square foot. This material has a smooth surface which renders it susceptible to the finest kind of finish in any color or style of ornamentation.

The final appraisal made by the State Board of Tax Commissioners places the valuation of electric roads in Indiana at \$23,383,012, a gain of \$1,006,774 over the appraisal of the electric roads in the State in 1910.

## LONDON LETTER

*(From Our Regular Correspondent)*

Trackless trolleys were inaugurated recently in Leeds and Bradford. These cities are the first in Great Britain to experiment with the railless system, and both municipalities became interested in the subject at the same time. The systems have been inspected by Major Pringle, on behalf of the Board of Trade, and duly passed by him, and they are now in successful operation. The trackless system has been in use for some years in about a dozen places on the Continent, and the various deputations which have left England to visit the different cities in Europe where the trackless trolley is in use have reported in its favor. It is to be hoped that the experiment commenced by Leeds and Bradford will prove successful and enable the municipalities and companies to extend the facilities of transportation to the outlying and more thinly populated districts. After the inauguration in Bradford the guests there were conveyed to Leeds, where they joined those who had taken part in the Leeds inauguration.

The tramways running to Handsworth and along the Bristol Road to Selly Oak and King's Norton, hitherto operated by the city of Birmingham Tramways Company, have passed into the hands of the Corporation of Birmingham. The company's leases recently expired, and the tramways committee of the City Council has taken over the lines, both inside and outside the city, and will in future work them as part of the corporation tramway undertaking. In doing this the corporation, by arrangement with the districts concerned, anticipates the Greater Birmingham Act, which comes into operation next November, and by which the area covered by Birmingham will be very largely increased. In order that no delay might occur owing to the transference of the lines from the authority of the company to that of the city, the substitution of electricity for the cable system on the Handsworth route has been effected in advance. Poles and wires have been erected, and the overhead work has been completed. The track, which is not altogether suitable for electric traction, has been bonded, and the cables supplying the current have been laid by the tramways committee up to the city lines.

Much time has recently been spent by the tramways committee of the Birmingham City Council in deciding the question of the extension of the tramway system into Greater Birmingham. Negotiations with the City of Birmingham Tramways, which hitherto controlled a very large portion of the tramways in the Birmingham district, are now practically completed and before long the tramways will pass into the hands of the corporation, which will then be able to extend them without hindrance.

At an extraordinary meeting of the Metropolitan District Railway a resolution was carried approving an agreement entered into by the company and the London Electric Railway to acquire the Lots Road (Chelsea) generating station of the Underground Electric Railway. A bill authorizing the transfer of the undertaking has already passed Parliament. The London Electric Railway and the Underground Railway have approved the agreement.

The annual report of the Manchester Corporation Tramways shows that the lines now measure 184 miles and serve a population of 900,000. The number of passengers carried was more than 165,000,000, and the gross profit was £290,951, or nearly £14,000 more than in any previous year. Over 67 per cent of the fares amounted to 1d. The traffic revenue worked out at 11.043d. per car mile, and the working expenses were 7.174d. per car mile. Progress in the parcels department has been rapid. Four years ago only 141,7815 parcels were carried, and the profit amounted to only £265. Last year 948,074 parcels were carried, and the profit was £2,484 on total receipts amounting to £10,018.

The annual congress of the Tramways & Light Railways Association was held at the Carlton Hotel, Edinburgh, on July 13 and 14. On the first day the following papers were read: "Transfer Fares," by C. W. Shepherd, general manager Edinburgh & District Tramways; "A Few Reasons Why Electric Traction in England Remains Stationary," by G. H. J. Hooghwinkel. In the evening the chairman and directors of the Edinburgh & District Tramways enter-

tained the association at dinner. On July 14 two papers were read: "Notes on Tramway Problems," by C. W. Malins, general manager Liverpool Corporation Tramways; "Tramways and Light Railways Legislation of the Future," by Alderman W. Ivey, West Ham Corporation Tramways Committee. In the evening there was a joint dinner with the members of the Royal and Imperial Automobile Clubs of England and Germany, at the Royal Hotel.

The newly constructed tramline between Churwell and Morley, completely linking the latter town with Leeds, has been opened, the first car being driven by the Mayor of Morley (Alderman). The work of extending the line which already existed between Leeds and Churwell was begun in the early months of the present year. The scheme altogether will cost between £35,000 and £40,000. The line is a single one, but the facilities of the service will be by no means impaired by this, for it is well equipped with sidings and one of the most up-to-date systems of signaling is to be installed.

Colonel Yorke recently made the Board of Trade inspection of the London County Council Tramways which connect the Battersea lines with King's Road, Chelsea, by way of Battersea Park Road and Battersea Bridge. F. Hall, M. P., chairman of the highways committee of the County Council; Mr. Fell, chief officer of tramways, and Mr. Way, of the chief engineer's office, accompanied the inspecting officer, who expressed his satisfaction with the line, which will open up the Hyde Park district to Southwest London. The County Council has now five tramways over five bridges, namely, at Blackfriars, Westminster, Vauxhall, Battersea and Putney. At the latter place the line from Hammersmith is now being extended to Wandsworth.

The bill to empower the building of the new St. Paul's Bridge across the river Thames, to take the place of the present Southwark Bridge, has been read a third time in Parliament, and will in due time receive the royal assent. The building of the bridge will therefore duly proceed, and though there is nothing in the bill about tramways, it being incompetent for the City Corporation to introduce a tramway scheme into a bill of this kind, yet it was definitely stated in the House of Commons that there existed an agreement between the corporation and the London County Council that the necessary tramways across the bridge would be built. The amended scheme to bring the bridge to the center of St. Paul's Cathedral, to make a beautiful vista of the noble building to be seen from the river, has not succeeded, and, strange to say, was not recommended by the committee of architects appointed for the purpose of judging the case.

A select committee of the House of Lords has passed the preamble of the bill promoted by the Central London Railway which authorizes the company to make a double line about one-half mile in length, commencing at Wood Lane Station and terminating by a junction with the authorized Ealing and Shepherd's Bush Railway of the Great Western Railway. The bill has already passed the House of Commons. J. D. Fitzgerald, who appeared for the promoters, said that the Great Western Railway had been authorized to construct a railway between Ealing and Shepherd's Bush, which would be electrically equipped, and if the proposed extension was carried out it would give a direct service between Ealing and the city. When the Liverpool Street extension of the Central London Railway was opened it would give direct communication between Ealing and Liverpool Street. Henry Oakley, late chairman of the Central London Railway, gave evidence to the effect that the company had undertaken to run one hundred and thirty-six trains a day to Ealing. It was proposed at first to have two stations on the extension—one at Ealing and the other at North Acton.

Other cities are also becoming interested in this subject. Among the many important schemes for tramway extensions into the various suburbs the Council of Sheffield recently proposed that Parliamentary powers should be obtained to run a trackless trolley along the new Rivelin Valley Road and back to Manchester Road.

It is also worthy of note that the Corporation of Brighton has withdrawn all opposition in the House of Commons to the Brighton, Hove & District Railless Traction scheme, which has already been sanctioned by the House of Lords.

A. C. S.

# News of Electric Railways

## New Subways and Tunnels for Boston

By the provisions of an act just passed by the Legislature of Massachusetts and approved by the Governor, the Boston Transit Commission will construct three tunnels and subways as a further development of the city's transportation system. The present underground portion of Boston's transit facilities consists of a subway under Tremont Street and its approaches, which are leased from the city by the West End Street Railway; a tunnel under Washington Street, from near Oak Street to Haymarket Square, which is leased from the city by the Boston Elevated Railway, and the East Boston tunnel, extending from Court Street, in Boston, under the harbor to the waterfront at East Boston, and occupied by the Boston Elevated Railway, a toll charge of 1 cent being collected on each passenger for the maintenance of the tunnel. The new constructions will be (1) the Boylston Street subway, (2) the Dorchester tunnel, and (3) the East Boston tunnel extension.

The Boylston Street subway will contain two tracks, and will begin with an open cut near the junction of Commonwealth Avenue and Beacon Street and thence continue under Commonwealth Avenue, Charlesgate West, the Fenway, Charlesgate East, Newburg Street, Boylston Street, to near the junction of Boylston Street and Tremont Street, and under Tremont Street or Boston Common to the Park Street station of the present Tremont Street subway. Stations will be located at Massachusetts Avenue, Copley Square, Boylston and Tremont Streets and Park Street. The present Tremont Street tunnel may be enlarged to accommodate the two additional tracks from Boylston to Park Street. The total length of this subway will be 10,350 ft.

The Dorchester tunnel will be designed for two tracks, will connect with the tracks of the Cambridge connection under Boston Common and Tremont Street, and will run under Winter and Summer Streets to Dewey Square, and thence to the junction of Dorchester Avenue and Broadway, South Boston; thence by way of Dorchester Avenue to Andrew Square, Dorchester—a total distance of about two miles. The act provides for stations at the corner of Washington and Summer Streets, at South Station in Dewey Square, at Broadway and Dorchester Avenue, and at Andrew Square. There will be passageway connections with the present Tremont Street subway, with the Washington Street tunnel and the South Station. The present Park Street Station will be enlarged and altered to accommodate the increase in travel at that point.

The East Boston tunnel extension will begin at the present Court Street terminal, and be continued under Court Street, Tremont Row and Bowdoin Square, and under Cambridge Street to a suitable connection with the surface tracks near Lynde or North Russell Streets. There will be stations in Scollay Square and Bowdoin Square.

Under the provisions of the act the lease of the present Tremont Street subway to the West End Street Railway, which is to be consolidated with the Boston Elevated Railway, is extended to July 1, 1936. The lease of the present East Boston tunnel is extended to the same date, the rental from the expiration of the present lease—June 10, 1922—until July 1, 1936, to be 4½ per cent on the net cost of the tunnel.

The contract for the use of the present Washington Street tunnel is extended from the expiration of the present lease—Nov. 30, 1933—until July 1, 1936, on a 4½ per cent basis. The contract for the use of the Dorchester tunnel is also to be for a term ending July 1, 1936, at 4½ per cent. That for the use of the Cambridge connection is to be for a term ending July 1, 1936, the rental for twenty years from the opening of the tunnel to be 4¾ per cent on the net cost, and thereafter until 1936, 4½ per cent. The terms of lease of the East Boston extension will be the same. The Boston Elevated Railway will be the lessor of all the subways and tunnels.

The Transit Commission has instructed its engineers to begin laying out the new subway and tunnels, but before

entering upon the work of construction the City Council and Mayor and the Boston Elevated Railway must accept the law. This must be done within fifteen days after the stockholders of the West End Street Railway have voted on the question of whether that company will sell its property and franchises to the Boston Elevated Railway.

The estimated cost of constructing that part of the tunnel to Dorchester from the South Station to Andrew Square, a distance of 7800 ft., including the Broadway and Andrew Square stations, is set by the Transit Commission's engineers at about \$3,500,000. This is exclusive of land damages, and to this must be added the cost of the section between Park Street and South Station, which is through the heart of the business district of the city. The district tributary to this tunnel contains about 200,000 persons.

The estimated cost of the Boylston Street subway is \$4,700,000, apportioned as follows:

Cost of stations and enlarging existing stations—	
Park Street, lower level.....	\$500,000
Enlargement of present Park Street Station.....	100,000
New station, Boylston and Tremont, lower level.....	280,000
Enlargement of present Boylston and Tremont Street Station.....	180,000
Copley Square Station.....	200,000
Massachusetts Avenue Station.....	185,000
	\$1,445,000
*Cost of constructing 9,140 feet of subway outside station limits, including land damages.....	\$3,255,000
	\$4,700,000
Reduction if subway is located west of Tremont Street subway on same level.....	\$400,000

\*Of the total length of route—10,350 ft.—1,210 ft. are included within limits of stations and 9,140 ft. are outside station limits.

It is estimated that the Boylston Street subway could be completed in two to two and a half years after the beginning of work, provided no legal difficulties are encountered. The district tributary comprises about 30 square miles and includes Brookline, Newton, Watertown and Waltham, as well as the Back Bay, Allston and Brighton districts of Boston. The population to be served is about 210,000.

The Boylston Street route was substituted for the proposed Riverbank subway, which was determined upon by Legislative enactment in 1907. It was estimated that this subway would cost \$3,700,000. The Boylston Street route is practically parallel with the Riverbank route, but is for its greater part several blocks distant from the waterfront of the Charles River Basin, which the Riverbank subway was designed to follow closely. The route now adopted is generally agreeable to the public, the officials and legislators, and is considered more nearly to serve the interests of the city, both present and prospective.

## Toledo Franchise Negotiations

The City Council of Toledo, Ohio, at a meeting on the evening of July 26, 1911, took action to require the Toledo Railways & Light Company to decide between the payment of a rental of \$250 per day for the use of the streets where its franchises have expired, operate these lines at a fare of 3 cents, or remove its tracks from the streets. An ordinance providing for the rental was enacted and City Solicitor Cornell Schreiber was instructed to prepare another ordinance providing for an extension of franchise on those lines on a 3-cent fare basis to a period equal to the life of the longest unexpired franchise. He was further instructed to prepare an ordinance to authorize injunction proceedings in case the company refused to pay the rental.

M. B. Severance, city accountant, had completed a report on the earnings of the lines on which franchises have expired and the amount of rental asked was based upon his figures, which indicate that the daily rental on the basis of earnings of 19 cents per car mile would be \$351.73; of 20 cents per car mile, \$294.70, and 21 cents per car mile, \$237.72. He estimates the company's earnings at 23 cents per car mile. It will be seen that the amount decided upon is in the nature of an average. Mr. Severance's report also indicated that the yearly increase in business of the com-

pany had been 5.79 per cent for some time. He reported the gross passenger receipts for 1909 to be \$1,556,260; for 1910, \$1,646,368, and estimated the receipts for 1911 at \$1,741,693.04.

On July 24, 1911, the company sent a check for \$9,837.15 to the city treasurer in full payment, with interest, of the 1 per cent claimed by the city to be due on the receipts from the old Robison lines. Mr. Schreiber proposed to ask Council to cause the forfeiture of the franchise on these lines because this money had not been paid. In discussing the franchise question in a letter to the committee of the whole of the Council, on July 24, 1911, Mr. Schreiber said in part:

"I have made a very careful examination of the decision in the Detroit franchise matter, and although that case was decided by one of the lower courts of Michigan, I have determined, so far as possible, to rely upon the correctness of the law as laid down in the Detroit case. It would be a proper procedure with reference to the already expired lines, for the Council to pass an ordinance calling upon the company to pay a sort of rental for the use of the streets which the company is occupying without franchises, or, rather, on which the franchises have expired.

"If the decision in the Detroit case is correct the company is a mere trespasser on the streets on which the franchises have expired. In other words, the company in order to operate its cars on those streets on which franchises have expired must comply with the terms which the city fixes or get off the streets.

"So I would suggest that an ordinance be passed requiring the Toledo Railways & Light Company to pay Toledo (if the company desires to operate its cars on the streets whereon the franchises have expired) the sum of \$150 per day, beginning Nov. 10, 1910, and that this ordinance allow the company to operate on those lines only from day to day and that the permission granted be revocable at the will of Council. In case the company refuses to pay this rental that then the city solicitor be authorized to begin a suit, praying for relief in the alternative requiring the company either to pay the rental or abandon the streets."

A statement of the earnings of the company for June, 1911, and the first six months of 1911, follow:

	June, 1911.	Six Months End'g June 31
Gross receipts .....	\$240,066.62	\$1,539,472.69
Operating expenses .....	144,708.85	966,556.51
Net earnings .....	\$95,557.77	\$572,915.18
Miscellaneous income .....	432.25	4,630.36
Gross income .....	\$95,790.02	\$577,545.54
Deductions .....	79,008.13	475,329.06
Surplus .....	\$16,781.89	\$102,216.48

In a long letter, dated July 25, 1911, addressed to Mayor Whitlock, Albion E. Lang, president of the Toledo Railways & Light Company, reviewed the franchise negotiations and explained why the company has refused to accept Judge J. M. Killits as umpire in the valuation of the property. The letter is concluded by Mr. Lang as follows:

"In nearly all the communications we have sent to you we have urged the making of a valuation on the theory that a valuation was necessary in settling the franchise matter, and have several times expressed our ideas of how it should be undertaken, and the kind of persons who should be employed for that purpose, knowing what such appraisers would be called upon to do.

"We believe that Judge Killits, not being an engineer, nor experienced in work of this kind, is not the proper person to undertake it, and this statement cannot be construed in any manner as a reflection upon his professional and judicial ability, nor his character as a man. I yield to none in my regard for him as the possessor of all of these qualifications.

"You now say to the public, 'They have 3-cent fares in Cleveland, and we will have them in Toledo if we can be firm enough,' etc., and that there is no way in which the question 'can be settled immediately unless the company be allowed to fix the valuation to suit itself and be allowed to draw the ordinance to suit itself.'

"The consideration of the franchise subject in Cleveland was prolonged for years, and was made the issue in several political campaigns, and for these reasons, taken in

connection with the effort of the Mayor of that city to bring about municipal ownership and operation through the formation of a so-called Municipal Traction Company, owned by himself and friends, what was the result? The street railways there, owned largely by citizens of Cleveland, giving good service and helping to develop the resources of the city, were forced into the hands of receivers, and their owners obliged to accept a loss of several millions of dollars in the value of their property to effect a settlement and save the property from utter ruin. The adjustment of the matter there was based on a sliding scale of fares by which the car riders paid increased rates as expenses increased, and reduced rates as expenses diminished—the person wanting a transfer paying more than those who did not. The scale of fares under this arrangement has twice changed since its inception, and for the past few weeks has been on the basis of 3 cents straight, but the company claimed that the rate was unfair when it was instituted, and under it suffered a loss of over \$60,000 in operating and maintenance accounts last month.

"In the meantime the citizens of Cleveland are complaining bitterly about the street railway service. Besides no new tracks are being built to meet the city's growth and necessities. The whole subject is still immersed in politics, and no real settlement of the street railway problem in Cleveland is in sight. Do we want that kind of an adjustment of the franchise question here, and would it make for the growth and development of the city? If we proceed to a valuation of our street railway conditions it matters little what burdens are imposed by an ordinance, provided there is no maximum fare, and proper provision is made to safeguard the capital invested and to be invested, but if the company assumes all of the risk of changing conditions, the burdens of an ordinance become quite material as well as the rates of fare.

"Under existing contracts our roads have been developed until lately in advance of increasing population, the rides of our patrons extended from about three miles to about twelve miles at the same price, and reduced rates have been voluntarily granted by the company to those who would buy tickets. It therefore appears that our company has demonstrated both enterprise and liberality under contracts heretofore made, and there is not much well grounded fear that all of this will be ignored in the future if new contracts are made following the lines of the old, and such as exist generally in American cities. It is for the citizens of Toledo to determine which course to pursue. I contend that whichever course is taken, it is of the utmost importance to select the one that will produce the best service and develop the property as the growth of the city requires. I believe this to be the desire of the mass of our citizens, hence my energies will be directed accordingly."

#### Chicago Subway Board

Brief mention was made in the *ELECTRIC RAILWAY JOURNAL* of July 29, 1911, page 199, of the appointment by Mayor Harrison of Chicago of John Ericson, E. C. Shankland and James J. Reynolds as an advisory board of engineers to recommend a plan for a passenger subway in Chicago as soon as practicable. Mr. Shankland is considered an expert on the foundations in Chicago. He is a member of the firm of E. C. and R. M. Shankland, and he has been a designing engineer, directing the steel construction and foundation work of large buildings since 1889. He built the Masonic Temple, the Ashland Block, the Great Northern Hotel, and a number of the other Chicago skyscrapers.

Mr. Reynolds has been engaged in railroad work since 1884. He was chief engineer of the Calumet Terminal Railway and completed the construction of that line, was chief engineer of the Chicago Elevated Terminal Railway and several other railroads, his last large task being that done for the Lake Shore & Michigan Central Railroad in its construction work in and near Gary, Ind.

John Ericson has been city engineer of Chicago since 1897. In that capacity he has had charge of the city's water works, bridge and harbor construction. It was under his direction that the former municipal subway bureau compiled its invaluable statistics, containing in great detail the location of public utility pipes and conduits.

In making the appointments the Mayor said: "Among

the first questions to be considered are the space to be given the subway and the depth of the subway below the street level. I personally believe in a narrow subway kept between the curb lines, and as high as possible.

"I think that the city should be grateful to receive the services of the three men who have accepted places on the commission. No man knows more than Mr. Shankland of the nature of Chicago's subsoil and its building foundations. Mr. Ericson knows more than any other man about the public utilities, and Mr. Reynolds is an operating man thoroughly competent to handle the transportation phases of the problem.

"Mr. Arnold was considered along with other engineers, but I did not appoint him because I am opposed to his idea of a double-deck subway built under the entire street. I think a subway from building line to building line, as the Arnold plans propose, would be a dangerous thing, and this was one of the first objections I made to his plans when I heard them explained at a meeting of the local transportation committee. However, I am not an engineer, and it is up to the commission to decide that and every other question."

The commission held its first session on July 28, 1911. Mr. Ericson said:

"Naturally, it is impossible at this time to estimate even approximately the length of time required before the work of the commission can be completed. Aside from the subway problem itself there are many other municipal and public utility problems which must be considered and provided for. It involves, for one thing, a new system of sewers, a problem which would have to be met, anyway, in the near future. Also there is the matter of a high-pressure water system in the downtown district, which cannot be properly passed upon except in connection with the subway plans.

"We are setting out on this work with free and open minds, ready to give honest consideration to every phase of the problem and open to conviction on all points. Out of the great amount of data already in existence we shall endeavor to utilize the best and reject the worthless. We shall proceed along scientific, practical lines, confident that when the plans are submitted they will meet with the full approval of the city and the other interests concerned."

#### Work Begun on Lexington Avenue Subway, New York

Work on the new Lexington Avenue subway was formally begun on the morning of July 31, 1911, when Chairman Willcox, of the Public Service Commission, dug out a spadeful of dirt from the pavement near the corner of Sixty-seventh Street and Lexington Avenue. The Bradley Contracting Company, which has the contract for the section in question, is required to finish the task in forty-eight months. The section of the subway on which work started extends from Fifty-third Street to Sixty-seventh Street. The other sections the Bradley Company is to construct extend from Twenty-sixth Street to Fortieth Street, from Seventy-ninth Street to Ninety-third Street and from Ninety-third Street to 106th Street. An effort had been made to obtain an injunction to restrain the Bradley Company from starting the construction work, but Justice Giegerich issued a writ, returnable on Aug. 6, 1911, requiring the company to show cause why a restraining writ should not issue.

The Public Service Commission has approved forms of certificates for the third-tracking of the elevated lines of the Interborough Rapid Transit Company in Manhattan and for building extensions in the Bronx. As soon as printed they will be signed and sent to the Interborough Rapid Transit Company. One extension is to be a three-track elevated road from a connection with the Third Avenue line at or near Pelham Avenue, crossing above the right-of-way of the New York & Harlem Railroad Company to Webster Avenue, along Gun Hill Road to White Plains Road and to 241st Street. Another extension is to be from the Ninth Avenue elevated line, from 157th Street and Eighth Avenue, crossing the Harlem River on the Putnam Bridge, with a tunnel through Highbridge Hill, and along 162d Street to River Avenue; along River Avenue and Jerome Avenue to Woodlawn Cemetery. Provision is also made for a two-track elevated road, known as the

Queensboro Bridge line, to connect the Second Avenue elevated between Fifty-eighth and Sixtieth Streets with the bridge and crossing to Jackson Avenue, in Queens. The third-tracking privilege is to apply to the entire length of the Second Avenue line from Chatham Square to the Harlem River, with a fourth track also north of the 125th Street station, and also from Fifty-third Street to Sixtieth Street and on the connection with the Queensboro Bridge. The Third Avenue line is to have four tracks from City Hall to Chatham Square.

The Public Service Commission has since signed the certificates for the improvements to the elevated lines. Before work can be begun the company must secure the consent of the Board of Estimate and Mayor.

#### Increase in Tax Values in Ohio

The increases in the announced tentative valuations fixed upon electric railways by the Ohio State Tax Commission range from 300 per cent to 1000 per cent. Many railway officials have already appeared before the commission to protest against the figures.

The Toledo Railways & Light Company is a conspicuous example of the values fixed by the commission. In this case the value of the property is placed at \$14,232,000, which represents an increase of about 1000 per cent. The taxes of the company would be \$300,000 annually, or about one-third of the net earnings. Attorney Barton Smith, Auditor H. S. Swift and E. R. Effler argued against the figures before the commission on July 28, 1911. Mr. Smith read an article from the *Toledo Blade*, telling about the action of the City Council in fixing a rental of \$250 per day for the use of the streets where the franchises have expired, thus necessitating the payment of \$69,000 since Nov. 11, 1910. A statement of the earnings, expenses and interest paid by the Toledo Railways & Light Company for the past three years follows:

Earnings—1908, \$2,542,111.38; 1909, \$2,733,177.58; 1910, \$2,985,382.49; 1911, six months, \$1,544,103.05. Total, \$9,804,774.50.

Paid out in operation, maintenance and taxes—1908, \$1,856,449.49; 1909, \$2,286,449.49; 1910, \$2,399,772.49; 1911, \$1,163,710.77 (six months). Total, \$7,696,135.

Interest paid—1908, \$476,608.30; 1909, \$578,822.80; 1910, \$512,182.53; 1911, \$203,940.67 (six months). Total, \$1,671,554.30.

On July 26, 1911, Bion J. Arnold, representing the electric railway companies centering in Cleveland advised the commission that its tentative valuations were too high. Mr. Arnold said that electric railways could not be valued upon the same basis as steam roads. The life of electric railways averaged only about twenty years, and the companies depended upon franchise rights of various kinds which had to be frequently renewed at a loss.

Following are some of the tentative figures given out by the commission. In some cases the increases are shown, while in others merely the new value is given: Western Ohio Railroad, from \$459,663 to \$2,000,000; Cleveland, Southwestern & Columbus Railway, from \$975,026 to \$5,006,800; Cleveland & Eastern Railway, new valuation, \$1,122,000; Cleveland, Youngstown & Eastern Railway, from \$147,414 to \$517,900; Cleveland, Painesville & Ashtabula, from \$137,853 to \$632,000; Cleveland, Painesville & Eastern Railroad, from \$267,175 to \$2,058,400; Northern Ohio Traction & Light Company, from \$1,594,337 to \$11,272,100; Lake Shore Electric Railway, from \$922,504 to \$5,300,400; Lorain Street Railway, from \$167,295 to \$823,400; Sandusky, Fremont & Southern Railway, from \$54,485 to \$491,350; Columbus Railway & Light Company, from \$2,761,540 to \$8,563,612; East Liverpool Railway & Light Company, new valuation, \$1,143,800; East Liverpool Traction & Light Company, new valuation, \$2,000,000; Midland Power & Traction Company, Cambridge, new valuation, \$200,000; Dayton, Covington & Piqua Traction Company, new valuation, \$500,000; Toledo Railways & Light Company, from \$2,042,900 to \$14,232,000; Cincinnati Traction Company, from \$2,883,000 to \$15,200,000; Ohio Electric Railway, from \$2,899,375 to \$15,000,000; Toledo, Fostoria & Findlay, from \$162,771 to \$794,200; Ohio River Electric & Power Company, from \$39,407 to \$175,000; Springfield, Troy & Piqua Traction Company, from \$115,710 to \$400,000; Portsmouth Railway & Light Company, from \$262,746 to \$700,000.

Charles Francis Adams on Commission Regulation

The Boston Transcript recently published the following letter addressed to John H. Carter, Boston, Mass., by Charles Francis Adams, one of the original members of the Railroad Commission of Massachusetts and for a number of years chairman of the commission:

"Without going into details, I can say that this proposed measure in no way commends itself to my judgment. I think, on the contrary, if passed and put in force, it would have a tendency to destroy the usefulness of the commission.

"The Massachusetts Railroad Commission was established forty-three years ago, on the principle of having no power, and acting only through the force of reason and public opinion. That its work, up to this time, has been unsatisfactory, I think can hardly with truth be said. On the contrary, it has generally been considered as the most efficient commission in the country.

"In conformity with the tendency of modern thought, which recognizes no force in existence except the constable's staff, supported by the bayonet of the soldier, and regards appeal to reason as an archaic proposition, the inclosed bill proposes to substitute for intelligence and reason the physical forces of the Commonwealth.

"I do not believe in it. However, I am, personally, a back number. Belonging to a generation which has now passed from the stage, I can only look with some amazement, not unmixed with amusement, at the tendency to reaction now going on. In former days recourse was had to enlightened public opinion as sure in the end to produce all necessary and desirable results. Now this is relegated to the museum of antiquities, and here, as two hundred years ago in Europe, the constable and the posse are called into play on every possible occasion. The 'big stick' is very generally substituted for argument addressed to intelligence.

"It is on this principle and conviction that the bill to which you have called my notice is based."

**Accident at Riverton, Ill.**—On July 22 the casing of one of the steam turbines at the power station of the Illinois Traction System at Riverton, Ill., burst, causing some damage to the plant and killing two men.

**Report on Los Angeles Traffic.**—It is stated that the principal recommendation of the report of Bion J. Arnold on transit conditions in Los Angeles, which will be made public very soon, will favor the construction of a four-track electric railway from the business center of Los Angeles to the harbor at San Pedro, the road to run underground through the congested district in Los Angeles.

**Municipal Ownership in Winnipeg.**—The announcements in connection with the proposed sale of the property of the Winnipeg (Man.) Electric Railway to the city which have been published in the daily press and credited to the Mayor of Winnipeg are misleading. The City Council of Winnipeg has, however, decided that if an audit of the books of the company shows sufficient earnings power an ordinance will be passed to submit to the voters the question of buying the company's stock at \$250 a share, the asking price. If the purchase is made the city will have to raise \$15,000,000 to pay for the \$6,000,000 of stock and will also have to assume the indebtedness of the company, which amounts to \$7,500,000.

**Inspection of Stone & Webster Properties.**—A party of nineteen guests of Stone & Webster has returned from a three weeks' tour of inspection of the Stone & Webster properties on Puget Sound. Among the members of the party were: Reginald Bradlee, of Chandler Hovey & Company, Boston; J. P. Bradshaw, of Clark, Dodge & Company, New York; Thomas B. Gannett, Jr., of Parkinson & Burr, Boston; Edgar Rust, of Parkinson & Burr, Boston; N. P. Halliwell, Jr., and F. L. Higginson, Jr., of Lee, Higginson & Company; Thomas Motley, of Curtis & Sanger; F. Foster Sherburne, of Estabrook & Company; Isaac Sprague, of N. W. Harris & Company; Samuel H. Wolcott, of Brown Brothers & Company. Representing Stone & Webster were: John W. Halliwell, George Higginson, Jr., Henry R. Hayes, Charles Sprague, Philip L. Warren, George O. Muhlfield, and Charles E. Mayer.

# Financial and Corporate

## New York Stock and Money Markets

Aug. 2, 1911.

Weakness developed throughout the entire list in to-day's trading and declines of several points took place in the majority of active issues. Breaks in American Tobacco and Standard Oil shares led the decline. The government's report on cotton was made public and indicated a record yield. Next Wednesday the Government's crop report is due. Preparations for financing the harvests have caused a slight tightening in the rates of the money market. Quotations to-day were: Call, 2¼@2¾ per cent; ninety days, 2½@3 per cent.

### Other Markets

Chicago Railways have been the feature of the Chicago Exchange in the past few days. Prices have advanced and in to-day's market further gains were made in both Series 1 and 2. The tone of the Chicago money market is becoming stronger.

Public utilities have dominated the Philadelphia market during the week, and trading has been active in Rapid Transit and Union Traction. Philadelphia Rapid Transit, in particular, has displayed marked firmness.

To-day's market in Baltimore was quiet and price changes only fractional.

The Boston market continues steady, but trading is light with transactions not much in evidence.

Quotations of traction and manufacturing securities as compared with last week follow:

	July 26.	Aug. 5.
American Light & Traction Company (common).....	a305	a304
American Light & Traction Company (preferred)....	a107	a106
American Railways Company.....	a44¼	44½
Aurora, Elgin & Chicago Railroad (common).....	a44½	*44½
Aurora, Elgin & Chicago Railroad (preferred).....	a87	*87
Boston Elevated Railway.....	a129½	a131½
Boston Suburban Electric Companies (common).....	a15	a15
Boston Suburban Electric Companies (preferred)....	75	75
Boston & Worcester Electric Companies (common)....	*12½	a13
Boston & Worcester Electric Companies (preferred)..	a56	a56
Brooklyn Rapid Transit Company.....	82½	a80½
Brooklyn Rapid Transit Company, 1st ref. conv. 4s..	86¾	*86¾
Capital Traction Company, Washington.....	a132	a132¾
Chicago City Railway.....	a190	a190
Chicago & Oak Park Elevated Railroad (common)....	3	*3
Chicago & Oak Park Elevated Railroad (preferred)..	5	*5
Chicago Railways, pteptg., ctf. 1.....	a95	a101
Chicago Railways, pteptg., ctf. 2.....	a28¼	a33¾
Chicago Railways, pteptg., ctf. 3.....	a94	a13
Chicago Railways, pteptg., ctf. 4.....	a6	a7½
Cincinnati Street Railway.....	a130¼	a130
Cleveland Railway.....	99½	*99½
Columbus Railway (common).....	81½	81½
Columbus Railway (preferred).....	a100	a100
Consolidated Traction of New Jersey.....	a76	a76
Consolidated Traction of N. J., 5 per cent bonds....	a105	a105
Dayton Street Railway (common).....	a25	a25
Dayton Street Railway (preferred).....	a100	a101
Detroit United Railway.....	a76	a72½
General Electric Company.....	163½	162
Georgia Railway & Electric Company (common).....	a156	154
Georgia Railway & Electric Company (preferred)....	a95	92
Interborough Metropolitan Company (common).....	18	17½
Interborough Metropolitan Company (preferred)....	51¼	49½
Interborough Metropolitan Company (4½s).....	79½	*79½
Kansas City Railway & Light Company (common)....	a19	a19
Kansas City Railway & Light Company (preferred)..	a44	*44
Manhattan Railway.....	a143	*143
Massachusetts Electric Companies (common).....	a22¾	a22¾
Massachusetts Electric Companies (preferred).....	a93½	a92¾
Metropolitan West Side, Chicago (common).....	*27½	*27½
Metropolitan West Side, Chicago (preferred).....	*75	*75
Metropolitan Street Railway, New York.....	15	15
Milwaukee Electric Railway & Light (preferred)....	*110	*110
North American Company.....	a74¾	74½
Northern Ohio Light & Traction Company.....	a51	50½
Northwestern Elevated Railroad (common).....	*30	*30
Northwestern Elevated Railroad (preferred).....	*70	*70
Philadelphia Company, Pittsburgh (common).....	a54¼	55
Philadelphia Company, Pittsburgh (preferred).....	a44¾	44½
Philadelphia Rapid Transit Company.....	a22¾	23½
Philadelphia Traction Company.....	a86½	86
Public Service Corporation, 5% col. notes (1913)..	*101	a94
Public Service Corporation, cts.....	a107	a107
Seattle Electric Company (common).....	a110¾	a110¾
Seattle Electric Company (preferred).....	103	103
South Side Elevated Railroad (Chicago).....	*76½	*76½
Third Avenue Railroad, New York.....	*11	*11
Toledo Railways & Light Company.....	*7½	6½
Twin City Rapid Transit, Minneapolis (common)....	109	107½
Union Traction Company, Philadelphia.....	a52¼	52
United Rys. & Electric Company*, Baltimore.....	a197½	18
United Rys. Inv. Co. (common).....	a38½	*38½
United Rys. Inv. Co. (preferred).....	69	*69
Washington Ry. & Electric Company (common)....	*42½	a45
Washington Ry. & Electric Company (preferred)....	*89½	a92
West End Street Railway, Boston (common).....	88½	89
West End Street Railway, Boston (preferred).....	a103	a103
Westinghouse Elec. & Mfg. Co.....	75	73
Westinghouse Elec. & Mfg. Co. (1st pref.).....	a120	118¾

a Asked. \*Last sale.

**Organization of American Cities Company Completed**

The American Cities Company was organized permanently in New Orleans on July 25, 1911, to take over the American Cities Railway & Light Company and the New Orleans Railway & Light Company, and now controls the street railway and lighting systems of New Orleans, Birmingham, Knoxville and Little Rock, the electric railway systems in Memphis and the electric lighting companies in Houston. Its capitalization is \$10,000,000 in collateral trust bonds, \$21,810,083 preferred stock and \$16,643,416 common. The officers are: George H. Davis, of Ford, Bacon & Davis, president; George Bullock, of New York, and W. von Phul, of New Orleans, vice-presidents; M. McGrath, secretary; R. E. Slade, manager of the New Orleans Railway & Light Company, treasurer and assistant secretary; Ira Lockwood, assistant treasurer and assistant secretary; Charles K. Beekman, general counsel. The board of directors is as follows: George W. Bacon, of Ford, Bacon & Davis, New York; George Bullock, president Susquehanna Railway, Light & Power Company, New York; S. R. Bertron, member of Bertron, Griscom & Jenks, New York; E. H. Bright, member of T. & B. Beer, New Orleans; Harry Bronner, member of Halgarten & Company, New York; William B. Bonbright, of William B. Bonbright & Company, New York and London; Lynn H. Dinkins, president Interstate Trust & Banking Company, New Orleans; Marshall J. Dodge, member of Bertron, Griscom & Jenks, New York; George H. Davis, of Ford, Bacon & Davis, New Orleans; C. P. Ellis, cotton broker and banker, New Orleans; C. L. Edwards, of A. G. Edwards & Company, bankers, St. Louis; Oscar L. Gubelman, of Knauth, Nachod & Kuhne, New York; John J. Gannon, president Hibernia Bank & Trust Company, New Orleans; R. M. Gannon; Charles Godhauz, president Whitney-Central Trust & Savings Bank, New Orleans; Frank B. Hayne, cotton merchant, New Orleans; A. J. Hemphill, president Guaranty Trust Company, New York; C. J. Hardy; Charles Janvier, vice-president Canal-Louisiana Bank & Trust Company, New Orleans; Emil Loeb, capitalist, Birmingham and New York; Fernand Lepyre, capitalist and stock broker, New Orleans; S. Z. Mitchell, president Electric Bond & Share Company, New York; J. K. Newman, of Isidore Newman & Son, New Orleans; Maurice Stern, of Lehman, Stern & Company, New Orleans; L. K. Thompson, vice-president Bank of Commerce & Trust Company, Memphis, Tenn.; William von Phul, of Ford, Bacon & Davis, New Orleans; R. M. Walmsley, president Canal-Louisiana Bank & Trust Company, New Orleans; F. B. Williams, vice-president Whitney-Central National Bank, New Orleans; A. H. Wiggin, president Chase National Bank, New York. The Whitney-Central Trust & Savings Bank, of New Orleans, was appointed transfer agent, and the Hibernia Bank & Trust Company, of New Orleans, registrar.

**Bangor Railway & Electric Company, Bangor, Maine.—**

John R. Graham, president of the Bangor Railway & Electric Company and of the Lewiston, Augusta & Waterville Railway, has bought the property of the Bodwell Water Power Company at Old Town and Milford, on the Penobscot River, 12 miles above Bangor. The property includes a dam across the Penobscot and Stillwater Rivers more than 2000 ft. long, and a power house on the Milford side built entirely of concrete.

**Boston (Mass.) Elevated Railway.—**The directors of the Boston Elevated Railway have voted unanimously to recommend that stockholders of the company vote in favor of purchasing the property and franchises of the West End Street Railway as provided in Chapter 740 of the Acts of 1911. A special meeting of the stockholders of the Boston Elevated Railway has been called for Aug. 24, 1911, to vote on the question. The stockholders of the West End Street Railway will vote on the question on Sept. 15, 1911.

**Brooklyn (N. Y.) Rapid Transit Company.—**The Public Service Commission of the First District of New York has authorized the Nassau Electric Railroad, one of the constituent companies in the Brooklyn Rapid Transit System, to issue \$52,000 of 4 per cent bonds under the first consolidated mortgage dated June 30, 1898, to refund an equal amount of 5 per cent bonds of the Brooklyn, Bath & West

End Railroad under the second mortgage which matured June 1, 1911.

**Central Pennsylvania Traction Company, Harrisburg, Pa.—**A gain of almost 8 per cent in the gross income of the Central Pennsylvania Traction Company for the fiscal year ended July 15, 1911, was shown in the annual report submitted to the meeting of stockholders on July 25. F. B. Musser, president of the company, reported gross receipts at \$851,295, a gain of \$61,167, or 7.7 per cent, while operating expenses were \$361,135.13, leaving net earnings of \$490,159. Surplus earnings were \$249,213; taxes, interest on bonds and rentals totaling \$240,946. From the surplus earnings \$98,235 was deducted for repairs, betterments and depreciation, leaving a net surplus of \$150,978. Out of this latter amount these dividends were paid: 2 per cent on Oct. 1, 1910; 3 per cent on April 1, 1911; total, \$105,000, leaving a surplus of \$45,978.45. The percentage of operating expenses to gross receipts was 42½ per cent. The company's lines carried 20,576,732 passengers during the year, an increase of 1,242,658 over the preceding year, or 6.4 per cent. The company increased its trackage during the year from 71.29 miles to 72.10 miles, and is now building an extension from Second and Seneca Streets to Lewis Street, Riverside. The company has 119 cars in service. The total number of car miles operated during the year which ended June 30, 1911, was 3,311,244, an increase of 6 per cent over the preceding year. It is expected that the new 1600-kw, direct-connected steam engine and generator will be in operation at the main power plant about Dec. 1, 1911. These directors were elected for three years to succeed those whose terms expired: Edward Bailey, Harris Cohen, S. F. Dunkle, Henry A. Kelker and B. F. Meyles.

**Chicago (Ill.) City Railway.—**The Chicago City Railway has sold an additional block of its 5 per cent first mortgage bonds, bringing the total amount now outstanding up to \$23,800,000.

**Chicago (Ill.) Railways.—**Marshall Sampson, the remaining receiver of the Union Traction Company, has been discharged by Judge Peter S. Grosscup, of the Circuit Court of the United States, at Chicago. Mr. Sampson has been the sole receiver of the Union Traction Company since the sale of the property of the company to the Chicago Railways, in 1908. The receivership was granted in April, 1903, on the petition of the Guaranty Trust Company, New York, N. Y.

**Chicago & Milwaukee Electric Railroad, Chicago, Ill.—**Judge Peter S. Grosscup, of the Circuit Court of the United States at Chicago, holds that the bonds issued under the mortgage of the Wisconsin division of the road are valid. The decision is expected to facilitate the reorganization of the property.

**Citizens' Railway & Light Company, Ft. Worth, Tex.—**Judge Buck, of the District Court at Ft. Worth, has confirmed the sale of the railway property of the Citizens' Railway & Light Company under foreclosure to G. H. Clifford, general manager of the Northern Texas Traction Company, representing Stone & Webster, Boston, Mass.

**Columbia Railway, Gas & Electric Company, Columbia, S. C.—**E. H. Rollins & Sons, Boston, Mass., and New York, N. Y., and Redmond & Company, New York, N. Y., offer for sale the unsold balance of an issue of \$2,454,000 of Columbia Railway, Gas & Electric Company first mortgage 5 per cent sinking fund gold bonds, due July 1, 1936. The bonds are secured by a first lien upon the entire property, which comprises all the public utility enterprises in Columbia. The only exception to the first lien is upon a portion of the property where \$200,000 prior liens exist. The company's franchises are either unlimited or extend beyond the maturity of the bonds. The net income for the twelve months ended May 31, 1911, was equal to considerably more than the interest charges, the company earning dividends at the rate of 6 per cent on its preferred and about 5 per cent on its common stock. The bonds are offered at 94 and interest, paying about 5.50 per cent.

**Columbus Railway & Light Company, Columbus, Ohio.—**The committee of stockholders of the Columbus Railway, appointed to consider whether the capital stock of the company should be increased by \$3,000,000, has employed Ernst & Ernst, Cleveland, Ohio, to audit the books and accounts

of the Columbus Railway and the Columbus Railway & Light Company for the eight years since the holding company was formed and report upon the relations between the companies.

**Georgia Railway & Electric Company, Atlanta, Ga.**—The Railroad Commission of Georgia has authorized the Georgia Railway & Electric Company to issue \$760,000 of bonds on account of recent extensions and improvements costing \$1,026,000.

**Louisville (Ky.) Railway.**—The Louisville Railway has disposed of \$750,000 of 5 per cent general mortgage bonds, the proceeds of which will be used to make improvements.

**Manhattan Bridge Three-Cent Line, New York, N. Y.**—The Public Service Commission of the First District of New York has authorized the Manhattan Bridge Three-Cent Line to issue \$50,000 of bonds. The company has secured a certificate of public convenience and necessity for an electric railway from West Street, Manhattan, to the Flatbush Avenue station of the Long Island Railroad, Brooklyn.

**Metropolitan Street Railway, New York, N. Y.**—Judge Lacombe, of the United States Circuit Court, has denied the motion of Arthur H. Masten, acting for Adrian H. Joline and Douglas Robinson, receivers of the Metropolitan Street Railway, to file an amended petition and claim against William W. Ladd as receiver of the New York City Railway. The original petition was filed in February, 1910, and covered an alleged breach of agreement between the two companies. The receivers of the Metropolitan Street Railway asked to have the amount of \$1,251,741 stricken from the papers. The reason for this, according to the receivers, was that that sum represented material, labor and service supplied by the New York City Railway to the Metropolitan Street Railway and should not be in the papers. The receivers also asked to have the total claim of \$4,964,800 changed to \$4,729,516. Judge Lacombe, in denying the motion, said that the appeal was unnecessary, because there was an apparent discrepancy between the proofs and the averments as to the amount of the balance due. He added that the court always had the power to conform pleadings and proof.

**New York, Westchester & Boston Railway, New York, N. Y.**—On July 27, 1911, the Public Service Commission of the Second District of New York authorized an issue of \$60,000,000 of thirty-five-year first mortgage gold bonds by the New York, Westchester & Boston Railway to mature July 1, 1946, with interest at not more than 5 per cent, and to issue \$20,100,000 of the bonds, \$17,200,000 at once to cover 67 per cent of the cost of property to the New York, New Haven & Hartford Railroad, and \$2,800,000 later for proposed additions. J. P. Morgan & Company later announced that they had sold for the account of the New York, New Haven & Hartford Railroad to Kissel, Kinnicutt & Company and Harris, Forbes & Company, New York, N. Y., all of the authorized issue. On July 31, 1911, Kissel, Kinnicutt & Company and Harris, Forbes & Company offered the bonds for subscription at 96¼ and interest, to yield more than 4.70 per cent. The purposes to which the present issue will be put follow: To refund at par all New York, Westchester & Boston Railway bonds secured by the mortgage of Oct. 1, 1904, \$16,200,000; to refund at par all of the bonds of the New York & Port Chester Railroad, dated June 1, 1907, \$100,000; to acquire real estate and construct the branch from Mount Vernon to White Plains as previously authorized by the commission, \$3,800,000. The previous authorization of the commission allowing the issue of \$5,000,000 of bonds under the mortgage of October, 1904, has been revoked.

**Philadelphia Company, Pittsburgh, Pa.**—Holders of the \$500,000 of the first-mortgage 6 per cent bonds of the Allegheny County Light Company, due on Aug. 1, 1911, have largely accepted the proposition to exchange the same, dollar for dollar, for the first mortgage and collateral trust 5 per cent bonds of the Philadelphia Company, with an adjustment of interest. Bonds not exchanged before Aug. 1, 1911, will be paid.

**Portland & Brunswick Street Railway, Freeport, Me.**—The Portland & Brunswick Street Railway was, on July 31, 1911, ordered sold under foreclosure at Brunswick, Me., on

Sept. 25, 1911. The sale was ordered by Associate Justice Albert M. Spear, of the Supreme Court of Maine, in accordance with a petition presented by the Augusta Trust Company, trustee of the mortgage securing \$500,000 of bonds. The total capital of the company amounts to \$597,087. The road is a link in the through electric railway route easterly from Portland, affording connection at Yarmouth with the Portland Railroad, and at Brunswick with the Lewiston, Augusta & Waterville Electric Railway. E. M. Thompson, Augusta, Me., has been appointed the master in chancery to investigate claims against the road and report to the court.

**Puebla Tramway, Light & Power Company, Pueblo, Mexico.**—The Puebla Tramway, Light & Power Company proposes to issue \$3,000,000 of 5 per cent prior lien bonds, with the right to increase the same when required to not exceeding \$6,000,000, in order to provide funds for the development of the Tuxpango Falls. The principal holders of the outstanding first mortgage bonds are reported to have assented to the suggestion, and negotiations to that end are said to be practically completed.

**Railway & Light Securities Company, Boston, Mass.**—The Railway & Light Securities Company has filed at Augusta, Maine, a certificate showing an increase in the authorized capital stock of the company from \$2,200,000 to \$3,200,000 by raising the limit of the issue of preferred stock from \$1,000,000 to \$2,000,000.

**Tampa & Sulphur Springs Traction Company, Tampa, Fla.**—P. O. Knight, Tampa, has been appointed receiver of the Tampa & Sulphur Springs Traction Company.

**Winona Railway & Light Company, Winona, Minn.**—The Old Colony Trust Company, Boston, Mass., trustee for the bondholders, has brought suit in Minnesota for the foreclosure of the \$500,000 mortgage of the Winona Railway & Light Company, interest on which is in default, and for the appointment of a receiver for the company.

#### Dividends

Boston & Northern Street Railway, Boston, Mass., 3 per cent, first preferred; 3 per cent, old preferred.

Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

Old Colony Street Railway, Boston, Mass., 3 per cent, preferred.

Toledo, Bowling Green & Southern Traction Company, Toledo, Ohio, quarterly, 1½ per cent, preferred.

#### MONTHLY ELECTRIC RAILWAY EARNINGS

BINGHAMTON RAILWAY COMPANY.					
Period.	Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
12m., June, '11	\$349,186	\$200,254	\$148,933	\$108,428	\$40,505
12 " " '10	372,211	212,527	159,684	110,781	48,904
CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY.					
1m., June, '11	\$100,243	\$54,879	\$45,364	\$30,181	\$15,183
1 " " '10	92,050	50,606	41,443	29,794	11,649
6 " " '11	524,270	302,231	222,040	180,276	41,763
6 " " '10	478,331	289,364	188,968	178,764	10,205
DETROIT UNITED RAILWAY.					
1m., June, '11	\$893,250	\$563,512	\$346,216	\$177,179	\$169,037
1 " " '10	831,472	512,996	330,912	168,530	162,382
6 " " '11	4,768,049	3,026,290	1,827,210	1,057,278	769,932
6 " " '10	4,344,067	2,770,785	1,647,351	973,058	674,293
FAIRMONT & CLARKSBURG TRACTION COMPANY.					
1m., June, '11	\$64,512	\$23,066	\$41,446	\$17,021	\$24,425
1 " " '10	51,057	18,078	32,979	12,611	20,368
6 " " '11	336,325	117,668	218,657	95,064	123,593
6 " " '10	269,776	100,866	168,909	75,295	93,614
MINNEAPOLIS & ST. PAUL SUBURBAN RAILWAY.					
1m., June, '11	\$681,503	\$326,349	\$355,154	\$140,079	\$215,074
1 " " '10	650,605	301,678	348,927	140,112	208,815
6 " " '11	3,781,952	1,928,194	1,853,158	840,475	1,012,683
6 " " '10	3,582,248	1,748,128	1,834,126	841,142	992,978
MONTREAL STREET RAILWAY.					
1m., June, '11	\$432,027	\$227,218	\$204,809	\$63,996	\$140,813
1 " " '10	384,564	198,849	185,716	54,940	130,776
9 " " '11	3,438,940	2,015,139	1,423,801	403,886	1,019,915
9 " " '10	3,091,800	1,806,292	1,285,508	361,087	95,495
NORTHERN OHIO TRACTION & LIGHT COMPANY.					
1m., June, '11	\$245,097	\$134,983	\$110,115	\$44,334	\$65,781
1 " " '10	221,673	123,673	98,548	43,375	55,173
6 " " '11	1,222,676	697,023	525,653	266,107	259,546
6 " " '10	1,087,335	624,230	463,105	259,917	203,188
TOLEDO RAILWAYS & LIGHT COMPANY.					
1m., June, '11	\$240,499	\$144,709	\$95,790	\$79,008	\$16,782
6 " " '11	1,544,103	966,557	577,546	475,329	102,217

# Traffic and Transportation

## Ventilating the New York Subway

The following is an extract from an article in the current issue of the *Interborough Bulletin*, published by the Interborough Rapid Transit Company, New York, N. Y., telling what the company has done to improve atmospheric conditions in the subway in summer:

"It was, of course, anticipated that subway temperatures would be representative of the amount of energy dissipated in electrical train operation, but it was hardly expected that the problem would be so difficult to overcome.

"Experimental exhaust fans, having a capacity of 24,000 cu. ft. per minute, were installed for trial purposes at the Brooklyn Bridge, and the air throughout this portion of the subway replenished every hour. They failed, however, to reduce the temperature even one single degree.

"Ventilating louvers and numerous openings have been placed at frequent points along the subway route, thus providing for constantly circulating the air between the subway and street levels, but they have also failed to produce any perceptible effect.

"It has been suggested that if the tracks were divided by partitions the piston effect of moving trains would provide for a sufficient replenishment of air to produce the desired results. Physical limitations in the present subway construction with respect to clearance between the tracks prohibit this plan. Even if this were possible it is doubtful if any material reduction in temperature could be obtained because of the great quantity of electrical energy converted into heat owing to the movement of unprecedentedly large and heavy trains.

"Subways located below rivers or large bodies of water have been found, of course, to be cooler than subways designed to be immediately below the surface of city streets. The reason for this fact is that the moisture contained in the river bottoms is a rapid absorber of heat.

"Having failed to produce the results sought for in the many different experiments thus far conducted, relief was attempted through the medium of electric fans installed within cars. At the outset it was known, of course, that electrical fans have no effect in reducing temperatures, but the physical effect produced upon passengers, it was believed, would be greatly improved through increasing the rate of physical evaporation.

"Extensive experiments were conducted along this line to determine the type of fan most suitable and it was found that electrical ceiling fans were most satisfactory because the circulation of air thus provided covers the greatest area and is least objectionable to passengers compelled to stand immediately below the fans during rush hours.

"Test trains were equipped with these devices and observations demonstrated that the subway patrons unanimously approved of the electrical ceiling fans, whereupon it was decided to install the fans in subway cars. Orders were placed and the apparatus is being manufactured and installed as rapidly as possible and a considerable measure of relief will very soon be realized."

## Decision by I. C. C. on Commutation Fares

The Interstate Commerce Commission on July 31, 1911, ordered the Pennsylvania Railroad to make a general readjustment of its commutation rates in the New York commutation zone. The monthly rate of \$12 for sixty trips to New Brunswick, N. J., was ordered reduced to \$10. All other rates are to be rebuilt on this ratio. The commission also decided that the fifty-trip tickets of the Erie Railroad, Delaware, Lackawanna & Western Railroad, Pennsylvania Railroad and West Shore Railroad are higher than they should be, and the companies were notified to readjust these rates on a reasonable basis. The new rates are to be presented to the commission for final judgment. The complaints against the New York, New Haven & Hartford Railroad in Connecticut were held under advisement.

The general commutation charges of the Lehigh Valley Railroad and the Central Railroad of New Jersey were held

to be reasonable "looking at them from a broad standpoint and considering the interests of the commuters and the companies under complaint."

The companies involved in the cases argued that the commission had no authority over the rates charged for commutation service, provided such charges were not higher than the general through rates. In deciding against their contentions on this point Commissioner Harlan stated:

"Suburban communities have grown into existence on the theory voluntarily accepted by the carriers as well as by the public that one who makes daily use of an agency of transportation between his place of business and his home must necessarily be accorded a special and a low rate. This theory is firmly fixed in the history and traditions of transportation by rail, and must therefore be regarded as embraced in the law under which such transportation is regulated."

## Accidents in New York in May

The Public Service Commission of the First District of New York has made public the following comparative summary of accidents during May, 1909, 1910 and 1911, on the street railways and railroads in Greater New York, which come within its jurisdiction:

May.	1909	1910	1911
Car collisions .....	144	84	113
Persons and vehicles struck by cars..	822	982	1417
Boarding .....	647	683	760
Alighting .....	830	933	1086
Contact electricity .....	21	35	31
Other accidents .....	2048	2082	2398
<b>Totals .....</b>	<b>4512</b>	<b>4799</b>	<b>5805</b>
<b>Injuries:</b>			
Passengers .....	1962	2063	2412
Not passengers .....	559	487	544
Employees .....	459	640	590
<b>Totals .....</b>	<b>2980</b>	<b>3190</b>	<b>3546</b>
<b>Serious (included in above):</b>			
Killed .....	32	32	29
Fractured skulls .....	8	3	7
Amputated limbs .....	5	4	3
Broken limbs .....	26	32	37
Other serious .....	132	154	138
<b>Totals .....</b>	<b>203</b>	<b>225</b>	<b>214</b>

The number of revenue passengers on street surface, elevated and subway railroads follows: 1909, 127,543,788; 1910, 135,660,301; 1911, 145,131,790. The revenue car miles for the same periods were: 1909, 23,676,411; 1910, 24,976,082; 1911, 27,070,070. On the street, elevated and subway railways the number of accidents for 1909 was 4,476; for 1910, 4,513, and for 1911, 5,533. The number of people killed on these railroads during the same month in each year follows: 1909, 24; 1910, 24; 1911, 21.

**Heavy Traffic on Indianapolis Lines.**—Owing to the heavy excursion business out of Indianapolis during the summer months some of the electric railways centering at that point are running trail cars on their excursion trains and also on their regular trains.

**Increase in Service Ordered in Queens County.**—The Public Service Commission of the First District of New York has ordered the New York & Queens County Railway, Long Island City, N. Y., to increase the service on its lines as a result of the hearings which have been held recently before Commissioner Eustis.

**Fare Question Between Chicago and Cicero.**—At a recent meeting of the local transportation committee of the City Council of Chicago a sub-committee was appointed to arrange if possible for an operating agreement between the Chicago (Ill.) Railways and the County Traction Company by which residents of Cicero would obtain a 5-cent fare to Chicago.

**Surface-Elevated Transfers in Boston.**—The Railroad Commission has approved the establishing by the Boston Elevated Railway of a transfer point at the South Station, in Boston, to permit passengers on south-bound elevated trains to transfer to Summer Street Extension surface lines and passengers on that line from South Boston to transfer to north-bound elevated trains.

**Train Order Duplicating Machines.**—The Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has distributed a number of the new train order duplicating machines which were recommended by the Railroad

Commission of Indiana last fall. The machines are designed to increase the safety of transmission of train orders between the crew and the dispatcher.

**Freight Petition Granted in Massachusetts.**—On petition of the Boston & Northern Street Railway Company and the Union Street Railway for authority to act as common carriers of baggage and freight in New Bedford, Mass., the Massachusetts Railroad Commission has certified that public necessity and convenience require that the companies act as common carriers subject to the authority of the commission.

**Study of Traffic Conditions in Boston.**—By an act of the Massachusetts Legislature the Railroad Commission is authorized to employ experts to investigate traffic conditions on the Boston Elevated Railway, particularly with a view to prevent the overcrowding of cars in the subway. Ten thousand dollars has been appropriated for the purpose, the expense incurred up to that amount to be assessed upon the company.

**Fare Over the Syracuse & South Bay Electric Railroad.**—The Public Service Commission of the Second District of New York fixed Aug. 3, 1911, for a hearing at Albany on the application of the Syracuse & South Bay Electric Railroad, Syracuse, N. Y., on its application for a rehearing in connection with an order made recently by the commission reducing the fare between Stop 5 and the Syracuse City Line from 10 cents to 6 cents.

**Special Round-Trip Fare to Coney Island.**—The Coney Island & Brooklyn Railroad has agreed to operate to Coney Island for a round-trip fare of 10 cents, at certain times of the day, under the same conditions mentioned by President Williams, of the Brooklyn Rapid Transit Company, in his communication to the Public Service Commission of New York, mention of which was made in the *ELECTRIC RAILWAY JOURNAL* of July 29, 1911, page 198.

**Accidents on Interstate Electric Railways.**—Accident bulletin No. 39, of the Interstate Commerce Commission for January, February and March, 1911, shows that sixty-one persons were killed and six hundred and ninety-six injured during the period covered by the report on electric railways on which interstate traffic is carried. This is a decrease over the same period of 1910 of fifty-three in the number killed and three hundred and thirty-five in the number injured.

**Rockford & Interurban Railway Arranges Aviation Meet.**—The Rockford & Interurban Railway, Rockford, Ill., has arranged for an aviation meet on its line to be conducted by the Curtiss Exhibition Company. The aviators will be James J. Ward and Beckwith Havens, two of the Curtiss staff of aviators. The Curtiss Exhibition Company is giving special attention to aviation meets for railway companies and maintains a complete organization to handle the business end of the meets.

**Complaint Against Buffalo & Lake Erie Traction Company.**—The Public Service Commission of the Second District of New York has been asked by William Schuler, Fredonia, N. Y., to require the Buffalo & Lake Erie Traction Company to operate a baggage car between Fredonia and Westfield about 8 o'clock in the morning of each day except Sunday. Mr. Schuler asserts that for a long time this car was run and proved a great accommodation to merchants in either place for the transportation of purchases to their customers.

**Objection to Near-Side Stops in Minneapolis.**—Several thousand taxpayers of Minneapolis, Minn., have petitioned the City Council to require the Twin City Rapid Transit Company to return to the custom of stopping its cars at the far side of the street. All cars run on paved streets were recently ordered to stop at the near side. W. J. Hield, vice-president and general manager of the company, told the committee that many accidents are avoided by the present system. He was upheld in this contention by Lieutenant Michael Daily, of the police traffic squad.

**Through Line Between Cleveland and Lima.**—A party of electric railway men of Cleveland met the special car over the new through Cleveland-Lima line at Lorain at noon, on July 31, 1911, to celebrate the inauguration of the service. The tracks of the Lake Shore Electric Railway will be used from Cleveland to Fremont and the cars will operate

over the new Fostoria & Fremont line, between Fremont and Fostoria; over the Toledo, Fostoria & Findlay Railway to Findlay, and over the Western Ohio Railway to Lima. Four new cars are to be used in this service.

**Complaints Before the Pennsylvania Commission.**—The Railroad Commission of Pennsylvania has ruled that it is without jurisdiction to make an order prescribing the hours for the use of special coupon books on the Lewisburg, Milton & Watsonstown Electric Railway. Henry Hileman, of Pittsburgh, has complained to the commission that the Pittsburgh, Harmony, Butler & New Castle Railway has assessed an unreasonable charge of 85 cents per ton against him for transporting limestone from Harmony Junction to Warrendale, a distance of 11 miles. James J. Geisinger, of Centre Valley, has filed a complaint against the Lehigh Valley Transit Company regarding fare zones.

**Developing Freight Business in Philadelphia.**—Interchange of freight over the various electric railways between Harrisburg and Philadelphia will come with the completion of one or two short gaps between the different systems. On Aug. 1, 1911, the Philadelphia & West Chester Traction Company inaugurated freight service between West Chester and Sixty-third and Market Streets, Philadelphia, interchanging with the lines of the Philadelphia Rapid Transit Company. The stations for freight opened by the Philadelphia & West Chester Company are at Sixty-third Street and Market Street, Upper Darby, Llanerch, Manoa, Newton Square and West Chester. Branch line stations have likewise been opened at Ardmore and Clifton Heights. Three cars were put into service at the start. As soon as the projected new line between Middletown and Elizabethtown is built, the freight service will be extended.

**Developing the Piedmont Section.**—The activity of the Southern Power Company, the Piedmont Traction Company and the Greenville, Spartansburg & Anderson Traction Company, all controlled by the same interests, in perfecting their plans for completing the electric railway to connect Greenwood, S. C., and Durham, N. C., 300 miles distant, prompted the *Charlotte Observer* to make its issue of July 26, 1911, a special interurban edition, devoted to recording the work which the companies have in hand and to summarizing the economic, social and civic features of the territory through which the electric railway lines will extend. As previously stated in the *ELECTRIC RAILWAY JOURNAL*, the new electric railway will use 1500-volt direct current. Power for operating the system will be secured from the plants of the Southern Power Company on the Catawba River, which develop 134,000 hp and supply forty-five cities and towns in North Carolina and South Carolina. The developments which the companies are carrying out are by far the most important of their kind in the United States, and the *Observer* shows plainly in its account of the progress of the territory to be served that the vast expenditures to be made are fully justified.

**Medals for Conductors.**—W. O. Johnson, receiver of the Chicago & Milwaukee Electric Railroad, has decided to award a gold medal each month to the conductor who is regarded as the most efficient. E. H. Igou has received the first medal. In explaining the purpose of the company, Mr. Johnson said: "If the railroad companies would take more pains in dealing with their passengers they would have less trouble getting favors when they need them. In offering gold medals for politeness I feel that I am only carrying out what will eventually be the policy of every common carrying company in the United States. The medal we are giving is not for politeness alone. It is also a reward for cleanly kept accounts. Mr. Igou's were the cleanest and best kept on the road, according to the report of E. J. Bock, the superintendent." Mr. Igou's maxims follow: "Passengers are patrons of your employer. Treat them as such. Help old women and women with babies or bundles on and off the car. Remember where your regular passengers get off and don't haul them by. If old women or women with babies have no seat, ask some man to give them a seat. In rainy days open umbrellas for women as they get off. It saves accidents. Never give curt answers. If you're busy, wait to answer until you're through. Be as polite to homely women as to pretty women. Wait for passengers who are trying to catch the car. Keep your car clean and your patrons will help you."

## Personal Mention

**Mr. E. R. Cunningham** has resigned as electrical engineer of the Des Moines (Ia.) City Railway and the Inter-Urban Railway, Des Moines.

**Mr. J. B. Hughey** has been appointed superintendent of sleeping and parlor cars by the Illinois Traction System, with headquarters at Peoria, Ill.

**Mr. Eugene N. Lund** has been appointed city car inspector by the Council of Minneapolis. Mr. Lund is a graduate of Hamline University.

**Mr. H. C. Patterson** has resigned as mechanical and electrical engineer of the Illinois Traction System, Peoria, Ill., and will engage in other work.

**Mr. D. Y. Husselman**, formerly connected with the Ohio Electric Railway and other electric railways of the Middle West, has entered the employ of the Ohio Tax Commission, Columbus.

**Mr. Robert R. Hertzog** has resigned as general superintendent of the Chicago (Ill.) Railways Company, after twenty years' service in the transportation department of the company.

**Mr. D. C. Ward**, trainmaster of the Indianapolis & Louisville Traction Company, Scottsburg, Ind., has been appointed superintendent of the company to succeed Mr. H. D. Murdock, resigned.

**Mr. J. H. Lytle** has been elected secretary of the City Railway, Dayton, Ohio, to succeed Mr. R. R. Dickey. This is Mr. Lytle's first experience in railroading. His previous activities were in the advertising field.

**Mr. Frank Hedley**, vice-president and general manager Interborough Rapid Transit Company, New York, N. Y., will make quite an extended tour in Europe and will visit London, Paris, Berlin, Vienna and other important cities. He expects to sail on Aug. 5, and will go first to London.

**Mr. J. B. Hogarth** of the Chicago (Ill.) Railways Company's auditing department and formerly with the Chicago (Ill.) City Railway, and before that with the Denver (Col.) City Tramway, has been appointed general superintendent of the Chicago Railways Company to succeed Mr. Robt. R. Hertzog, resigned.

**Mr. Calvert Townley**, whose resignation as vice-president of the Connecticut Company, New Haven, Conn., to become connected with the Westinghouse Electric & Manufacturing Company, was noted in the *ELECTRIC RAILWAY JOURNAL* of July 1, 1911, has been given the title of assistant to the president of that company.

**Mr. C. A. Henderson**, secretary and auditor of the Los Angeles Railway Corporation, Los Angeles, Cal., has been appointed assistant general manager of the company. Mr. Henderson will retain his title as secretary and auditor. He became connected with the company in 1895 as auditor. He was previously connected with the Wabash Railroad.

**Mr. J. P. Peurrung** has resigned as vice-president and general manager of the Cincinnati, Milford & Loveland Traction Company, Cincinnati, Ohio, on account of ill health. It is announced that the management of the property will for the present be in the hands of Mr. B. H. Kroger, president, and Mr. August Beidenbender, superintendent.

**Mr. Hugh Pattison**, who has been appointed electrical engineer for the Chicago Electrification Commission, was tendered a dinner at the Engineers' Club, New York, N. Y., on July 22, 1911, by about sixty of his former associates in the engineering offices of the Pennsylvania Tunnel & Terminal Railroad. A gold watch was presented to Mr. Pattison as a token of esteem and some appropriate remarks were made by Mr. E. R. Hill.

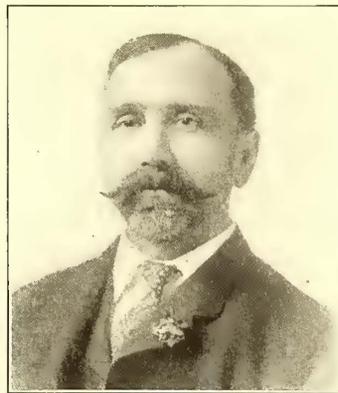
**Mr. H. D. Murdock** has resigned as superintendent of the Indianapolis & Louisville Traction Company, Scottsburg, Ind. Mr. Murdock was formerly mechanical and electrical engineer of the company. Before that he was superintendent of the Fifty-second Street shops of the Brooklyn Rapid Transit Company. Mr. Murdock entered the electric field in 1892, when he became connected with the construction department of the Westinghouse Electric & Manufacturing Company.

**Mr. C. O. Mailloux** will present two papers at the International Electrical Congress which is to meet in Turin, Italy, during the week beginning Sept. 11. One of these papers is on "Electrification of Railroads," the other is upon "Method of Determining the Equivalent Heating Current in Electrical Circuits." This latter paper will describe a simple method constituting an important extension and generalization of the Fleming method, developed by Mr. Mailloux, for calculating the root mean square values of alternating or varying currents.

**Mr. Sherman W. Dunn** has been appointed superintendent of the Augusta division of the Lewiston, Augusta & Waterville Electric Railway, Lewiston, Maine, to succeed Leander F. Taylor, deceased. Mr. Dunn is forty-three years old. He began his railroad career on a steam railroad. Eighteen years ago he entered electric railway work as a mechanic on repair work. Mr. Dunn was assistant to the late Mr. Taylor for ten years, first with the Augusta, Hollowell & Gardiner Street Railway and, after the consolidation, with the Augusta division of the Lewiston, Augusta & Waterville Electric Railway. The Augusta division includes 68 miles of line.

**Mr. Thomas F. Miley** has been appointed general superintendent of the New Jersey & Pennsylvania Traction Company, Trenton, N. J., a newly created office, Mr. C. M. Bates, president of the company, having previously directed the operation of the road himself. Mr. Miley began railroading with the Atlantic Avenue Railroad, Brooklyn, in 1892. He was with the Nassau Railroad, Brooklyn, from 1895 to 1899, and acted as master mechanic of the Eastern Division of the Lehigh Valley Traction Company, Allentown, Pa., from 1899 to 1904. In the latter year he returned to Brooklyn as foreman of the Smith Street and Franklin Avenue divisions of the Coney Island & Brooklyn Railroad, remaining with that company until February, 1910, when he was appointed master mechanic of the New Jersey & Pennsylvania Traction Company.

**Mr. James Anderson**, who was elected president of the Canadian Street Railway Association at the recent meeting of the association, is general manager of the Sandwich,



J. Anderson

Windsor & Amherstburg Railway, Windsor, Ont. He was born near Ayr, Ont., on June 20, 1851. At the age of nineteen he entered the employ of the Great Western Railway, and after serving a few years was appointed a conductor, which position he held until November, 1883, when he resigned and went into the grocery business as a member of the firm of Robinson & Anderson. In June, 1893, Mr. Anderson sold his interest in the firm to his partner, and with Mr. John Davis, Mr. W. J. Tucker, Dr. Coventry, Mr. W. J. Pulling, Windsor, Ont., and the late Robert Thomson and Mr. William Hendrie, Hamilton, Ont., he purchased the Sandwich, Windsor & Amherstburg Railway, which was operated under that ownership for eight years. When the Sandwich, Windsor & Amherstburg Railway passed into the hands of the present owners, the Detroit United Railway, in 1901, Mr. Anderson was appointed general manager of the company. The company's line has since been extended to Amherstburg and Tecumseh, and 35 miles of line are now in operation.

**Mr. D. A. Hegarty**, whose resignation as vice-president, general manager, treasurer and director of the Little Rock Railway & Electric Company, Little Rock, Ark., to become connected with the New Orleans Railway & Light Company, New Orleans, La., was announced in the *ELECTRIC RAILWAY JOURNAL* of July 22, was tendered a banquet at the Hotel Marion, Little Rock, by the business men of Little Rock on his departure for New Orleans. Mr. W. M. Kavanaugh, president of the Little Rock Railway & Electric Company, acted as toastmaster. Among the speakers were

Mr. J. N. Heiskell, editor of the *Little Rock Gazette*; Mayor C. E. Taylor, of Little Rock; Dr. W. H. Frost, of Washington, D. C., and Mr. D. H. Cantrell. Mr. Hegarty said that the work done in Little Rock could not have been accomplished had it not been for the hearty co-operation of the other officers of the company and the employees. As a token of their esteem the directors and employees of the company presented Mr. Hegarty with a handsome chest of silver.

**Mr. R. B. Stearns**, of Chicago, has been appointed assistant general manager of The Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company, Milwaukee, Wis., in charge of the railway departments of those companies. Mr. Stearns was educated at Purdue University, class of 1889. He was engineer in connection with the Columbian Exposition at Chicago, in 1893. Subsequently he was engaged in the United States engineer service on the Chicago Drainage Canal and the Hennepin Canal during the early history of that work. He was also engaged from their inception in the construction of the Northwestern Elevated Railroad, the Union Loop and the extensions to the Lake Street Elevated Railroad, Chicago, now the Chicago & Oak Park Elevated Railway, as assistant chief engineer and superintendent of construction. Later he was appointed chief engineer and superintendent in charge of the operation of the Northwestern Elevated Railroad. Mr. Stearns was general manager of the Chicago & Milwaukee Electric Railroad for a short time before that road was placed in the hands of receivers and continued in that capacity under the receivers.

**Mr. George W. Knox**, president of the Knox Engineering Company, Chicago, Ill., has been elected second vice-president and general manager of the Oklahoma Railway Company, Oklahoma City, Okla. While he will devote the greater part of his time to working out the operating problems of the Oklahoma Railway Company, Mr. Knox will retain his interest in the Knox Engineering Company, as in the past. Mr. Knox has long been connected with electric railway work. Originally he was in the employ of the Sprague Electric Company, and later was with the General Electric Company, acting as superintendent of construction and as an electrical engineer. Then he became electrical engineer of the Chicago (Ill.) City Railway, and built the first electric line in Chicago—that on Forty-seventh Street. In 1900 Mr. Knox resigned from the Chicago City Railway and organized the Knox Engineering Company. Some of the railways which his company has acted for as engineer and has constructed follow: Rockford, Beloit & Janesville, Beloit, Wis.; People's Traction Company, Galesburg, Ill.; Stark Electric Company, Alliance, Ohio; Guthrie (Okla.) Railway, Green Bay (Wis.) Traction Company, reconstruction of the Choctaw (Okla.) Railway & Light Company, design and construction of the Wausau (Wis.) Street Railroad, Grand Rapids (Wis.) Street Railroad, Mankato (Minn.) Traction Company, and power plant of the Rock Island Southern Railway. Work in which Mr. Knox is now interested includes the construction of the new interurban road in Ohio, known as the Cleveland, Alliance & Mahoning Valley Railway, extensions of the Wausau (Wis.) Street Railroad and the rehabilitation of the Freeport Railway & Light Company, Freeport, Ill. Mr. Knox has also reported on many propositions for bond houses and individuals. He made the original report on the Oklahoma Railway in 1901, and he has been connected with the company ever since in the capacity of consulting engineer. He is the patentee of the automatoneer and a number of other railway devices. Mr. Knox is an associate member of the A. I. E. E.



G. W. Knox

## Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (\*) indicates a project not previously reported.

### RECENT INCORPORATIONS

**Colorado Interurban Railway, Denver, Col.**—Incorporated in Colorado to build an electric railway from Denver to Ft. Lupton; also from Ft. Lupton to Greeley and Longmont. Capital stock, \$6,000,000. Irving Hale, president.

**Gary-Hobart & Eastern Traction Company, Hobart, Ind.**—Incorporated in Indiana to build an electric railway between Gary, Hobart and Valparaiso. Capital stock, \$125,000. Directors: W. H. Clinton, A. Z. Olson, A. J. Smith, J. H. Earle, E. H. Guyer, J. C. Cavender and Grant Crum-packer. [E. R. J., May 13, '11.]

**\*New Castle (Pa.) Connecting Street Railway.**—Incorporated in Pennsylvania to build an electric railway in New Castle. Incorporators: W. G. Weimer, I. K. Norris, J. H. Corbett, J. E. White and Roy M. Jameson.

**\*Ft. Worth Power & Light Company, Ft. Worth, Tex.**—Incorporated in Texas to operate an electric railway in Ft. Worth. Capital stock, \$3,500,000. Directors: J. R. Nutt, Cleveland, Ohio; George T. Reynolds, W. C. Stripling, A. J. Duncan, T. B. Yarbrough and John P. King, of Ft. Worth.

### FRANCHISES

**\*Phoenix, Ariz.**—The Salt River Electric Railway has asked the City Council for a franchise to build its lines in Phoenix. Jacob K. Kleck is interested.

**Burlingame, Cal.**—Ansel M. Easton has received a franchise from the Board of Trustees to operate an electric railway from the United Railroads, westerly, through the streets of Easton. [E. R. J., July 8, '11.]

**Rockvale, Cal.**—The Florence Interurban Electric Company has received a franchise in Rockvale. [E. R. J., July 22, '11.]

**Woodland, Cal.**—The Vallejo & Northern Railway, Sacramento, has received a franchise from the City Trustees to build its tracks over Main Street in Woodland. [E. R. J., July 29, '11.]

**Cicero, Ill.**—The Cicero & Southwestern Railway has asked the Town Board for a franchise to build its tracks in Cicero. The franchise calls for a 2½-cent fare to all parts of Cicero. [E. R. J., July 15, '11.]

**Bedford, Mass.**—The Lexington & Boston Street Railway, Newtonville, has asked the Council for a renewal of its franchise in Bedford.

**Erving, Mass.**—The Miller's River Street Railway, Miller's Falls, has asked the Selectmen for a franchise to build its tracks over the city streets of Erving. Frederick L. Greene represented the company. [E. R. J., July 1, '11.]

**Holyoke, Mass.**—The Holyoke Street Railway has been granted authority by the Massachusetts Railroad Commission to construct its line on private land in that city, near the Holyoke Country Club.

**Eveleth, Minn.**—The Range Electric Railway has received a franchise from the City Council to build its tracks over the city streets. The railway will connect Gilbert, Eveleth and Virginia. Oscar Michell, Duluth, is interested. [E. R. J., Jan. 7, '11.]

**Solvay, N. Y.**—The Syracuse Rapid Transit Company has asked the Board of Trustees for a franchise to build an electric railway over certain streets of Solvay.

**Utica, N. Y.**—The Utica & Mohawk Valley Railway has received a franchise from the Common Council to extend its tracks over East Dominick Street and West Dominick Street.

**Durham, N. C.**—The Durham Traction Company has received a franchise from the County Commissioners to build an extension to Watts Hospital.

**Akron, Ohio.**—The Alliance-Akron Railroad, Alliance, has asked the County Commissioners for a franchise to build its track over 2 miles of the public highway from Mogadore to Akron. [E. R. J., July 15, '11.]

**Defiance, Ohio.**—The Defiance Interurban Railway has

received a franchise from the Council to build an electric railway in Defiance to the part of its line from Defiance to Ft. Wayne. [E. R. J., Nov. 26, '11.]

**\*Steubenville, Ohio.**—The Steubenville, Wellsburg & Weirton Railway will apply for a franchise to build an electric railway in Steubenville. Edward McDonnell, vice-president.

**Cambridge Springs, Pa.**—The Erie Traction Company has received a franchise from the Borough Council to build its tracks on Railroad Street from Grant Street to the borough limits.

**Lebanon, Pa.**—The Lebanon & Campbelltown Street Railway has received a franchise from the City Council in Lebanon. S. M. Hirshey is interested. [E. R. J., July 29, '11.]

**\*Watertown, S. D.**—S. D. Ferris has asked the Council for a franchise to build an electric railway in this city.

**Brownsville, Tex.**—The San Benito Interurban Railway has asked the City Council for a franchise to build its tracks over the city streets. Sam Robertson, San Benito, represented the company.

**\*Mount Vernon, Wash.**—The Bellingham & Skagit Railway has asked the City Council for a perpetual franchise to build an electric railway in Mount Vernon.

#### TRACK AND ROADWAY

**Salt River Electric Company, Phoenix, Ariz.**—This company plans to build three electric railways out of Phoenix. The first will extend 15 miles northwest to Peoria, the second to Scottsdale, 11 miles northwest of Phoenix, and the third 18 miles southeast to Mesa. A spur track will run 3½ miles east to where an amusement park will be established. F. M. Winter, Jacob K. Leck, W. S. Furman, J. M. Wivertnam and C. C. Lewis are interested.

**Ft. Smith Light & Traction Company, Ft. Smith, Ark.**—About 10 miles of new track will be built by this company on the South Side in Ft. Smith, in the near future.

**Arkansas Valley Interurban Railway, Little Rock, Ark.**—Work is almost completed by this company on its electric railway from Wichita to Newton. Work will soon begin on the extension to Goessee, 14 miles north of Newton. [E. R. J., May 20, '11.]

**Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.**—This company plans to build a 23-mile extension of its line to connect Fowler and Hanford.

**Los Angeles (Cal.) Railway.**—This company is completing the laying of 1½ miles of concrete railway ties in Los Angeles.

**Santa Rosa & Clear Lake Railroad, Santa Rosa, Cal.**—Work will be begun by this company within the next few days on its 56-mile electric railway to connect Santa Rosa and Clear Lake, via Burke, Markwest, Kellogg and Mount St. Helena. The line is to be a narrow-gauge and either gasoline motors or electricity will be used as motive power. [E. R. J., Dec. 3, '10.]

**\*Bridgeport, Conn.**—O. G. Beard, Jr., L. E. Moulthrop and B. N. Beard are said to be considering plans to build an electric railway to connect Shelton and Bridgeport, via Huntington Centre.

**Connecticut Company, New Haven, Conn.**—Work has been begun by this company on two concrete bridges, one over the neck of Whitney Lake and the other over a creek at Centerville.

**Wilmington, Del.**—Plans have been made and estimates secured for an electric railway along the Delaware River to connect the system of the Wilmington & Philadelphia Traction Company with the New Castle & Delaware City line at New Castle.

**Pensacola (Fla.) Electric Company.**—This company will soon build an extension to the new baseball park in the western section of Pensacola.

**St. Louis-Rock Island Railway, Keokuk, Ia.**—The Mississippi River Power Company is surveying the line to be built by the St. Louis-Rock Island Railway to connect Hamilton, Washaw and Keokuk. [E. R. J., July 22, '11.]

**Mattoon-Charleston Traction Company, Mattoon, Ill.**—Marshall Sampsell, president of this company, states that work on the line from Charleston to Paris and Christman

cannot be started as early as intended because of the failure to float the bonds in the East. He has not abandoned the enterprise and expects to complete the work of construction next year. The company bought the lighting plant at Kansas, Ill., which would be on the route, to use as a power station. [E. R. J., June 11, '10.]

**Chicago, Ottawa & Peoria Railway, Ottawa, Ill.**—This company has recently purchased a private right-of-way through the town of Utica, and is moving its line onto the new roadbed, which is about a mile long. Grading and pole setting on the 22-mile extension from Morris to Joliet is nearly finished.

**Illinois Traction System, Peoria, Ill.**—This company recently purchased 25 miles of new 70-lb. rails for renewal and extension work. A considerable portion of this rail will be used in renewing rails of similar weight on the main-line tracks. The rail to be taken up is used in lengthening sidings and building industrial tracks and terminal yards.

**\*Quincy & Peoria Traction Company, Peoria, Ill.**—Robert H. Baldwin, locating and constructing engineer, 1243 Monadnock Building, Chicago, has prepared a preliminary report for the Quincy & Peoria Traction Company, a line 141 miles, traversing the west side of the Illinois River Valley, between Quincy and Peoria, Ill., with branches to Canton, Pekin and Rushville. A maximum grade of 0.4 per cent, and a curvature of not more than 4 deg., will be obtained on the final location surveys, which are to follow. It is estimated the line can be built for less than \$22,000 per mile. Terminal agreements have been signed by the Peoria Railway Terminal and the Illinois Central Electric Railway, and arrangements have been made with the Illinois Traction System at Peoria to furnish energy. The report has been turned over to M. H. Myers, Chicago, one of the principals, who is interested in the financing.

**\*Fox & Illinois Union Railway, Yorkville, Ill.**—H. H. Evans has deposited \$50,000 in banks at Yorkville and Morris to guarantee that this proposed interurban railway connecting Yorkville and Morris will be built. The right-of-way has been secured.

**Gary & Southern Traction Company, Crownpoint, Ind.**—The Ahlbom Construction Company, Hammond, has been awarded the contract by this company to complete the line from Ridge Row to Forty-third Avenue, and work has been begun. An effort will be made to have cars running between Gary and Crownpoint by Dec. 1.

**Gary-Hobart Railway, Gary, Ind.**—Surveying has begun on this company's line from Gary to Hobart, and the contract for construction has been let. [E. R. J., April 1, '11.]

**Indianapolis, Nashville & Southern Traction Company, Indianapolis, Ind.**—Survey is now under way by this company and work has been begun on track construction in the southern part of Indiana. It is planned to touch French Lick Springs and to go by way of Bloomington, Oolitic and Bedford.

**Kokomo, Frankfort & Western Traction Company, Kokomo, Ind.**—Work has begun on the construction of this line between Kokomo and Frankfort. T. C. McReynolds is general manager. [E. R. J., July 15, '11.]

**\*Lawrenceburg, Ind.**—A survey has been made between Osgood and Versailles, and nearly all of the right-of-way obtained, with the intention of the immediate construction of an electric railway. J. L. Phillips, Clinton, Mo., and Julius E. Wayland, Gerard, Kan., are interested.

**Vincennes, Washington & Eastern Traction Company, Vincennes, Ind.**—This company has begun work on the interurban line from Vincennes to Washington. Arrangements may be made with the Vincennes Traction Company whereby the cars will enter Vincennes over the lines of the former company. [E. R. J., June 8, 1911.]

**\*Manhattan (Kan.) Interurban Railway.**—This company plans to build an electric railway from Manhattan to Ft. Riley, at which point it will connect with the line which now connects Ft. Riley and Junction City, making a continuous line from Manhattan to Junction City, a distance of 24 miles.

**Shelbyville, Ky.**—R. D. Armstrong, Frankfort, Ky., one of those interested in a project to build an electric line from Shelbyville to Frankfort, Ky., states that following the

securing of rights-of-way Eastern capital can be secured for the construction of this line, which would be about 25 miles long. [E. R. J., Apr. 22, '11.]

**Boston (Mass.) Elevated Railway.**—Plans and surveys are being made for the Dorchester tunnel, the Boylston Street subway and the East Boston tunnel extension. Work will be begun as soon as the company and the city accept the act providing for these improvements.

**Detroit (Mich.) United Railway.**—Track laying has been begun by this company on its extension on Hamilton Boulevard, in Detroit.

**Mankato (Minn.) Electric Traction Company.**—This company will extend the line to Wilmar.

**Buffalo & Lake Erie Traction Company, Buffalo, N. Y.**—This company plans to rebuild a large part of its line from North East to Erie, a distance of about 12 miles.

**Penn Yan (N. Y.) Keuka Park & Branchport Railway.**—Plans are being made for the extension of this company's lines to Corning. The line now stops at Branchport, 8 miles distant from Corning, and it is proposed to extend it along the west shore of the west arm of the lake to Pulteney Landing and thence eventually on toward Hammondsport.

**Syracuse (N. Y.) Rapid Transit Company.**—This company has completed and will soon place in operation its Willow Street extension.

**Black River Traction Company, Watertown, N. Y.**—This company will double-track its Court Street line and place heavier rails on its State Street line, in Watertown.

**Springfield, Wilmington & Cincinnati Railway, Cincinnati, Ohio.**—G. H. Frey, Springfield, is negotiating with several Eastern stockholders of the company in New York for the construction of this railway to connect Springfield, Cincinnati, Wilmington and Norwood. [E. R. J., April 17, '09.]

**Cleveland, Ohio.**—The Deming Brothers Realty Company has begun grading on its 1-mile double-track street railway which will connect Forest Hill with the lines of the Cleveland Railway. The Cleveland Railway is constructing the line.

**\*Fremont, Ohio.**—C. C. Anderson, Fostoria; A. H. Jackson, Fremont, and A. S. Close, Toledo, are interested in a plan to build an electric railway between Tiffin and Fremont. They are now securing rights-of-way. The old Bunn route, which will be followed most of the way, was graded about six years ago and is in good shape. The proposed line will connect with the new Fostoria & Fremont line near Ballville.

**Wapakoneta & Kenton Traction Company, Kenton, Ohio.**—Work has been begun by this company on its electric railway from Wapakoneta to Kenton. Alonzo S. Roberts is interested. [E. J. R., June 17, '11.]

**Hocking-Sunday Creek Traction Company, Nelsonville, Ohio.**—Twibill Powers, Kimberly, has been awarded the contract by this company for grading the second section of its line from Sunday Creek to the switch at Sugar Creek. Work has been begun. Juniper & Nixon Company has been awarded the contract for the grading from Greenlawn to Sunday Creek, below Chauncey. About 1½ miles of this work has been done.

**Mahoning & Shenango Valley Railway, New Castle, Pa.**—This company will improve and extend its tracks in and around Sharon.

**\*Rogersville, Tenn.**—McDonald Brothers, Rogersville, Tenn., have a plan to develop water power on the Holston River, near McMinnville, Tenn., and to operate an electric railway between Rogersville and Hale Springs.

**Texas Traction Company, Dallas, Tex.**—This company advises that construction has been begun on 2½ miles of track in McKinney and not in Dallas as was stated in the ELECTRIC RAILWAY JOURNAL of July 15, 1911.

**\*San Antonio, Tex.**—The Medina Irrigation Company plans to build an electric railway from San Antonio to its reservoir and from thence down the valley of the Medina River.

**\*Bellingham, Mount Baker & Spokane Interurban Railroad, Spokane, Wash.**—This company has been organized to build an electric railway from Spokane to Bellingham,

Wash., 288 miles. It is announced that London capital is interested in the project. The engineer's estimate places the cost at from \$20,000,000 to \$25,000,000. The road will traverse Spokane, Stevens, Ferry, Okanogan and Whatcom Counties to Tidewater. Among the incorporators are: Joseph Morrison, president of the Morrison Mill Company; J. E. Morrison, superintendent of the Nooksack Valley Traction Company; A. E. Mead, Bellingham; W. L. Hart, Blaine; F. Peace, Vancouver, B. C.; A. C. McLean, Seattle; Z. E. Hawkins, Nome, Alaska, and C. E. Wingate, Tilden, Wash. The capital stock is \$22,500,000.

**Charleston-Dunbar Traction Company, Charleston, W. Va.**—The Standard Contracting Company, Charleston, has been awarded the contract and work has been begun by this company to build a 4-mile electric railway to connect Charleston and Dunbar. Officers: F. P. Grosscup, president; W. C. Davidson, vice-president; H. Gluck, treasurer, and J. F. McAndrew, secretary. [E. R. J., June 24, '11.]

**Clarksburg (W. Va.) Northern Railway.**—Grading has been begun by Joseph Fucy on the line from Middlebourne to New Martinsville. T. Moore Jackson is promoting the line. [E. R. J., July 22, '11.]

**Clarksburg & Western Electric Railway, Clarksburg, W. Va.**—Grading has been completed from Clarksburg to Mount Clare and the track and trolley wire have been placed from Clarksburg to the Hoff farm.

**Mount Morris-Morgantown Traction Company, Morgantown, W. Va.**—Bids for the construction of this line will be asked for in a few days. Nearly \$60,000 in stock subscriptions has been obtained, and most of the right-of-way has been secured. [E. R. J., June 24, '11.]

#### SHOPS AND BUILDINGS

**Los Angeles Railway, Los Angeles, Cal.**—This company will let a contract for a carhouse to be built on its property at Fifty-fourth Street and Arlington Street. The building will be 624 ft. x 355 ft., and will be of concrete and steel construction throughout.

**Ontario & San Antonio Heights Railway, Ontario, Col.**—This company will build frame passenger depots at San Antonio Avenue, between Ninth Street and Tenth Street, and at Euclid Avenue at the junction of the branch line to Claremont.

**Keokuk (Ia.) Electric Railway & Power Company.**—Stone & Webster Engineering Corporation, Boston, Mass., will prepare plans for the construction of the carhouse and the track of this company. Work on the reconstruction of the system will be commenced immediately upon the consummation of the negotiations by which the Stone & Webster company is to obtain title to the Keokuk franchise, plant and equipment.

**Ft. Wayne & Northern Indiana Traction Company, Ft. Wayne, Ind.**—This company will let the contract within thirty days to build a carhouse.

**Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.**—This company has just awarded a contract for a new passenger station at Lebanon. The station will be built of Indiana limestone and will be ready for occupancy on Dec. 1, 1911.

**Amherst & Southerland Railway, Amherst, Mass.**—Work has been begun on this company's passenger station in the campus of Amherst College. The building is of brick and stucco and was designed by Arthur H. Sharp and is being built by C. A. Jewett.

**Boston & Eastern Electric Railway, Boston, Mass.**—This company is considering plans to build a new station on Broadway and a terminal at Wallis Street in Beverly.

**Syracuse, Lake Shore & Northern Railroad, Syracuse, N. Y.**—This company is considering plans for the purchase of property in West First Street upon which to build a new carhouse.

**Scioto Valley Traction Company, Columbus, Ohio.**—Plans have been completed by this company for its new repair shops at Obetz and a new passenger station at Chillicothe.

**Portland Railway, Light & Power Company, Portland, Ore.**—Work has been begun by this company on its combination warehouse and clubhouse for employees. The building will be 100 ft. x 200 ft., four stories high and of reinforced concrete construction.

**Fairmont & Clarksburg Traction Company, Clarksburg, W. Va.**—Plans have been completed and the contract will soon be let by this company for its freight depot on Fairmont Avenue and First Street.

#### POWER HOUSES AND SUBSTATIONS

**Connecticut Company, Waterbury, Conn.**—This company will dispense with its old steam power plant on Bank Street as soon as its 5000-hp steam turbine is installed in its plant at West End.

**St. Louis-Rock Island Railway, Keokuk, Ia.**—This company will build a power house at Hamilton.

**Chicago, Ottawa & Peoria Railway, Ottawa, Ill.**—A substation building on the new shop property just west of Ottawa is being reconstructed for a trainmaster's and dispatcher's office. The rotary converter from this substation has been reinstalled in the Ottawa power house, which receives energy from the Marseilles water-power plant.

**Kentucky Traction & Terminal Company, Lexington, Ky.**—Sargent & Lundy, Chicago, are completing plans for the new power house of the Kentucky Traction & Terminal Company, which recently took over the traction properties in and around Lexington. It is stated that a contract will be awarded for the erection of the building and the installation of machinery in the next two weeks.

**Bangor Railway & Electric Company, Bangor, Maine.**—This company has purchased the hydroelectric plant of the Bodwell Water Power Company at Old Tower and Milford, on the Penobscot River. Plans are being made to build a 2000-ft. dam across the Stillwater branch of the river, as was originally proposed.

**United Railways & Electric Company, Baltimore, Md.**—The Pennsylvania Water & Power Company has begun to furnish current to the Pratt Street power station of the United Railways & Electric Company.

**Metropolitan Street Railway, Kansas City, Mo.**—This company will remove a 1000-kw generator from its Fifteenth Street substation to its Fortieth Street substation and install in its place a 3000-kw generator.

**Public Service Railway, Newark, N. J.**—E. M. Waldron & Company have been awarded the contract by this company to build a power house in Marion. The building will be 100 ft. x 100 ft., two stories high and of brick and steel construction.

**Cleveland, Painesville & Eastern Traction Company, Cleveland, Ohio.**—Plans have been completed by this company for consolidating its two power houses at Painesville and Willoughby. Its principal source of energy will be at Painesville. This company now operates both the Cleveland-Painesville and the Cleveland-Ashtabula lines.

**Northwestern Pennsylvania Railway, Meadville, Pa.**—This company has let contracts to the General Electric Company for one 300-kw motor generator set, one 200-kw generator set for its Main Street station at Meadville, and one 300-kw rotary converter for its substation at Harmonsburg.

**Trenton, Bristol & Philadelphia Street Railway, Bristol, Pa.**—During the next four weeks this company will purchase a 500-kw engine or turbine with generator.

**Philadelphia (Pa.) Rapid Transit Company.**—This company will soon award a contract for a \$25,000 addition to its power plant on Delaware Avenue.

**Mahoning & Shenango Valley Railway, New Castle, Pa.**—This company will enlarge its power house and install new equipment at Sharon.

**Charleston Consolidated Railway & Light Company, Charleston, S. C.**—J. W. Lindsay, Philadelphia, has been awarded the contract by this company to build the superstructure of its new power house. A battery of boilers rated at 2640 hp has been installed by the Franklin Boiler Works.

**Winchester & Washington City Railway, Winchester, Va.**—This company is building a new tailrace for its power house at Millville.

**Charleston-Dunbar Traction Company, Charleston, W. Va.**—This company will build a power house at Dunbar for its line from Charleston to Dunbar.

## Manufactures & Supplies

#### ROLLING STOCK

**Maysville (Ky.) Public Service Company** is receiving bids for several new cars.

**Central Pennsylvania Traction Company, Harrisburg, Pa.**, is understood to be considering the purchase of additional prepayment cars.

**Trenton, Bristol & Philadelphia Street Railway, Bristol, Pa.**, has ordered two 30-ft. 8-in. closed motor cars mounted on Brill 27-G-1 trucks, from The J. G. Brill Company.

**Charleston (S. C.) Railway & Lighting Company** has ordered six single-truck car bodies from the Cincinnati Car Company. They will be mounted on Brill 21-E trucks.

**Mount Hood Railway & Power Company, Portland, Ore.**, has ordered four 38-ft. interurban cars mounted on Brill 27-MCB-3 trucks, from the G. C. Kuhlman Car Company.

**Bluestone Traction Company, Bluefield, W. Va.**, has ordered one 20-ft. 8-in. semi-convertible motor car body mounted on a Brill 21-E truck, from the G. C. Kuhlman Car Company.

**Savannah (Ga.) Electric Railway** has ordered, through Stone & Webster Engineering Corporation, six Brill 39-E trucks, for use on the three cars being built by the St. Louis Car Company.

**Dallas (Tex.) Electric Corporation** has purchased, through Stone & Webster Engineering Corporation, twenty Brill 30-E trucks for the ten double-truck car bodies being built by the Cincinnati Car Company.

**Geary Street Municipal Railway, San Francisco, Cal.**, noted in the *ELECTRIC RAILWAY JOURNAL* of Jan. 28, 1911, as being in the market for twenty cars, will soon issue specifications for forty-three steel pay-as-you-enter cars. They will be 47 ft. long and equipped with four 50-hp motors each.

#### TRADE NOTES

**Grip Nut Company, Chicago, Ill.**, has appointed W. G. Wilcoxson sales manager.

**Ackley Brake Company, New York, N. Y.**, reports the receipt of an order for a large number of Ackley adjustable brakes from the Rosario (Argentina) Tramway.

**Dossert & Company, New York, N. Y.**, have elected John J. Deck vice-president to succeed Charles A. Flynn, resigned. D. J. Fitch has been elected secretary and treasurer of the company.

**Pittsburgh Steel Products Company, Pittsburgh, Pa.**, has appointed Jason Paige contracting engineer with headquarters in Chicago. Mr. Paige was formerly connected with the Inter-Ocean Steel Company, Chicago, Ill.

**Pressed Steel Car Company, Pittsburgh, Pa.**, has elected N. S. Reeder second vice-president of the company. Mr. Reeder is also vice-president of the Western Steel Car & Foundry Company, Chicago, Ill., and will continue to have his office in Chicago.

**Pittsburgh Forge & Iron Company, Pittsburgh, Pa.**, has appointed F. R. Cooper Western sales agent with headquarters in the McCormick Building, Chicago, Ill. Mr. Cooper was formerly superintendent of motive power of the Kansas City Southern Railroad.

**Standard Coupler Company, New York, N. Y.**, has elected Edward F. Pride secretary and assistant treasurer to succeed the late Alexander W. Taylor. Mr. Pride has been connected with the Standard Coupler Company for fourteen years, having been for several years assistant superintendent of its works at Bridgeport, Conn.

**Wonham, Sanger & Bates, New York, N. Y.**, report the receipt of an order from the International Railway, Buffalo, N. Y., for sixty H-B wheelguards to equip the sixty new near-side cars recently ordered, as reported in the *ELECTRIC RAILWAY JOURNAL* of July 15 and 29, 1911.

**McKeen Motor Car Company, Omaha, Neb.**, on July 22 shipped one of its standard 55-ft. motor cars to the Woodstock & Sycamore Traction Company, Woodstock, Ill. This is the third car of this type in service on that line. The company has also shipped a 70-ft. motor car to the Oregon

Short Line Railroad and a 70-ft. car to the Ann Arbor Railroad.

**Nova Scotia Car Works, Halifax, N. S.**, expects to complete its new steel car plant by Oct. 1, 1911. The erecting shop will be a steel structure, 300 ft. x 100 ft., equipped with electric overhead traveling cranes and electrically driven tools and air tools. The new plant will be capable of turning out ten steel cars daily. With numerous other improvements being made to the plant the company expects that its former output of six wooden cars will be increased to twelve cars a day, making a total capacity of twenty-two cars a day.

**Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.**—At a meeting of the board of directors of the Westinghouse Electric & Manufacturing Company held in New York on Aug. 1 the following officers were elected: Chairman of the board of directors, Robert Mather; president, Edwin M. Herr; vice-presidents, Loyall A. Osborne, Charles A. Terry, Harry P. Davis; acting vice-presidents, Henry D. Shute, George P. Hebard; comptroller and secretary, James C. Bennett; treasurer, T. W. Siemon; auditor, F. E. Craig. Mr. Herr was elected to succeed Edwin F. Atkins, who had been president of the company since June, 1910, and declined re-election. Mr. Herr, the new president, was born at Lancaster, Pa., May 3, 1860. After a common school education he studied telegraphy and then began his railroad career as station master and operator at Deer Trail, Col., on the Union Pacific Railway. While in this service he prepared for college and was graduated as a mechanical engineer from the Sheffield Scientific School of Yale College in 1884. After graduation he became a special apprentice of the Chicago, Milwaukee & St. Paul Railway in the motive power department at West Milwaukee, and later entered the motive power department of the Chicago, Burlington & Quincy Railroad as mechanical draftsman and test engineer. Owing to his former experience he was finally made superintendent of telegraphs of the Chicago, Burlington & Quincy system, and his work in this department, especially during the Burlington strike, brought him to the attention of the operating department and led to his appointment as division superintendent of the Galesburg division. In 1889 he went with the Chicago, Milwaukee & St. Paul Railroad as master mechanic, which position he held until 1892, when he was called to the superintendency of the Grant Locomotive Works at Chicago. In 1895 he was sent to Europe by financial interests to report upon and establish locomotive works in Russia, upon the completion



E. M. Herr

of which mission he became, in 1896, general manager of the Gibbs Electric Company, of Milwaukee, and shortly after accepted the position of assistant superintendent of the motive power department of the Chicago & Northwestern Railroad. In 1897 Mr. Herr went to St. Paul as superintendent of the motive power department of the Northern Pacific Railroad. He filled this post until 1899, when he went to Pittsburgh to take the position of assistant general manager of the Westinghouse Air Brake Company, later becoming general manager of that company. In 1905 he was appointed first vice-president of the Westinghouse Electric & Manufacturing Company, which position he has occupied continuously up to the present, having had direct charge during this period of all manufacturing and commercial operations of the company. President Herr has appointed Calvert Townley as his assistant. Mr. Townley was for many years connected with the Westinghouse Electric & Manufacturing Company, at first in Pittsburgh and later as manager of its Boston office, and as special representative in New York City. A portrait and biographical sketch of Mr. Townley were published in the *ELECTRIC RAILWAY JOURNAL* for July 1, 1911. Mr. Townley goes to the Westinghouse company directly from the New York, New

Haven & Hartford Railroad, with which he has been connected for the past seven years. Mr. Davis, who has been elected one of the vice-presidents of the company, has been with the company for twenty years. For the last few years he has held the position of assistant to the first vice-president and manager of engineering at the East Pittsburgh works.

**Hayes Track Appliance Company, Richmond, Ind.**, has placed on the market a new style of derail for use in connection with interlocking work called model CP. This derail is similar in form and size to model C, but has a reversible central eyebolt like model AP. This permits of three connections to the derail. The operating rod is attached to the eyebolt while the facing point lock and wire bolt lock are attached to the cast lugs. The eyebolt is drop forged and passed through two webs of the derail block. It is reversible and is held in place by double jam nuts.

**Yard, Otis & Taylor, Chicago, Ill.**, is a new firm formed by Fred A. Yard and Benjamin F. Taylor, formerly of the bond department of Finley Barrell & Company, Chicago, and Henry B. Otis, of Evanston, to deal in railroad, municipal and corporation bonds. The new firm has acquired the good will and the business of the bond department of the older banking house, Finley Barrell & Company, while discontinuing their bond department, will continue as brokers to execute orders for listed bonds on the exchange. The headquarters of the new company will be in the Borland Building, Chicago.

**Pullman Automatic Ventilator Manufacturing Company, York, Pa.**, the Consolidated Ventilating Company, Rochester, N. Y., and the National Ventilator Company, New York, N. Y., are to be merged. The new company will be capitalized at \$800,000, of which \$275,000 will be 7 per cent cumulative preferred stock and \$525,000 common stock. The president of the consolidated company will be Freeman Allen, of Rochester. C. C. Frick, president of the Pullman Automatic Ventilator Manufacturing Company, will remain with the consolidated company for the present at least. The constituent companies have a number of plants in operation at the present time, but it is probable that the work of the company will be concentrated at either York, Pa., or Rochester, N. Y.

#### ADVERTISING LITERATURE

**Ackley Brake Company, New York, N. Y.**, has issued a folder describing and illustrating the Ackley adjustable brake.

**Phillips Manufacturing Company, New York, N. Y.**, describes and illustrates the Phillips automatic commutator grinder in a booklet recently issued.

**Bridgeport Brass Company, Bridgeport, Conn.**, has issued a folder calling attention to the merits of phono-electric trolley wire which the company manufactures.

**W. H. Zimmerman Company, Chicago, Ill.**, engineer and constructor, is mailing a post card showing views taken during the construction of the Lansing, Grand Ledge & Western Railway, Lansing, Mich.

**Chisholm & Moore Manufacturing Company, Cleveland, Ohio**, has issued a sixty-six-page catalog which describes and illustrates its various types of chain and trolley hoists. Several pages of the catalog are devoted to the Moore anti-friction baggage car door and elevator door hangers.

**General Electric Company, Schenectady, N. Y.**, has issued Bulletin No. 4855, which is devoted to a detailed description of its double-truck type of gas-electric car. The publication is elaborately illustrated, and contains considerable data relative to the subject. It includes plans and elevations of cars of various sizes.

**Cambria Steel Company, Johnstown, Pa.**, has published the fourth revised edition of its handbook on steel axles and forgings. It contains the standard specifications for steel axles and forgings of the American Society for Testing Materials, the standard M.C.B. axle specifications and an abstract of the Interborough Rapid Transit Company's specifications for heat-treated axles of high strength made by the Coffin process, which is controlled exclusively by the Cambria Steel Company. The handbook also contains drawings of all standard sizes of axles, including motor axles, tables of weights of iron bars, conversion tables and many other useful data.