

Street Railway Journal

VOL. XXXI.

NEW YORK, SATURDAY, FEBRUARY 29, 1908.

No. 9

PUBLISHED EVERY SATURDAY BY THE

McGraw Publishing Company

James H. McGraw, President.

J. M. Wakeman, 1st Vice-president. Harold S. Buttenheim, Secretary.

A. E. Clifford, 2d Vice-president. Curtis E. Whittlesey, Treasurer.

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MAIN OFFICE:

NEW YORK, 239 WEST THIRTY-NINTH STREET.

BRANCH OFFICES:

Chicago: Old Colony Building.

Philadelphia: Real Estate Trust Building.

Cleveland: Schofield Building.

London: Hastings House, Norfolk St., Strand.

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

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TERMS OF SUBSCRIPTION

In the United States, Hawaii, Puerto Rico, Philippines, Cuba, Mexico and the Canal Zone:

Street Railway Journal (52 issues).....\$3.00 per annum

Single copies.....10 cents

Combination Rate, with Electric Railway Directory and

Buyer's Manual (3 issues—Feb., Aug. and Nov.).....\$4.00 per annum

Both of the above, in connection with American Street

Railway Investments (The "Red Book"—Published

annually in May; regular price, \$5.00 per copy).....\$6.50 per annum

To Dominion of Canada:

Street Railway Journal (52 issues), postage prepaid.....\$4.50 per annum

Single copies.....10 cents

To All Countries Other Than Those Mentioned Above:

Street Railway Journal (52 issues), postage prepaid.....\$6.00

Single copies.....20 cents

25 shillings. 25 marks. 31 francs.

Remittances for foreign subscriptions may be made through our

European office.

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During 1907 the Street Railway Journal printed and circulated 427,250 copies, an average of 8216 copies per week. Of this issue 8000 copies are printed.

The Hudson & Manhattan Tunnel

The tunnel of the Hudson & Manhattan Railroad Company, which was officially opened for traffic Feb. 25, from Washington by President Roosevelt, is the first of the three sets of tunnels now projected between the two States and the precursor probably, before many years have passed, of other similar means of communication between the two sides of the river. It is also the longest subaqueous tunnel in the world and its use is of course made practicable only through the employment of electricity as a motive power.

The importance of this piece of engineering work was evinced by the attendance at the opening ceremonies of the governors of the two States thus linked together as well as by one of the largest gatherings of engineers, bankers and railroad men which has ever been held in New York. To both States the opening of the tunnel system of the Hudson & Manhattan Railroad Company will be an important event. The magnificent waterway of the Hudson River, while advantageous to New York City in affording unrivaled docking facilities, has always been a bar to the spread of its population westward, and those whose business has required them to cross the river frequently have been subjected to delays due to transfer from boat to car at each end of the voyage and to fogs, ice and other obstructions of navigation. In its insular position New York has been unique among the large cities of the world, and many of its sociological problems are due to this cause. The population of the entire city is growing rapidly and the increase now averages 4 per cent annually. In a few years the unoccupied districts to the north and east of the city which can be reached within a reasonable time from the center of New York will be built up, so that the logical expansion of the future is toward the west.

The plan to construct an all-land route between Hoboken or Jersey City and New York is not a new one. The first attempt was made some thirty years ago and failed because the time was not ripe. One name stands prominently in the resuscitation of the scheme and its final successful completion, that of William G. McAdoo, and will be indissolubly linked with it, so that the celebration on Feb. 25 was largely a personal triumph for him. His efforts would of course have been unavailing without financial support and the work of the civil, electrical, mechanical and mining engineers upon whom have devolved the solution of the various problems connected with this stupendous work.

The Arnold Subway Report

The report of B. J. Arnold on methods of reducing congestion in the New York Subway, presented last December and printed in the STREET RAILWAY JOURNAL for Dec. 7, referred to the subject of car design. This, it was stated, was in a sense the crux of the situation and would be considered at length in a subsequent report. This report was presented this week and is abstracted at length elsewhere in this issue. As an example of a careful study of car design, it is extremely interesting and is the most complete report on the subject with which we are acquainted. Mr. Arnold does not hesitate to say that a change in the type of cars to be used is practically the only solution for the present difficulties. He discusses all of the various types of cars employed elsewhere and some which have simply been proposed, but rejects them all for a car with two end doors, which he believes to be best adapted for the purpose under present conditions of platforms and traffic.

So far as we know, the double-end door car has never

before been suggested in any of the studies on rapid transit car design which have been made public. Nevertheless it possesses a number of advantages for the conditions in New York and grows in favor upon one as he studies its plan. Whether it would be as desirable elsewhere is another question. But the New York conditions are different from those in practically any other rapid transit system because there is no distinct terminal at either end. As a result there is a certain amount of long-distance travel and a large amount of short-distance travel, so that the long-distance passengers have to be accommodated in a place in the car where they can be undisturbed by the shorter travel passengers who are constantly moving in and out. These conditions are summarized in the report by Mr. Arnold, who then runs through the gamut of the possible variations in car design in the way of end doors, center doors, quarter doors and multi doors. After applying each to the New York situation he finds in all of them drawbacks which render them inferior in practical value to the type finally selected. Of all of the rejected designs the multi side door car is most favored, provided the flow of passengers can be controlled at some place other than at the door of the car, but as this restriction is practically impossible in the New York subway, it need hardly be considered as a possibility.

Car design is so closely associated with platform design that the two have to be considered together. For this reason Mr. Arnold recommends a system of platform railings which should be used with the car proposed.

Tool Lists in Repair Shops

The importance of keeping an up-to-date list of tools is not always appreciated in street railway repair shop practice, but in reality few records can be made of greater value. Master mechanics with natural aptitude for recalling machine statistics are frequently found, but as a shop grows larger in its equipment resources it becomes more and more difficult to carry in mind the essential particulars of each machine tool. A change in administration, an appraisal of equipment value, extensions and alterations of the machine arrangement and the placing of repeat orders with the manufacturers for duplicate parts or entirely new apparatus are greatly facilitated by the existence of full data in one known place bearing upon the shop equipment.

In many cases the only way to secure accurate machine data is to go into the shop and by personal observation and measurement note the facts wanted. It ought not to be necessary to do this but once for a given machine, however. In some power plants the chief engineers have the commendable loose-leaf book habit and are able to quote minute machine details with immediate response when a request for information comes from headquarters. The saving in time is obvious. If master mechanics would more generally follow the same practice the advantage would easily outweigh the slight trouble required in carefully listing each machine from its first appearance in regular shop service. Just as drawings of shop "kinks" are of the greatest value when preserved in accessible form, so are similar records of equipment capacity, methods of driving, power needed for different services, manufacturer's numbers, speed limitations and costs, quickness of delivery and similar points

thoroughly useful many times in the life of the average shop machine.

Parks and Pleasure Resorts

In the issue of Jan. 25 we announced that the subject of parks and pleasure resorts of street railway companies would again be taken up in this paper, and this issue will be found to be devoted largely to that subject. No attempt will be made to summarize here the information contained in the following pages upon this topic, but one or two points might be emphasized as being in the direction of building up a permanent summer business to a street railway park.

When on a fine summer's day the casual visitor strays to some starting point of an electric railway system and sees hundreds or maybe thousands of would-be passengers struggling for the privilege of a ride to Sunnybrook Glen he may be pardoned for looking at park operation with rose-tinted lenses; but the railway manager who, in the idiom of the day, is "on the job" all the time knows that even summer skies can fail to smile and that then all the extra equipment and the park itself are eating up the profits of the occasional fat days. This state of affairs applies principally to the "natural" park, located beyond the five-cent zone, where there are few attractions in enclosed buildings and the attendance suffers greatly even if the weather is only dull or cool.

In view of this state of affairs it is worth noting that several electric railway companies are endeavoring to reduce this speculative element by setting aside a certain portion of the park grounds for a cottage colony through which they can develop a source of steady traffic every day in the week and for a longer period than the regular park season. No doubt on reading this many an over-burdened manager will cry: "What next? Am I to wrestle with plumbers' bills in addition to menageries, acrobats and vaudeville?" Some answer to this query is furnished by two articles in this number on parks in New York State, where the cottage feature has been actively taken up.

The larger of these resorts is Sacandaga Park, owned by the Fonda, Johnstown & Gloversville Railroad Company, which appeals to the very finest class of patronage. The cottages in this park are fitted with the most modern appurtenances and are in such attractive surroundings that they house many people who are not in business in the nearby towns. In striking contrast to this place is Forest Park, a modest tract, thirty minutes from Schenectady. The grounds are owned by the Schenectady Railway Company, which is developing a portion for a cottage colony. The terms for leasing land are reasonable enough to attract Schenectady workers with moderate incomes, so there is little question that in a few seasons there will be a good amount of regular interurban travel owing to the establishment of a few score cottages.

These two instances may suffice to prove how an attractive park at some distance from town can be of business value in another way, especially if it offers boating and fishing. It should be remembered, however, that an experiment of this character can be successful only in parks where the average visitors are well behaved enough to refrain from injuring the property of the cottagers.

Publicity for Interurban Railways

The work of the publicity department is closely associated with that of the department of the promotion of traffic. It is not out of place, therefore, in a number devoted largely to parks and pleasure resorts to refer to certain features of publicity work which have not received any great amount of emphasis. The papers on this subject at the last meeting of the American Street & Interurban Railway Association were devoted largely to a discussion of what can be done on large systems and under city conditions. The right kind of publicity, however, is no less valuable to the interurban railway with its chain of cities and towns. In large communities the principal value of such a department lies in the opportunity afforded to give out only true and accurate statements of accidents or other events; to exercise, as it were, a censorship on news relating to the company's interests and at the same time systematically to cultivate the good will of the press, which is a power for good or evil in affecting public opinion. The newspapers in smaller cities and towns have not the same potential power of doing harm, perhaps, but they can be of great help in promoting traffic, or, for example, in educating the public to some innovation which is to be made. Few interurban roads have made the most of their opportunities in this direction.

The editor of a country newspaper is always glad to receive and print almost any kind of an item of news. It is usually a struggle with him to fill up the space left over after the advertisements are in, and every such paper keeps in stock "plate matter" to fill in the gaps. Hardly a week goes by but some event occurs on an interurban road, which if given to the newspapers in the towns along the line in the form of a news item would be good for from an inch to a column of space. These bits of news about the road, its new cars, extra train service, new arrangements for selling tickets, inauguration of a merit system of discipline or any one of a hundred things of interest about it or its employees are good advertising which costs nothing. They keep the interurban before the minds of its patrons as no reasonable amount of paid display advertising will do.

It is not always necessary or even advisable to mention the name of the road in such items. Oftentimes the most beneficial and effective publicity is the most subtle. Shortly after the organization of the Central Electric Traffic Association the superintendent of one of the important interurban roads in Indiana prepared a full statement in plain language, of the purpose and objects of the new association, pointing out the benefits to passengers and shippers through an accurate and complete compilation of through rates and dispelling positively the idea that the new association was formed to make or raise rates. This he gave to the newspapers in four towns on his line, and with few changes it was printed entire in each of them, filling more than a column. This was the broadest kind of publicity, helping every interurban road in that part of the state. If each road did its share of the same kind of educational work each would reap a proportionate benefit in the end by the increase in traffic thus promoted. The country newspaper is well worth the modicum of trouble required to cultivate it.

Power Station Costs

In presenting data on power station operating costs at meetings of scientific bodies and in technical periodicals it is customary to include in that cost the items of labor and material only. For the purposes for which these figures are given out this method is perfectly proper because the audience directly reached understands or should understand all of the conditions under which the data are obtained. They realize that the costs quoted include no more than they purport to do and apply this knowledge to any use of them, either for comparisons or in any other way, which they may make. It is not at all our purpose to criticize the existing classification of power station operating expenses, still less to thrust upon the street railway world any new system of accounting, although we would have plenty of high precedents for so doing. Nevertheless, it seems desirable to point out that the common practice of engineers in thus referring to the cost per kw-hour of power generation often conveys to the general public an entirely different conception than that produced on an audience of engineers.

Assume for instance that some eminently respected citizen of civic reform proclivities reads in his evening paper, on his way home from his office, that the local street railway or lighting company has produced power at its station during the past six months for 0.46 cent per kw-hour. He glances around the car and remembers his last lighting bill and immediately jumps to the conclusion that 4.54 cents of the nickel which he has just paid for fare and 14.54 cents out of every 15 cents which he has been in the habit of paying per kw-hour for light have gone to swell the profits of the rapacious street railway or lighting monopolies. Perhaps he will grudgingly admit that the motorman and conductor upon the car have to be paid and that the lighting companies have a few trivial operating expenses in carrying their current to the lamps, but it will be with great difficulty that he can be convinced that provision has to be made for any other expenses in railway or lighting operation. Least of all will be remembered that the company has fixed charges which must be defrayed out of its receipts. These delusions are productive of 3-cent fare regulations and the like.

While it may be impossible to correct this condition of affairs entirely, one step in that direction is made when complete operating expenses are available in some form and an omission from a report of depreciation and maintenance is theoretically, at least, as serious an error as the wild assumption of the respected citizen already mentioned. Practically these items are considered. If a company was proposing to buy power instead of generating it, no one would consider the cost of materials and labor, fixed charges and general expenses only in the total amount. There are the wear and tear on the apparatus and the constant obsolescence of the machinery for which provision must be made. In consequence the 0.5 cent per kw-hour grows, and rightly, to perhaps 2.0 cents or more, before a fair charge is reached. If this is the right principle in power charges it is equally applicable throughout the system, and any impression that it is not and that these items can be ignored is unfair to the road, and will ultimately react upon it.

THE PARK EXPERIENCE OF THE UNION ELECTRIC COMPANY, OF DUBUQUE, IA.

BY L. D. MATHES.
General Manager of the Company.

For many years there has been discussion among street railway managers concerning the degree of activity which operating companies should exercise in the amusement line. The "amusement line" term as here used is intended to cover entertainment and amusement of every character and description, and its object is to induce traffic for the lines of the railway company.

The master minds of the profession have wrestled with the question, some on one side and some on the other. There are still many conservative managers who insist that no street railway company should invest a dollar of its money in amusement ventures, though the opinion generally held is that investments of this character are entirely legitimate.

The necessity of a company embarking in this field is



MUSIC PAVILION.

less pronounced in the larger cities. Centers of population of 150,000 and over present an attractive field for the individual whose business is catering to the amusement loving public. It is in the smaller cities, say of 75,000 or less, where the company is as a rule left by the professional promoter to its own devices. This will undoubtedly be the case to a greater extent in the future on account of the unfortunate summer season of 1907. The element engaging in this line had a sad experience the country over last year. The "White City" craze which spread over the country like an epidemic during the past two or three years found root in many cities and towns which on account of restricted population were entirely unable properly to support the ventures.

The writer, from contact with railway and park managers from many sections, and some observation as well, is of the opinion that the days of the gaudy papier-maché front with its glare of electric lights and corps of leathern-lunged boosters, the merry-go-round with its never ceasing mechanical piano, the roller coaster railway, the Katzenjammer castle, the crazy house, the old mill and all that line of so-called amusement devices, have had their day. The

public is tired of the toys of yesterday and wants something new. Ingenious as are the creators and builders of these schemes they cannot keep up with the demand of the public for a complete line of new devices each season. Even though they could be produced the income from the game would not permit of the reconstruction each year.

Many managers incline to the reasoning that the public in tiring of the boisterous "slap-stick" entertainment of the variety found in the average amusement park craves a touch of nature. This accounts for many striking examples of the development of natural resorts which are being undertaken in some of the smaller cities.

In the amusement line the Union Electric Company, of Dubuque, has, in the expression of the "Great White Way," "been down the line" in an endeavor to create traffic for its railway. The company in years past has been liberal in its support of many ventures which gave promise of returns. It controlled for several years a franchise in the III League, the company's manager directing the handling of the club. After four years of professional baseball the company has retired, having as an evidence of the time and money spent one handsome silver loving cup, which was presented on the happy occasion when its gladiators came romping home with the goods. To balance the books on this deal would show a loss. It is estimated that the extra traffic to and from the baseball park was about sufficient to offset the subscriptions which the company was compelled to make from time to time to keep its lusty representatives in circuit with the feed trough.

The company has for several years been a leading spirit in the Tri-State Fair, which conducts for one week each fall a big county fair and trotting races at Nut-

wood Park, this being a finely equipped fair and racing plant owned by the company.

In the summer of 1904 the company conducted a miniature "White City" edition with vaudeville as the feature. A season of cold, rainy weather transformed this venture into a memory which is recalled occasionally by a glimpse at the profit and loss account.

Balloon ascensions, individuals who made a slide for life with their teeth encircling a wire rope, fire works shows, monster picnics, band concerts, sauerkraut fests, high dives—in fact anything and everything on the docket—were undertaken. Some of these promotions were highly successful and increased at the time the company's receipts \$500, \$600 or \$700 a day. This, it will be understood, for a system operating a schedule calling ordinarily for twenty cars is an increase of considerable magnitude in its business.

In 1905 the company undertook vigorously the matter of developing a natural situation—a tract of ground of 40 acres, which has since been increased through purchase of additional acreage. Cutting loose from the old time "ballyhoo" methods, announcement was made that the entire object of the company would be to create a pleasure ground

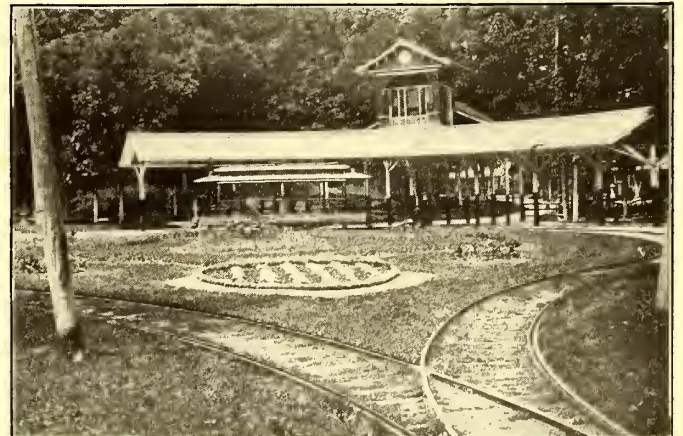
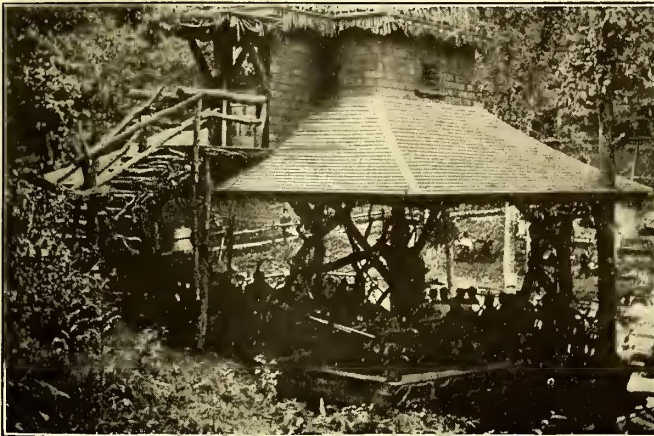
which would be the beauty spot of the city and the pride of its people. The first year material progress was made and in order to acquaint the public with the improvements concerts were announced by organizations of unquestioned merit. There was no charge or fee of any kind beyond the car fare, which is 15 cents for the round trip. From an obscure resort which for several years had been visited by a few thousand people each season, Union Park sprung immediately into popularity and each season has seen increase of patronage by the public at large.

The park is conducted along lines which could not but appeal to the best element of any community. The entertainment provided is of high class, and there is an entire elimination of the petty graft methods as involved through the

per cent more, but the company worked on the theory that there was more at stake through the guaranteed satisfaction of its patrons than an increase of \$1,000 or \$2,000 in the receipts from privileges.

The refreshment service, besides confections, cigars, soft drinks and ice cream, afforded a well-selected menu, including tea, coffee, chocolate, sandwiches, cold meats and salads.

Offers were made for concessions of the kind usually found in amusement parks which would have represented an income of several thousand dollars. Purchasers of these privileges would naturally have been compelled, in order to show a profit on the right side, to have grafted the company's patrons for an amount sufficient to pay for the priv-



VIEWS IN UNION PARK, DUBUQUE.

presence of individuals operating concessions of various kinds.

The concessions at Union Park consist of a dance hall, two refreshment stands and a bowling alley. The dance hall is a structure of unusual attractiveness; it is surrounded by a 12-ft. veranda, is brilliantly illuminated and is equipped with a large number of electric fans. The company sells the privilege for a fixed sum, reserving the right to cancel the lease at any time and demanding of the lessees that the dance feature be conducted in a manner agreeable to the company. The refreshment stands and bowling alleys are fully provided with modern equipment and are operated by responsible individuals on the profit-sharing basis. The company supervises the general conduct of these enterprises and guarantees the public city prices and the highest character of service.

The net amount received by the company for the 1907 season for the park privileges was \$1,500. These privileges could have been sold through competitive bidding for 100

ileges and a surplus. The manager of a street railway who realizes that he must win and hold the support of the public to which he caters will readily realize that these "separation" schemes will in a short time kill his park business. These games may prove successful for a short time in a community where there is a large transient population, but never in the cities of the class with which we are now dealing.

To insure its patrons of the minimum of annoyance from obstreperous characters, the company maintains during the season a park police force—special officers authorized by the judge of the county court. They are on duty during the afternoon and evening, assist in the handling of the crowds on and off the cars and incidentally look after the conduct of all who enter and leave the park.

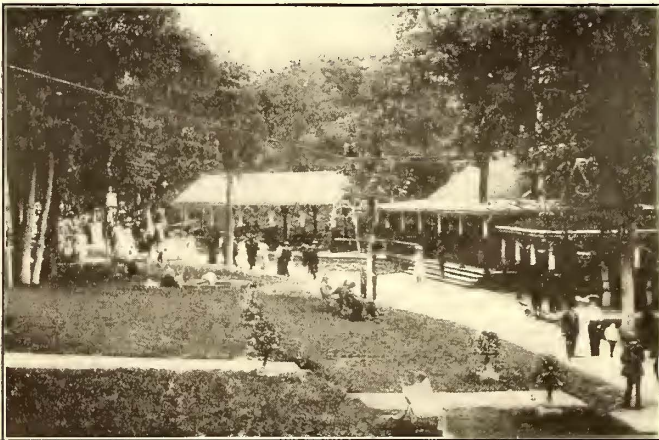
The feature of the park is the "Plaza." This is a large square with a firmly rolled cinder and gravel bottom and provides, through the agency of modern equipment, seating capacity for 3000 people. The seats face a rustic band

stand, the platform of which is 40 ft. x 40 ft. The roof of this stand was designed by a specialist on acoustics. Musicians and performers comment on the remarkable effects produced by vocal or instrumental effort from this stand.

Two performances are given daily, afternoon and evening. Each program lasts for two hours, with a fifteen-minute intermission. For two seasons the company put on brass bands, orchestra and soloists. A band of from twenty-five to thirty-five pieces would enter a two weeks' engagement, the elimination of railroad fares on the second week making it advantageous for the company to hold the organizations more than one week. On the last half of the engagement, as an added attraction, a singer of note would

Dubuque have questioned the wisdom of assuming this expense with no revenue other than the car fares. At Dubuque there is no question but that the returns have been in sufficient volume to more than justify the expenditure. Without the attractions the park travel would have been much less than that actually realized.

The company believes in using liberally the space of the daily papers. In each of the two dailies a double column space 6 in. deep is carried. On Sunday, the opening day of the week, the announcement of the week's program is given a space four columns wide and 6 ins. deep. In addition to this there is inserted in each paper 1000 lines per month of 3-in. and 4-in. "local readers." In recognition of the liberal support given the press by the management the



VIEWS IN UNION PARK, DUBUQUE.

be engaged to appear with the band or orchestra, the soloists rendering a number in each half of the two daily programs. The bands and soloists presented at this park play in all of the larger cities of the western country.

For the closing month of 1907 the company was prompted on account of inclement weather to economize on the cost of its entertainment, and put on moving pictures with three changes weekly with two singers who would change weekly and an accompanist. It was an agreeable surprise to note that this entertainment, at one-third the cost, drew equally as well as the more expensive attractions, indicating that the masses are not discriminating so long as the entertainment provided is clean and wholesome. The pictures could not be presented in the afternoon, and to lengthen the program the singers put on extra numbers.

During the season of 1907, which lasted only 60 days on account of unusually inclement climatic conditions, the cost of the advertising and attractions was \$7,720. Managers of street railways operating in cities of the class of

papers publish as reading matter such articles relating to the programs at the park as would be of general interest. This means in the neighborhood of three-quarters of a column of reading matter in each Sunday issue and from a third to a half column in each daily issue. Traveling organizations provide lithographic matter which is placed at the company's expense through contract with the City Bill Posting Company. In addition to these methods bands and soloists provide half-tones which are used on 8-in. streamers—these streamers in bunches of fifty are hung in the cars to the amount of 10,000 or 20,000 per week.

Dubuque is a great community for picnic parties. The park is equipped with tables and benches which are scattered in shady nooks and corners, with a seating capacity of approximately 1000. It is the practice for the women and children to go out in the afternoon with the lunch baskets and be joined in the early evening by the male members of their families. After lunch they enjoy the first half of the program and return to the city—in this

manner contributing to break the rush which follows at the conclusion of the concerts.

The company operates a five-minute schedule to its park. Each motor car hauls a trailer, so that the carrying capacity is about 2000 people per hour.

One feature of Union Park which is not usually enjoyed by operating companies is the fact that every person visiting the park must go on the cars of the company. The

ROCKWOOD PARK, ST. JOHN

An excellent example is presented in Rockwood Park at St. John, N. B., of the results possible where full advantage is taken in park management of the natural resources of the land available for park purposes. The park is within limits of St. John, a city of some 50,000 inhabitants, and a 5-cent fare is charged from any point in the city to the



LAKE AT ROCKWOOD PARK

park is located at the head of a rocky gorge and there is no other entrance except via the street railway line.

Visitors are impressed with the substantial character of the park improvements—there are long stretches of broad cement walks, a complete water works system, beautiful fountains and the floral designs and exhibits are the most elaborate in the city.

Absolute good order in the park is so strictly enforced that women and children can visit the resort unattended at all times with every confidence that they will be free from contact with disagreeable influences of any char-

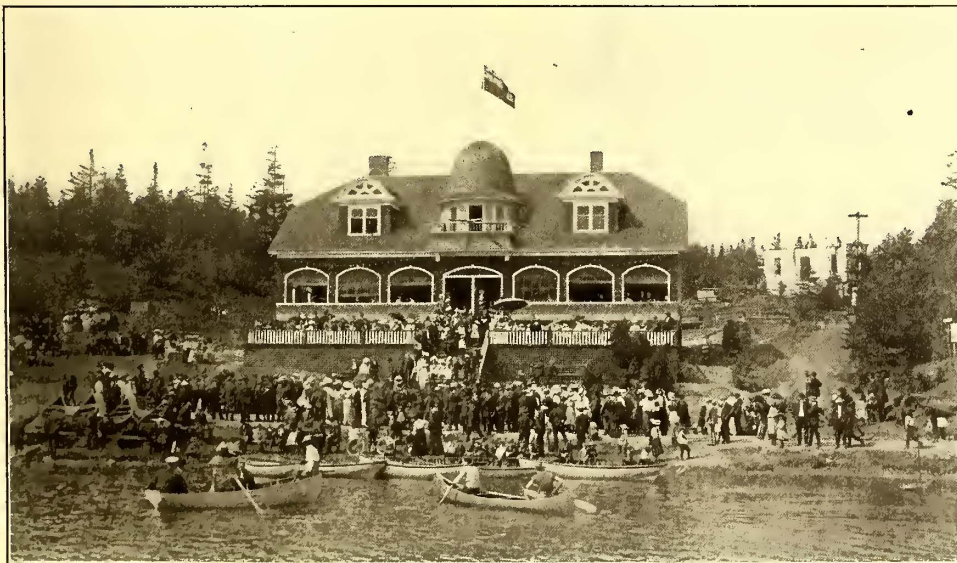
acter. The land set aside for amusement purposes comprises 1000 acres, included in which are three beautiful natural lakes. It is the water feature especially that has been taken advantage of to draw the crowds, and the methods used are in a way available to all park managers who are so fortunate as to include a lake within the boundary of their resorts. The resort is well patronized in summer as well as winter. As the seasons succeed each other, boating and fishing give way to skating and tobogganing and vice versa. The extent of the patronage is clearly indicated by the accompanying pictures showing both winter and summer

scenes. An especially surprising feature of the winter patronage is the large number of spectators; in fact, the ice sports seem almost to draw as many people as the races in the summer.

The popularity of both boating and skating has been patent for years. The question has been how best to make the most of it. This the Rockwood Park management seems to have solved. The main chance is accommodation. This has been carefully looked after by providing a suitable club house, artistic but not costly, which serves as a rendezvous for the boats in the summer and as a retreat in the winter. Here a lunch

room is maintained where at all seemly hours sandwiches, cakes, tea, coffee and milk may be obtained.

It is from this building that the boat livery is conducted in summer. On hire are row boats, canoes and barges. The row boats and canoes of course are exceedingly popular with the young men and women, who patronize them liberally, especially on Saturdays and in the evenings.



CASINO AT ROCKWOOD PARK

acter. This the company regards as one of the chief assets of the institution. No park can enjoy a higher tribute than the entire confidence of the public at large in this particular.

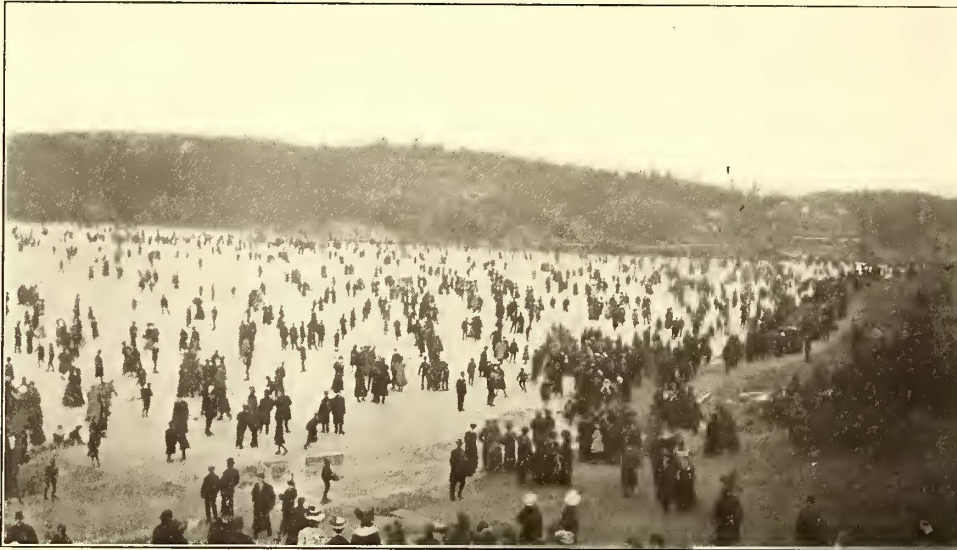
Many improvements are being made for the 1908 season and the company anticipates a large increase over the business of the past three years.

For them a charge is made of 40 cents an hour. The competition for rowing honors is keen and races are frequent. Whenever one is held it is a limited edition of the college event on the Thames, the spectators in proportion probably outnumbering those who attend the big event. The fishing is excellent and naturally a large number of boats are hired by fishermen. For them special boats are set aside, as

FOREST PARK ON THE LINE OF THE SCHENECTADY RAILWAY COMPANY

The Schenectady Railway Company, while it has not gone into the amusement business on a large scale, operates a 180-acre park and cottage resort on the shores of Ballston Lake, about half-way between Ballston and Schenectady.

The grounds are called Forest Park, and as the property is only 8 miles from Schenectady the cottage feature has proved a good one for maintaining traffic before and after the regular excursion season, when most travelers use this line for visits to the park or Ballston Spa and Saratoga at the northern end of the line. The park is easily reached from Albany and Troy for a regular round-trip fare of 65 cents. Excursion rates, however, are lower, 54 cents being charged for adults and 25 cents for children. Other excursion fares are as follows: Schenectady, 25



SKATING AT ROCKWOOD PARK

fishing from a boat soon makes it undesirable for renting to pleasure parties.

Accommodations for the skaters are provided at the building which in summer serves as the boat house. Here skates may be hired, and, as before stated, lunch may be bought. The skating is at times enlivened by competitions and by figure skating. Both of these classes of events bring to the park no end of spectators. The slides are run from the bank and terminate on the lake. There always is a goodly crowd watching the coasting.

Until 1907 the resort depended solely upon the boating and skating, but last year it was decided to take advantage of the crowds attracted to the lake and a carrousel, Ferris wheel and shoot the chutes were installed. The shoot the chutes is probably the only one in the world that uses the natural hill at the side of the lake for its elevation. A flight of eight stairs is used at the top of the hill to bring the patrons of this sport to the top of the chutes. The height of the platform from which the boat starts to the water is 65 ft. The carrousel was supplied by the Herschell & Spillman Company and seats 56 people. The Ferris wheel is second hand. The daily average attendance in fine weather is about 4000 people. The St. John Street Railway Company's line is now some five minutes' walk from the entrance to the park, but it is probable the company will in the near future build into the park.

Vinewood Park, reached by the Topeka Railway Company's lines from Topeka, Kan., is a model summer resort in many respects. It comprises about 80 acres of forest and meadow and presents in that respect excellent natural advantages. It is open every year from Easter until October. There is no end of amusement devices. Besides there is a lawn for tennis and croquet, and boats are to hire on the lagoon, a beautiful shaded spot. Among the attractions are a Fig. 8, toboggan, circle swing, electric carrousel, penny arcade, a café and a miniature railway. Theatricals are given in a tastefully arranged auditorium.

cents; Ballston Spa, 25 cents; Saratoga, 45 cents.

In spite of the fact that practically all the business emanates beyond 5 or 10 cent fare zones, the park is visited every season by 75,000 to 100,000 people, who are willing to travel a considerable distance because they are sure of a fine all-day outing without coming into contact with the cheaper element met in parks nearer the cities. The holiday crowds often number 5000 to 6000, and it is not unusual



A TYPICAL FOREST PARK COTTAGE

to have 3000 visitors on Sunday, although a band or orchestra is the only large attraction.

Naturally enough the presence of a fine lake has made boating a leading feature in this park. The company operates a steam launch on which 30-minute trips are given for 10 cents. During a season this launch has carried over 10,000 people. Last season 36 steel rowboats furnished by the Detroit Steel Boat Works were used, and although 3500

trips were made by them there was not a single accident. The cost for the rowboats is 25 cents the first hour and 15 cents for each additional hour.

Aside from the water sports there is a pretty dancing pavilion 40 ft. x 80 ft. in size, ice cream booth, confectionary and novelty bazaar and a kitchen for the free use of picnickers. A welcome feature for the young visitors from the adjoining interior cities is the miniature sea beach. The grounds are also provided with swings, benches and similar conveniences.

It is apparent from the foregoing that the Schenectady Railway Company has not endeavored to do much more with its park than to make an attractive place for nature lovers. In fact, the park idea has been more or less subsidiary to the company's desire to develop a cottage colony for moderate salaried workers in Schenectady. The land owned by the railway extends for about half a mile along the lake shore and is ideal for residential purposes. It is cut up into lots 150 ft. deep by 100 ft. water front, which



SCHENECTADY RAILWAY COMPANY'S STATION AT FOREST PARK



SEA SAND BEACH AT FOREST PARK



FOREST PARK DANCING PAVILION



A SCENE ON BALLSTON LAKE DURING ONE OF THE ANNUAL REGATTAS

are leased for an annual rental of \$25 for a period of ten years. The cottagers put up the buildings themselves and may remove them if the lease is not renewed. At present 29 cottages are in use and seven more are under contract. There is every reason to believe that this colony will enjoy

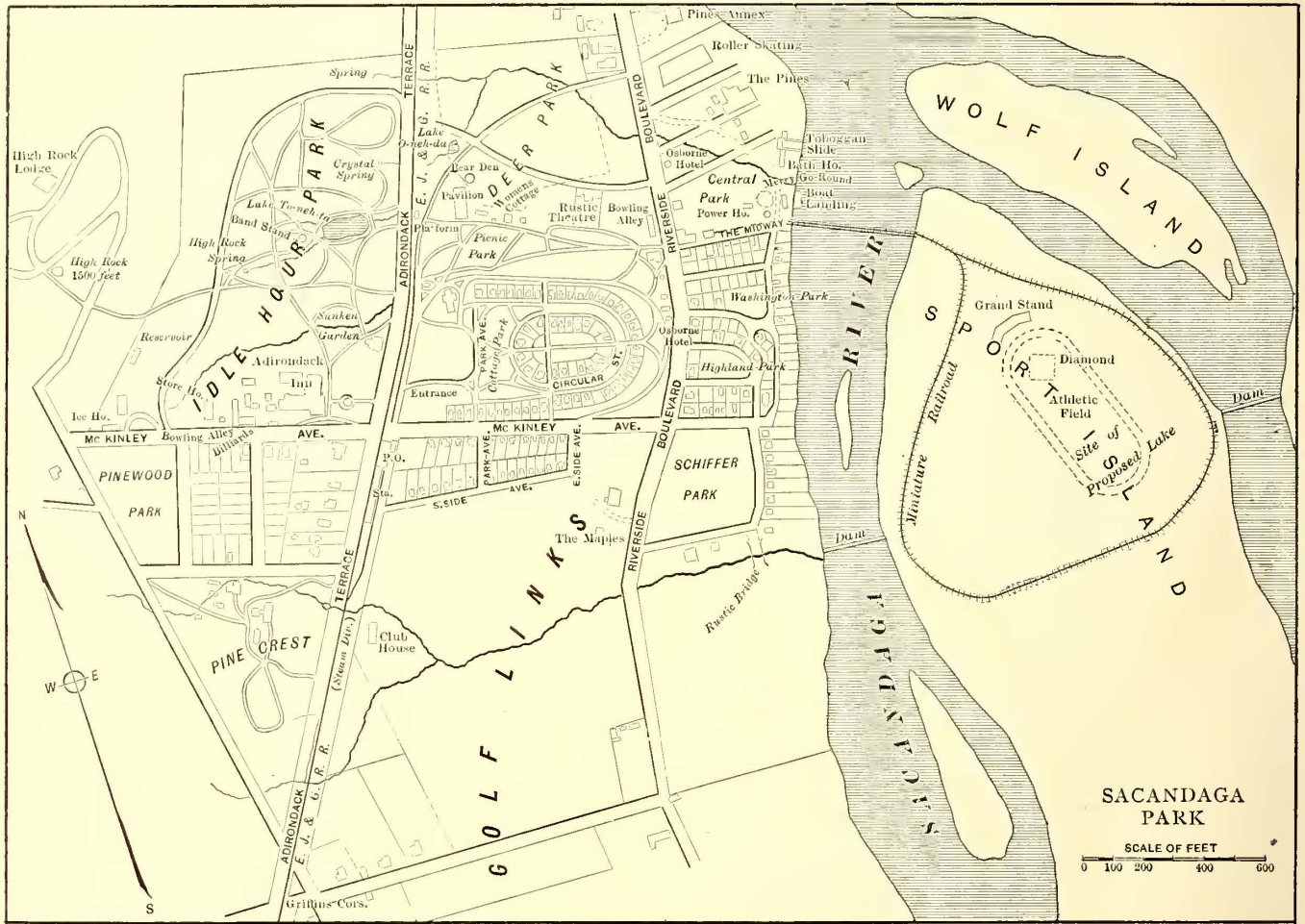
a rapid growth, as the park is only 30 minutes from Schenectady and the railway gives a half-hour service at commutation rates. Most of the cottagers at Forest Park make it their home from spring to snow time, but some remain all winter.

SACANDAGA PARK IN THE ADIRONDACK FOOTHILLS

Although many electric railways manage large park properties directly, there are very few which have gone into this phase of the transportation business so extensively as the Fonda, Johnstown & Gloversville Railroad Company, operating in Central New York. The territory traversed by this line is of great scenic interest, especially at the northern terminus near the Sacandaga River, where the company owns a beautiful 300-acre pleasure ground in the foothills of the famous Adirondack Mountains. This place, which is widely known as Sacandaga Park, is so attractive that it has been found equally suited for the picnic party

district. The season for transient visitors extends from about May 30 to Sept. 30.

The accompanying map of Sacandaga Park is of rather unusual interest because of the combination it presents of a pleasure resort for both permanent and transient patrons. The greater part of the grounds has been tastefully laid out by landscape artists into rustic roadways with many arbors, gardens and ponds, while the sanitary features have been well cared for by a complete system of water supply and drainage. There are about 300 cottages and two large hotels in the park. The cottages are rented for \$15 to \$30 a month, these figures including water rates and taxes. The largest hotel is the Adirondack Inn, which accommo-



Street Railway Journal

MAP OF SACANDAGA PARK. NEAR JOHNSTOWN, N. Y.

of a day and for the cottage or hotel folk who stay for weeks or months at a time.

The park is on the main line of the Fonda, Johnstown & Gloversville Railroad, about sixty-eight miles from Albany on the east and seventy-seven miles from Utica on the west. These towns fairly represent the limits within which transient business is attracted to the park, but many of the residents in the hotels and cottages come from points hundreds of miles away, just as they would to any other summer resort. The other summer residents in the park are business men from adjacent towns, who go up either every day or at the week end to join their families. The average number of park patrons of this character is about 2000 for a season extending from May 1 to Oct. 30. The length of this season is due both to the attraction of living on the grounds and also to good fishing and hunting in the

dates about 250 guests. The other hotel, known as The Pines, is the one more commonly used by those who visit the park for periods of two or three days. Both hotels are strictly high class and have the conveniences of large city hotels in addition to tennis, croquet courts, bowling alleys, etc. There is also a fine golf links, which is open to both long and short-time visitors. The hotels are leased, but the cottages are cared for directly by the company. All of the buildings are electrically lighted from the railroad company's Northville power house about half a mile away. The grounds are splendidly lighted by electricity at night and the large electric fountain in front of the Adirondack Inn makes the park a veritable fairy garden.

The general management of the park is in the hands of the railway company's general passenger agent, who begins a systematic traffic campaign as early as April. A

list is prepared of all desirable organizations in Utica, Albany, Troy, Schenectady, Johnstown, Gloversville, Amsterdam and other towns in the district. Then the proper officials are thoroughly canvassed by a special excursion agent as to holding their next excursion at the park. Spe-

In 1907 there were 90,000 visitors in all, or 15,000 more than in 1906; of these 20,000 came in large excursion parties from the more distant points. The heaviest traffic was carried on July 4, when fully 25,000 people visited the park. The high character of the transient traffic appears plainly



A MERRY CROWD BATHING IN THE SACANDAGA RIVER

cial rates are made for parties of 500 or more via the New York Central Railroad and the electric railway. For instance, such an excursion party will be taken from Utica to the park and back for \$1.25 instead of the regular charge of

from the circumstance that this great crowd was easily handled by only six special policemen. In fact, on ordinary days one officer is sufficient to keep the peace. One might suppose that the cottagers would be annoyed by the large



IN THE CONCERT GROVE IN SACANDAGA PARK

\$2.75 and proportionate reductions are made throughout the whole territory. Children's fares are half rate. Of course a great deal of traffic comes from Johnstown and Gloversville, from which points only 50 cents is charged for a total ride of 38 miles and 32 miles, respectively.

numbers of occasional visitors, but this has not proved to be the case. The park is so large and the attractions so scattered that within a few minutes after a trainload of visitors has arrived at a station one can hardly imagine where they have gone to so quickly. Of course the orderly

nature of the picnickers has much to do with this absence of friction. All of the amusements are clean and sane, with an entire absence of the disgraceful scenes bound to occur in parks where liquor is freely sold. No gambling or games of chance are permitted.

Sacandaga Park has the good fortune to be well supplied with water. In fact it has a shore line of nearly a mile

the open air pavilion and on Wednesdays and Saturdays there are "hops" at the Adirondack Inn open to all visitors, while on other evenings a small admission fee is charged for dancing in the pavilion.

By an arrangement with the United Booking Offices of New York, Keith-Proctor high class vaudeville entertainments are presented with weekly changes of bill. The patrons of this park naturally are used to the best, so that the attractions offered are either equal to or better than the vaudeville seen in many large cities. The performances are very popular and are given practically at cost. The general admission is only 10 cents and the charge for reserved seats 15 cents. The posters and dodgers for each week are supplied by the booking agency just as for any other theater on the circuit, and are distributed broadcast. The music is supplied by a seven-piece orchestra drawn from the large park band. On Sundays the vaudeville performances are replaced by a moving picture and song show furnished by the Actograph Company, of New York.

Among the sports popular with everybody is roller skating, which is held in a large outdoor rink. There are four sessions every day with music. The charge to adults is 25

cents and for children 15 cents, including, of course, the use of skates, which are of the wooden roller type. This attraction is operated by R. P. Cornell, and the water sports, etc., are managed by the company, as are also the merry-go-round, miniature railway, laughing gallery and the Hale's touring car. The latter was put in last season and has proved a big hit. The penny arcade,



FONDA, JOHNSTOWN & GLOVERSVILLE RAILROAD STATION IN SACANDAGA PARK

long on the Sacandaga River, besides its brooks and lakelets. Boating and bathing in the river are very popular sports and the water toboggan is also well patronized.

It will be noticed from the map that the tracks of the railway run through the park and that passengers are discharged near the Adirondack Inn. There is no admission fee to the grounds and the visitor can have a fine day's



RUSTIC ROADWAY IN SACANDAGA PARK



A TYPICAL COTTAGE IN SACANDAGA PARK

outing and plenty of good music without spending a cent. The concerts are given on the hotel veranda every morning and evening, and in the beautiful wooded concert grove every afternoon. It is the policy of the company to secure during the early part of the season the most popular bands of the nearby cities as an additional drawing card for their townspeople. On Monday evening free dances are given in

souvenir stands, candy booth, etc., are leased. A very attractive feature for the children is the donkey race track and the rides to High Rock, which is 2000 ft. above the sea level and offers a fine view of the Mohawk Valley.

The Fonda, Johnstown & Gloversville Railroad also has the distinction of owning a baseball club, namely the A., J. & G. (Amsterdam, Johnstown and Gloversville) team, of the

New York State League. On certain dates regular scheduled games are transferred to the park ball ground on Sport Island, in the Sacandaga River. On such occasions a special excursion rate of 50 cents, including admission to the game, is made from Gloversville and Johnstown. Sport Island also has room for a football ground and quarter-mile bicycle track. The grand stand seats 1500 people. The island is reached from the park by a rustic bridge which carries the miniature railway.

The park is extensively advertised by the careful distribution of finely illustrated descriptive booklets, by news notices in all Central New York newspapers, excursion posters at the New York Central Railroad Company's stations, etc. During the coming season several hundred thousand souvenir cards of Sacandaga Park will be placed on sale at railroad stations and in towns within reasonable riding distances of the park. It is believed that these cards will prove a very good means of calling attention to the beauties of the park and also prove a source of revenue. Last season nearly 200,000 cards were sold at newsstands in the park.

Like other successful park operators, the management of this company has found that it pays to cater to the women and children if a good permanent park traffic is wanted. One of the most acceptable advertising features in bringing this class of business has been the institution of "Children's Day," when every amusement in the park is free to the children. This privilege includes all the shows, whether managed by the company or leased, in addition to special features such as balloon ascensions and fireworks.

A list of some of the attractions at Sacandaga Park and their manufacturers follows: Bowling alleys, Brunswick-Balke-Collender Company; merry-go-round, G. A. Denzel; miniature railway, Cagney Brothers; laughing gallery, Ingersoll Construction Company; touring car, Brady-Grossman Company; boats, Michigan Steel Boat Company. In addition the park is equipped with an electric fountain and a shoot-the-chutes installed by the company's engineering force.

Although this railroad company has gone into the park business much deeper than most railway companies which are connected with amusement resorts, its policy appears justified by exceptional conditions. Taken on the whole the park is a self-paying proposition and it induces many thousand dollars' worth of profitable traveling every year. The management of the park is in the hands of R. M. Colt, general passenger agent of the Fonda, Johnstown & Gloversville Railroad.

Ravinia Park, which was built by A. C. Frost in conjunction with the Chicago & Milwaukee Electric Railway, probably will be operated next summer under a lease from the receiver. Plans have been submitted to bidders for the new auditorium of the Chester Traction Company at Ridley Park. It will be 33 ft. x 93 ft., and will be of stone with a roof of Colonial pattern. There will be a basement for banquets and a stage 23 ft. wide. The auditorium will seat 400 people and will be finished in hard oak.

PREPARING A STREET RAILWAY PARK FOR ALL KINDS OF WEATHER

BY E. P. HULSE.

Summertime is harvest time for the electric railway as well as for the waffle-handed stirrer of the soil. This is ever true—unless the railway also owns extensive ice houses on the shore of a spring lake or the agriculturist sidesteps the forward march of nature's seasons and narrows his broad acres under the firmament of a glass roofed hothouse. But to the usual garnerer of the public's nickels with a resort or two on its lines the warm months give the best chance for fat figures in the receipts column, and a long succession of clear days hot enough to "run 'em all out and make 'em ride," is as fervently hoped for as a long, soft rain is by the brother of the hoe and the 40-horse-power steam gang plow.

Optimism—the same moss-rose tinted fluorescence that



"THE PINES," ONE OF THE SACANDAGA PARK HOTELS.

borders the auroral aspirations of a June girl graduate—unmathematical optimism, takes hold of the managerial head of the usual street railway on the approach of summer, and in making up his estimate of probable receipts in the months ahead for the cold eye of the directory board he simply "hopes" the hundred days will be fair ones. Hope is the only shield he presents against the weather forecast, despite the average of past seasons which his accounting force provides and which shows a large percentage of the short hundred days of harvest to have been cloudy. He can do nothing to control the weather, and while the farmer may take an occasional rain-making shot into the ether and shake out something to suit, the terrestrial controller of lightning commercially applied has to accept what comes.

Unless—new thought—he borrows an idea from the progressive nature worker with his roofed farm, and also places himself beyond the vagaries of climatic conditions; in other words, plans to make his resort as attractive and business pulling in foul weather as in fair. An actual rainy day is a bad enough minimizer of the register receipts, but the public's fear of possible rain to come is a worse one in its total results. "It looks like rain" is the

eternal anathematic foe of dividends. The traditional "cloud on the horizon no bigger than a man's hand" has kept more people from the pursuit of recreation than the actual drizzle does when it arrives. And no one envies the feelings of a superintendent who starts out open cars to a fair weather resort when the Washington bureau sounds a warning as yet unverified. In a business so dependent on uninterrupted sunshine, the electric railroad community has done almost nothing to avert the loss from this menace.

How few resorts can take care of their crowds properly when a sudden shower arrives, and how fewer still could safely shelter their patrons from a small midsummer tornado. Everyone who ventures far from home on pleasure bent knows he is taking a chance on the weather, and this genuine wet blanket is ever before his eyes, no matter how fast and furious the fun. If he trusts himself far out on the electric railway line, he knows that, should a shower come up, he will be as unable to avert the unpleasant effects as a rabbit caught outside its burrow. Summer resorts, being built for pleasure alone and fulfilling their purpose only on the fair days, take no account of the frequent seasons of unpleasant weather and seldom have protection for likely downpours.

The line that would provide amusement for its patrons equally on wet days and dry ones would eliminate entirely this problem, and for the added expense would receive a sufficient reimbursement and profit. If people could feel that, once seated in its cars in their summer clothes, they need have no further apprehension of weather conditions, it would seem that the riding would greatly increase and be distributed more evenly. The days with rain or showers or clouds form a large percentage of the total days of the summer months, and the riding falls off heavily on every one of them. Amusement is longed for on these dreary wet days as well as on the fair ones, and the line that could be prepared to advertise itself as absolutely free from weather influences could count, it would seem, on a steadier and larger patronage.

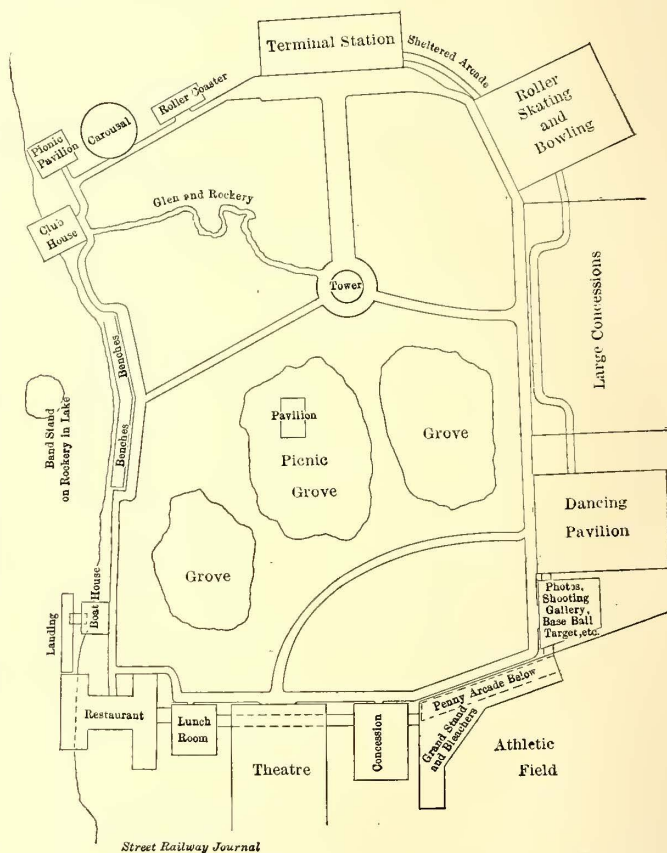
If people learned that they could always go to a certain resort, and could plan an outing for days ahead without fear of the provision of "postponement in case of rain," it would eliminate entirely the uncertainty that cuts into the receipts so much. If a five-minute rainfall half an hour before the curtain kills entirely the patronage of an open-air theater, and even a cloudy day makes it unprofitable, so that a roofed theater is the generally accepted plan, a continuation of the idea to the point of roofing just enough of the park to connect the different inclosed amusements would seem logical, and profitable also. Cases may be cited where a roof added to a theater has paid for itself in one season.

In providing a storm-proof park, the matter is simple enough if the park is to be newly laid out, and it does not provide very many brain-racking complications nor pull too strongly on new construction account if the resort is already in existence and the change is desired to be made.

Almost all amusement centers in summer parks are under roof, and connecting them up properly with a covered walk will make that roof continuous. First of all, shelter should be provided for thousands in case of sudden thunderstorms or even of small tornadoes. It isn't advisable to have the expensive dancing floor thrown open as an emergency shelter nor to have business brought to a standstill in the restaurant and smaller buildings by damp multitudes crowding in for standing room till the shower is over. Entire immunity from the drizzle could be provided from the mo-

ment a park patron boarded a car until he left one again on his return by having the car seats kept dry, the terminal station roofed and most of the buildings that provide amusement connected by a covered arcade or passageway. Something could be said of its value as a shelter from too hot a sun as well as from rain, and something again as to its use in winter.

A properly laid out suburban park with a well chosen site has usually a body of water, lake or river. This is generally at the greatest distance from the terminal station, the park acreage lying between. As boating, bathing, shooting the chutes and the other amusements dependent on the water are impossible in case of rain, they may be left out of consideration entirely, and the rainy day park can provide enough amusements anyhow otherwise. A park planned on good experience also has those forms of amuse-



PLAN OF PARK WITH ALL CONCESSIONS CONNECTED BY COVERED WALKS

ment where the crowds gather in largest numbers, such as the theater and the ball grounds, at some distance from the terminal, with all the lesser forms of amusement strung along between, so that the individual members of these large crowds, dismissed simultaneously, may be tempted to linger at the other nickel getters and not be stampeded to the terminal like a flock of sheep by the few who are really in a hurry to go home when the show is over.

The restaurant, to be at its best, should have the pick of the grounds, being located as near to the water as possible, with a balcony overhanging or a pier jutting out into the lake or river, and with a good view from its windows of the whole expanse of park. This would bring it at once to the water end of the line or semi-circle of buildings, say at the farthest distance from the terminal. The theater would naturally be next in line, with a smaller restaurant between, placing the theater far enough from the shore to avert annoyance from the voices or phonographs of boat-

ing parties. The small restaurant could take care of the dairy or counter trade and profitably relieve the larger dining room from it. In this building could also be such counters as the souvenir and candy pulling ones and small booth attractions, so that crowds could pass through as readily as in the penny arcade. It would take but a short covered walk to connect these three in line, the storm passageway as it reached the theater going under the raised part of the seating space and only being opened in bad weather.

This arcade should have a very wide roof and could have a floor of wood or concrete. Side walls should rise about four feet above the ground, the low extending eaves of the roof keeping the rain from driving under. In very exposed places long roller side curtains could be pulled down from the roof or glass sashes could be let into the side wall. Beyond the theater and nearer the terminal the ball ground would find its proper location. Underneath the bleachers on one side the passageway could continue, and this would be an inexpensive place to locate the penny arcade. Experience has proved that these machines do better gathered into one building than when scattered over the grounds, just as the nickel concessions provide quicker fun and more profit where their entrances are close together than where they are so distributed that fun followers weary in hunting them up. Some machines, those providing small eatables, candy, chewing gum and cigars, could, however, find frequent profitable location along the line of the covered passageway.

The dancing hall would come next, and the broad veranda surrounding the dance floor would form a continuation of the shelter. If any of the solid buildings, such as the theater or dancing hall, should be in part raised high enough above the ground, leaving sufficient space underneath the floor, an emergency shelter from heavy rain or wind could be cheaply planned beneath. The concessions such as roller coaster, merry-go-round, maze, old mill, laughing gallery, cave of the winds, etc., should be grouped together, and the arcade could pass some distance in front or weave around through them, with connecting walks to those under roof. The roller skating rink and the bowling alleys would be between the long line of concessions and the terminal station, and as in the case of the dancing pavilion the building itself would interpose its shelter.

In line with this plan the conductors on the cars should be instructed to make their cars weatherproof on the first appearance of rain. Hardly one in a hundred but waits until the seats are already drenched before he lowers the windows or curtains. Most of them during a rain will bring an empty car into a terminal where a crowd large enough to occupy every seat is waiting, with side curtains or windows up and the seats wet. This is too common an occurrence. Close discipline along this line, with instructions to conductors to indicate, in cross bench open cars, the location of vacant seats to boarding passengers, would greatly assist and add to the comfort of patrons.

The life of the park would be extended through the winter season by the covered passageway. With steam boiler heat from the restaurant parties could use the boathouse or even part of the restaurant, a gangway leading down to the ice. There are enough winter sports to make a park pay. Interest could be worked up in tobogganing, snowshoe and skieing clubs, fishing through the ice, horse trotting on the frozen surface, iceboating, curling, hockey and other sports. If some of the buildings,

such as those for bowling, dancing and roller skating, are well enough inclosed to stand the winter weather, they could be let to clubs and parties all season long, and here again the covered arcade would be invaluable. With its winter use of the park, which many roads have found most profitable, would be greatly assisted.

THE PARK CIRCUIT OF THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY

The properties comprised in the park system served by the electric railway companies of the New York, New Haven & Hartford Railway Company constitute undoubtedly the largest aggregation of parks under one management in the country, if not in the world. Nearly all of the individual city lines forming this system had parks of their own before the consolidation, and many of these parks date back to the time when horses were used as motive power. The electric railway companies themselves have been brought, during the last few years, into three groups. Those in Connecticut and New York are operated by the Connecticut Company; those in Rhode Island by the Rhode Island Company, and those in Massachusetts and Vermont by the New England Investment & Security Company. The park management of these companies, however, has been kept entirely distinct from that of the electric railway properties themselves and has been placed under the direct management of J. A. Blake, who reports directly to the general traffic manager in New Haven. Mr. Blake had a theatrical experience of many years before engaging in the electric railway park business, and this training has been of great assistance to him in the conduct of his work in New England.

The extent of the properties in charge of the park department of the New Haven Company has made it possible to maintain a special staff to attend to this portion of its work; to organize two circuits of exclusive attractions, one for the large parks and one for those of less size and to make direct engagement of attractions for the entire season. It has also made it feasible to transport from one park to another the expert help necessary in any special attraction, such as fireworks, balloon ascensions, etc., which may be given on a few days only at each park during the season.

The following is a list of the principal parks owned or operated by the companies mentioned and forming the circuit of the New Haven Railroad:

PARKS OWNED BY CONNECTICUT COMPANY.

East Haven, Conn.—Momauguin.
Meriden, Conn.—Hanover Park.
Middlebury, Conn.—Quassapaug.
Middletown, Conn.—Lakeview Park.
New Britain, Conn.—White Oak Park.
New London, Conn.—Ocean Beach.
Norwich, Conn.—Park Building.
Shelton, Conn.—Pine Rock Park.
South Norwalk, Conn.—Roton Point.
West Haven, Conn.—Savin Rock.
Winsted, Conn.—Highland Lake.

PARKS LEASED BY CONNECTICUT COMPANIES.

Hartford, Conn.—Laurel Park.
Putnam, Conn.—Wildwood Park.
Rye, N. Y.—Rye Beach.

PARKS OWNED BY NEW ENGLAND INVESTMENT & SECURITY COMPANY.

Bellingham, Mass.—Hoag Lake.
Bennington, Vt.—Battlefield Park.
North Adams, Mass.—Hoosac Valley Park.

Palmer, Mass.—Forest Lake.
 Pittsfield, Mass.—Berkshire Park.
 Southbridge, Mass.—Fairview Park.
 Westboro, Mass.—Chauncey Lake.
 Westfield, Mass.—Pequot Park.

PARKS LEASED BY NEW ENGLAND INVESTMENT & SECURITY COMPANY.

Webster, Mass.—Beacon Park.
 Worcester, Mass.—Lincoln Park.

The cities served by these parks vary in population from 20,000 to 150,000 inhabitants, and the attendance at some of the parks on special days is as high as 50,000. Savin Rock Park is the largest and probably the best known of all, and has a White City with all of the attractions possessed by Coney Island, such as "shoot the chutes," "fighting the flames," etc., although, of course, on a smaller scale. This City, however, is owned and conducted by private capital and is outside the railroad park, at which there are many other though less elaborate forms of entertainment.

Mr. Blake believes that to have a summer park successful,

house the number of cars which will be required to take the passengers away promptly after the entertainment is over, and these cars are sent to the park, where they are kept standing on loop or stub tracks until they are required.

Another essential in park success, according to the experience of the New Haven Company, is to maintain strict order. If this is neglected, a park will soon get to be considered a resort for rowdies and it may take a long time to overcome this reputation. No liquors are sold on the grounds of any of the parks of the New Haven Railroad Company, so that this question is simplified to some extent. In addition, the company has in all of its parks a force of guards, consisting either of railroad police or men connected with the regular municipal force, who are hired to protect the park. In either case the men have legal authority to make arrests.

The New Haven Company does very little in the way of chartering parks to different organizations, although, like all other transportation companies, it solicits meetings and reunions of societies, Sunday-schools and other organiza-



SAVIN ROCK PARK, NEAR NEW HAVEN, CONN.

especially in New England, it should be within the 5-cent zone. In some other parts of the country this does not seem to be so necessary. The New Haven Company has some parks to which a 10 or 15-cent fare is charged, but most of the parks operated by the company can be reached for a 5-cent fare from the city which they serve.

Another essential in the success of any park, according to Mr. Blake, is to get the patrons there and away with the minimum amount of discomfort during the trip. This means that a resort of any considerable size should be served by a double-track line, and that the tracks at the park terminal should be so arranged that a sufficient number of cars can be stored to carry all the patrons away quickly whenever they wish to leave. They will arrive at the park all through the morning, afternoon and evening, but most of them will wish to leave about the same time; that is, soon after the close of the afternoon or the evening performance. If they are delayed for lack of accommodations, every ten minutes seems stretched out to a half hour. This condition is provided for on the properties of the New Haven Railroad by keeping a careful record of the number of people who arrive at the park during the day. This is done by having the conductors report to the starter the number of passengers they carry to the park. The starter then telephones to the car

tions. Such parties are offered inducements in the way of special attractions, where the number of probable attendants warrants the company in doing so, but they are given no exclusive privileges at the park, and in no case are permitted to restrict the admission of others. The secretaries or other permanent officers of these organizations are approached early in the season, and circulars are mailed to them pointing out the advantages of the company's parks for their annual gatherings. When at such distance that they would use the steam cars of the New Haven Company, as well as its electric cars, through tickets good for the round trip are sold, if desired.

CONCESSIONS

In the operation of its parks the New Haven Company does not attempt to manage directly all of the amusements at the different resorts, but follows the usual practice of leasing them to different individuals. Sometimes all of the concessions are taken by one person; in other parks they are leased to several individuals. The payment is always a fixed rental and is not based on a percentage of the receipts of the concessions. The company has a regular form of contract, which has been prepared by the legal department of the company and which preserves the right of the com-

pany to see that the concessions are properly conducted. Payment for the concessions is usually made at three periods; the first sum is due when the contract is signed, the second in the middle of August, and the third at the conclusion of the season. The company furnishes all of the lighting, and, in the case of expensive attractions, the buildings. The company's inspectors visit the parks frequently to check up the conduct of the managers of the concessions.

THEATERS.

Eighteen of the parks are provided with theaters, to which a nominal charge of 5 cents is made for admission, with an additional nickel in most cases for reserved seats. The average seating capacity of the theaters is 1500, but the largest theaters, which are at Lincoln Park, Worcester, and at Hoag Lake Park, Woonsocket, will seat 2000 or more people. The entertainments given are vaudeville shows and farce comedy, and two circuits are arranged, one for the larger towns and the other for the smaller towns. The cost of these entertainments varies from \$200 to \$500 a week per park. Sometimes the circuits are arranged to overlap, so that the smaller towns get a few of the higher-priced exhibitions, while the larger towns get some of the cheaper shows. Entertainments are given at the theaters twice a day during the season, weather permitting.

The shows are booked early in January, most of them in New York City, and the circuits are carefully arranged, as it has been found that certain theatrical shows that draw well in some communities will fall flat in others.

BABY SHOWS

Certain forms of attractions have proved to be very popular in New England and are continued regularly each year at nearly all of the parks. One of these is the baby show, for which a day is set aside annually at most of the pleasure resorts of the company. The date selected is heralded several weeks in advance by means of billposters and advertisements in the local papers, and ambitious mothers are invited

given for the fattest and thinnest babies, with a special prize for colored babies. At other times the smallest baby is also given a prize. The management has never been courageous enough to offer a prize for the best-looking baby. After long, and in some cases unfortunate, experience, the company has settled down to having professional judges. These judges travel from one park to another and, during the last five years, have decided the critical points of many thousands of babies. As they are employees of the company, arguments as to the justice of their decisions are reduced to a minimum.

In New Haven, the largest city in the park system of the consolidated companies, there have been as many entries as

Section..... No. 201..

BABY SHOW

ENTRIES FREE. 15 PRIZES.

Annual Prize Baby Show

BERKSHIRE PARK, PITTSFIELD, MASS.

THURSDAY AFTERNOON, AUGUST 1, 1907.

Name of Child.....

Age..... Years..... Months..... Weight.....

Parents' Name.....

Address.....

IF STORMY, THE NEXT PLEASANT DAY.

It is absolutely necessary that you bring this ticket with you and report at one o'clock.

A Silver Souvenir to Each Baby.

The Blue Ribbon on Arm of Boys and Pink Ribbon on Girls' Arms.

BLANK USED FOR ENTRIES IN BABY SHOW.

1000 in a single contest. In other parks the number varies usually between 200 to 400. After their arrival at the park, the babies are arranged in rows, according to the class in which they are entered. The girls have a bow of pink ribbon pinned on their arm; the boys are decorated with blue ribbon. The contestants are roped off from the spectators while the judges are inspecting their charms and until the awards are made. The precaution is taken to have a physician and a trained nurse in attendance to prevent any untoward accidents.

JUVENILE DAY

Another special feature which has proved attractive in the circuit of New England towns served by the company is "Juvenile Day," which is supposed to draw out the youthful element in the community, after they have passed the age which entitles them to contest in the baby show. This equally enjoyable event is also announced well in advance of its occurrence, and when the day arrives each youngster, as he travels to the park on the cars, is given a numbered ticket similar to that illustrated on this page. This ticket entitles the holder, if it is presented between the hours mentioned on its face, to receive a "souvenir." One lucky individual is promised a gold watch, if he is at the theatre in the afternoon and if the number on his card corresponds to that which is announced at that time by the management. Each of the others is made happy with a Japanese fan, parasol, stick pin, a free ride on the merry-go-round, or some other souvenir to remember the day. In addition, a free Punch and Judy show forms a bait to attract the youths of the community, and, incidentally, their parents or guardians to see that the children have a good time and keep out of mischief.

OTHER ATTRACTIONS

The theaters and the other entertainments in the New Haven system of parks which have been described do not comprise all of the attractions which go to make up their well-deserved popularity. There is the usual equipment of merry-go-rounds, shoot the chutes, toboggan slides, laughing galleries, skating rinks, etc., all of which are employed

SAVIN ROCK, FRIDAY, JULY 26

Juvenile Day

Free Souvenir Invitation

PRESENT this Invitation Card to the attendant in the PARK on this date between 10 and 3 o'clock and receive a Souvenir at the option of

J. A. BLAKE, Amusement Manager
(If stormy, next pleasant day)

The Gold Watch will be presented to the Boy or Girl whose number is called out on the stage of the Theatre on this afternoon.

FORM OF TICKET FOR JUVENILE DAY

Keep this Check

No. 6003

to enter their offspring in competition for prizes. No charge is made for competing for a prize, but each contestant must be properly entered on a blank, which is supplied by the railway company. The form used is reproduced herewith. It calls for the name, age and weight of the child and the parent's name and address. Babies from six months to three years old are eligible, and, to encourage entries, the company usually announces that, before leaving the grounds, every infant in the competition will be given a silver souvenir, such as a mug, a napkin ring or a spoon. The entries are divided into three classes, one for babies from six months to a year, another for those from one to two years, and a third for children between two and three years of age. The number of prizes and the points of excellence announced before the show vary according to the number of entries and local conditions. Sometimes the prizes are

with success. The first mentioned is, of course, the standby. The carousel is always in favor with young and old, and is considered one of the best money earners among the park attractions, as well as one of the safest to operate.

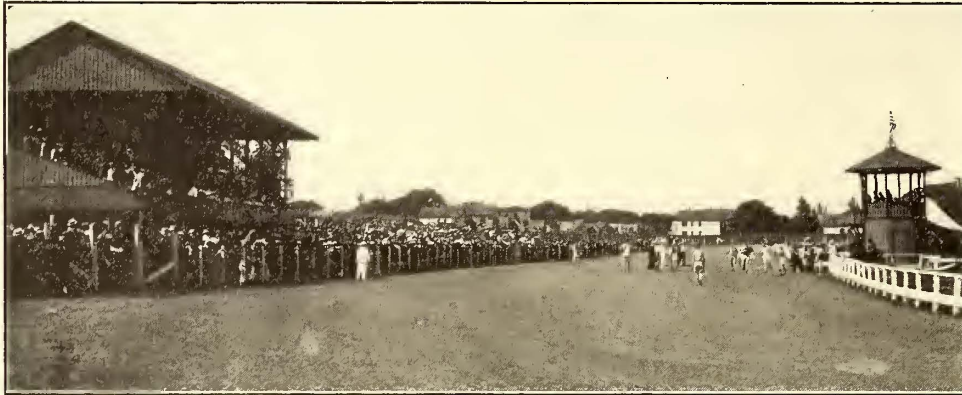
Roller skating has proven very popular during the past few seasons. The popularity of this form of amusement seems to travel in waves. But the rinks can be used for dancing when the skating enthusiasm wanes and can be re-applied to their original purpose when it returns. Fire-works are expensive, but well liked, and the company keeps

park enjoyed a successful season it may be of interest to mention its features and management.

The park was formerly used for a picnic ground and several years ago as the Rensselaer County Fair Grounds. The annual entertainment was the typical agricultural exhibit of produce and cattle, with trotting races as the principal attraction. Naturally the fair was accompanied by a large number of clap-trap shows, the better class of attractions being absent as they were unable to make a one week's stand profitable. The present scheme, therefore, represents a combination through which the prestige of the old Fair Grounds helps to attract thousands of visitors, while in return the annual agricultural entertainment has been rendered far more attractive through the addition of the entertainments and conveniences found in an up-to-date park. During the annual fair there is a division of gate receipts by the park operators and the fair people.

The trotting course, which is one-half mile long, is now used also for athletic events, the popularity of which may be judged by one of the accompanying illustrations. The grandstand used in conjunction with this track seats 2000 people. West of the grove and amusement court the Fair Association is to erect a fine exhibition hall and there will also be improved facilities for the cattle shows which will be electrically lighted.

The grounds are easily reached via the United Traction Company, which will shortly build a new line near the park with a one-block extension required to reach the gates. Steam railroad connections are furnished by the Boston & Maine Railroad, which has a track at the rear of the park and will put in a station siding. The general admission to the park is 10 cents, this including such free attractions as band concerts, open-air stage acrobatic performances, loop-the-loop, Gorman's diving horses and Cleveland's elephants. Among the pay attractions, most of which are



THE TRACK AT NEW RENSSELAER PARK, SHOWING ATHLETIC CONTEST UNDER WAY

a force of men especially for conducting its pyrotechnic exhibitions, which are given once a week at each of its parks. At each of the parks band concerts are given at frequent intervals.

The company also fosters all summer sports, and among them baseball, which is always popular in New England. Adjoining many of the parks are baseball fields controlled or owned by the railway company. The company does not attempt to organize or manage any teams of its own, but assists the local teams in various ways during the season, such as permitting them to use its grounds, and in some cases by giving prizes for local games.

NEW RENSSELAER PARK, TROY, N. Y.

Decoration Day, 1907, saw the opening of the New Rensselaer Park, a 42-acre pleasure ground in North Troy,



ENTRANCE TO NEW RENSSELAER PARK



NEW RENSSELAER PARK DANCING PAVILION

N. Y., directly opposite Cohoes and not more than two and a half miles from Troy's business center. The park is operated by a corporation known as the Diamond Novelty Company, whose directors have had considerable experience with amusement projects in this territory. As the

leased, are a dancing pavilion, pony track, figure 8, roller coaster, Ferris wheel, boxball alleys, Hale touring car, carousel, penny arcade and vaudeville. In addition there are several pavilions for the sale of novelties, candies, food and soft drinks. Spiritous liquors are positively forbidden.

The opening day of New Rensselaer Park brought 18,000 people and on July 4, when the Elks gave their annual picnic in partnership with the park people, there were 30,000 paid admissions at 50 cents each, covering certain attractions in the park. The Elks advertised the affair extensively and brought their own band. A similar arrangement will be made with the Shriners and other fraternal societies. One of the features which is expected to bring heavy business next September will be the first celebration of Old Home Week in Troy, beginning on Sunday,

fisticuffs or trivial subjects. Nothing is farther from the truth. Despite its lowly origin the moving picture has gained in popularity and has become a source of entertainment to discriminating audiences. As instances are the pictures of the Passion Play of Oberammergau and those shown by Dwight L. Elmendorf and Burton Holmes. Moving pictures are moving pictures, but only in the sense that the differences between them, like those between men, are of degree, not of kind.

It is this very flexibility of subjects which is the strong feature of the pictures as a source of entertainment. An example of this flexibility is at hand as this is being written. The New York-Paris race has begun and the papers are filled with the story of the start and the progress of the first few days. Right in New York, where the race began at Times Square, moving pictures of the panorama presented by the racers and the spectators were offered within twenty-four hours of the start. If it is possible successfully to bill these pictures as a leading attraction in one of the best vaudeville houses in



CROWD WATCHING FREE OPEN-AIR PERFORMANCE AT NEW RENSSELAER PARK

Sept. 5. Each day will be designated in honor of a certain class, such as Church Day, Labor Day, Civic Day and Educational Day.

THE MOVING PICTURE AND ITS POSSIBILITIES

The history of the moving picture business is replete with dramatic periods. On its face this sounds like a pretty broad statement, but it will bear close scrutiny and even dissection. The first really successful pictures were those of the famous Corbett-Fitzsimmons fight in Carson in 1897, only eleven years ago. Another early and successful set of pictures was taken of the Jeffries-Sharkey fight in 1899 at Coney Island. In fact, the real progress of the moving picture dates from that event, for the pictures then began to come into use to conclude vaudeville bills in many of the theaters. The idea of a strictly moving picture show was not fathered, however, until about five years ago, yet to-day there are upward of 5000 moving picture theaters or nickelodeons in America. What this means in capital expended it would be impossible to state with any degree of certainty, for individual installations vary in magnitude and cost from a few hundred dollars to the hundred thousand, as instanced in moving picture palaces in New York, Philadelphia and Boston. An idea may, however, be obtained of the patronage these 5000 places enjoy by allowing an average of \$200 a week for expenses for each of them. On this basis some 4000 people (at 5 cents per person) per week would have to patronize each in order to pay the operating expenses. This means 2,000,000 patrons a day, or about 15,000,000 a week.

The birth of the moving picture in the prize ring was not auspicious. It resulted in the impression in some quarters at first that the pictures must necessarily deal with

the city where the start was made, their popularity with an audience remote from the route is evident.

This is by no means an exceptional case. The moving picture men are as alert as are the daily newspaper men. Nothing of general import escapes them. Within a few days of its occurrence the people of Texas can become spectators of an event in Maine with which they have become familiar as the result of the accounts in the newspapers. Such incidents as the sailing of the squadron for the East has a peculiar fascination for the people in the interior, many of whom have never been so fortunate as to have seen a modern iron clad.

The possibilities of the moving picture as an adjunct to the street railway park are limitless. The shows can be made to fit any purse or to suit any taste. It is not difficult to learn what the public wants, the cue usually being furnished by the public themselves in the reception of the pictures as they are put on. In one instance a park manager actually had pictures taken of his own park and at times threw them on the scene by way of showing what the park had to offer in other features.

Moving pictures are not exclusively for evening entertainments. Matinées can be arranged especially for the entertainment of the women and children, a point sometimes of advantage at street railway parks to encourage midday riding. It is possible to offer pictures in the middle of the day as a free attraction and even to do so on week-day evenings, charging a small admission on Saturday afternoons and Sundays so as to defray the expenses.

The accommodations which should be provided must be judged by the park manager himself. In some cases shows can be given in the open. In others a tent would serve. Again, it might be desirable to erect a pavilion or even a building.

ELECTRIC PARK AT KINDERHOOK LAKE

Electric Park is a forty-acre pleasure ground located on Kinderhook Lake, along the main line of the Albany & Hudson Railroad Company, by which it is owned and operated. The park has attained such an enviable reputation for the cleanliness of its attractions and the attention given

undesirable elements are also kept out by the early closing time, which is 10:30 p. m. on week days and 7:30 p. m. on Sundays. The park is midway between Albany and Hudson, being eighteen miles from each place, from which it is reached for a 40-cent excursion fare. No general admission is charged to those coming in on the railroad, but otherwise there is a fee of 10 cents. The grounds are along Kinderhook Lake, which is about half a mile wide and a



ENTERING THE PARK GROUNDS FROM THE RAILROAD STATION.

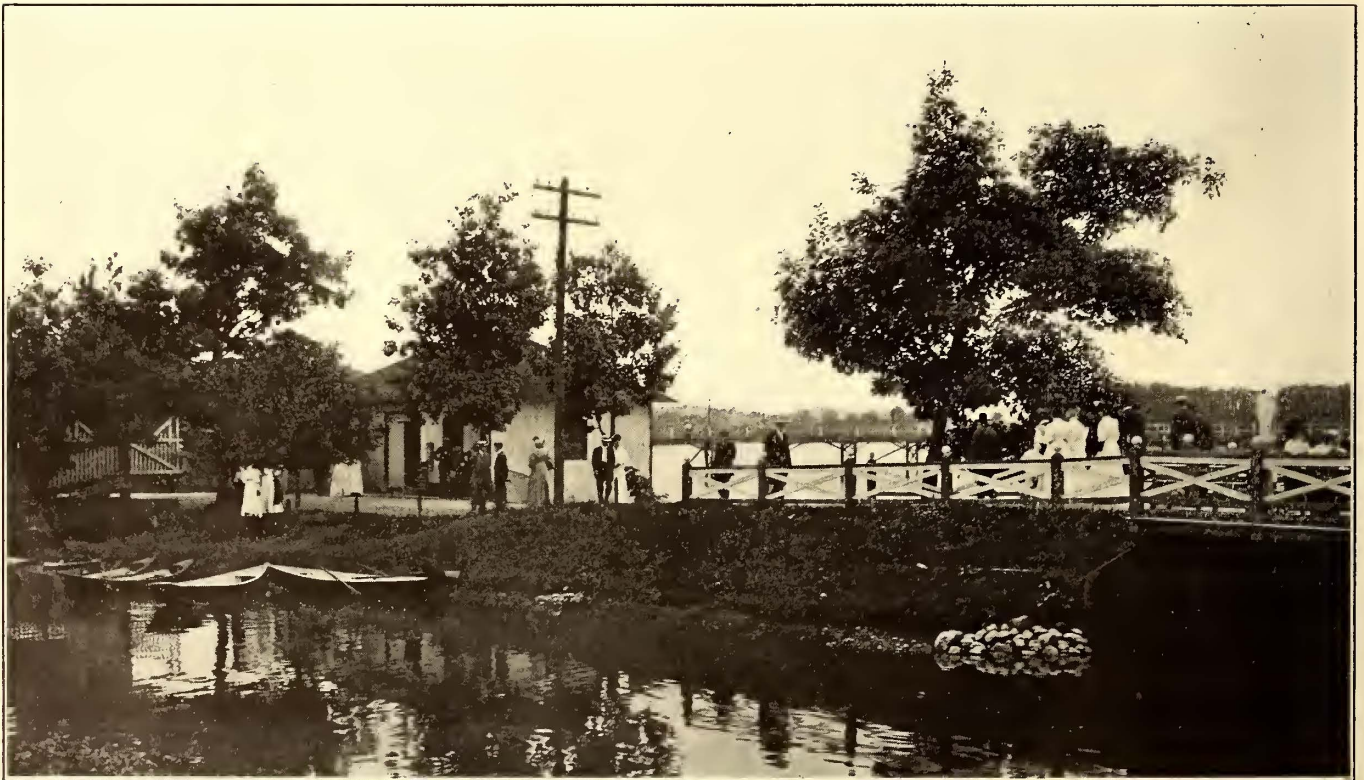


SCENE ALONG THE LAKE AT KINDERHOOK PARK

to patrons that it has become a favorite resort for residents of Albany, Troy and other towns in the upper valley of the Hudson River. The slogan of the management on

mile long, so that ample facilities are afforded for boating, fishing and other water sports.

The principal attraction outside of the natural beauty of



LANDSCAPE WORK IN AND NEAR THE BOAT HOUSE AT ELECTRIC PARK

all its advertising literature that Electric Park is "A place where ladies and children can go unattended," is confirmed by the fact that frequently whole parties of young women and children go to the park on their own account, and never find it necessary to enter a complaint with the management. The preponderance of this class of business will be noted also from some of the accompanying illustrations. Of course, no liquor is permitted on the grounds and

the park is the rustic theater, where entertainments are given every day. The theatrical attractions are high-class vaudeville features, booked through Frank Melville, of New York, with whom a contract is made for the entire season. The booking agent is responsible for the class of attractions sent up every week and has a representative on the grounds to care for the artists, but the management of the railroad company exercises the necessary supervision over

the character of the acts. All of the performers are given to understand what class of people they are expected to entertain and must govern their acts accordingly. The booking arrangement has proved very satisfactory, as very few of the attractions furnished have been found unsatisfactory to the visitors to Electric Park. Two vaudeville performances a day are given, one at 3:30 in the afternoon and the other at 8:30 in the evening. The only charge is the nominal one of 10 cents for reserved seats. The theater is not run on Sundays, but instead sacred concerts are given with an Albany band numbering twenty to twenty-five pieces. Nine of this number are retained for the vaudeville performances during the week.

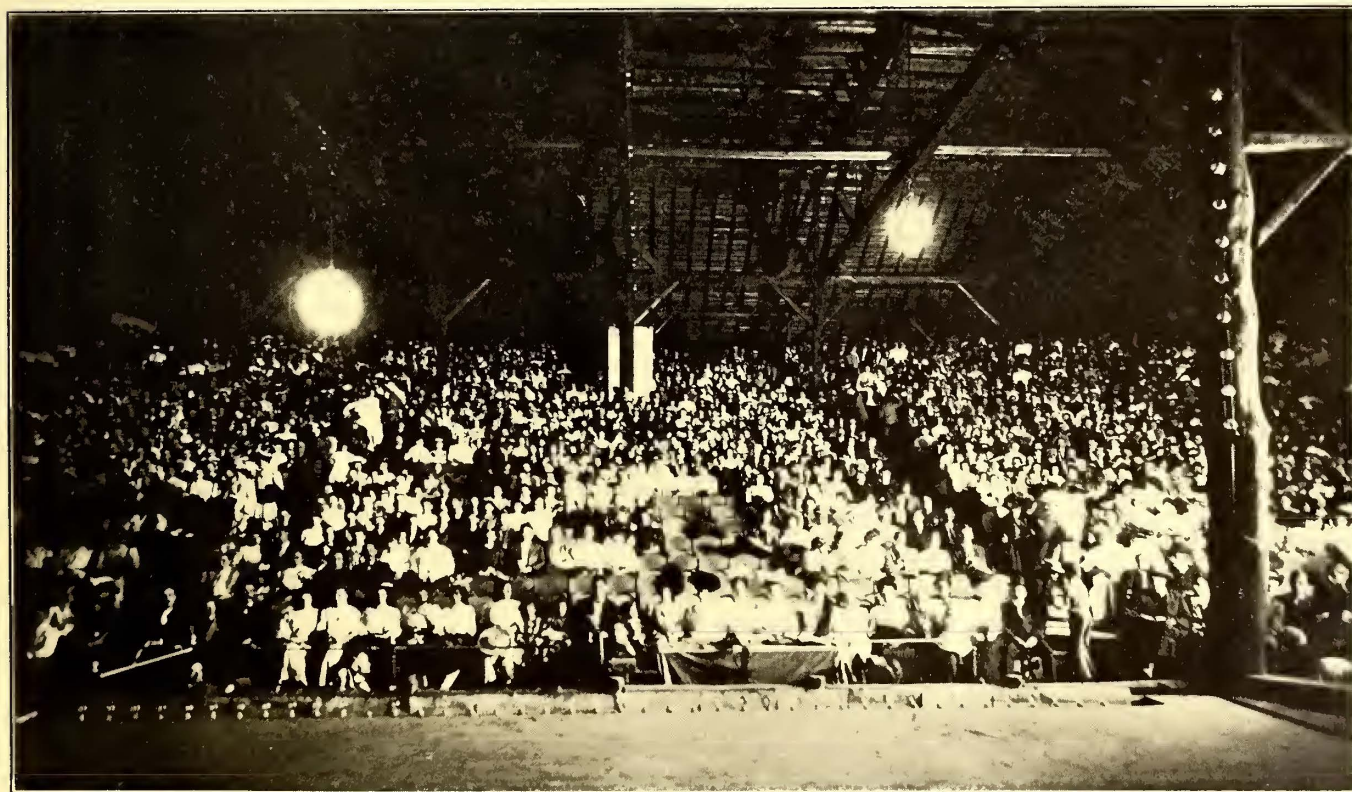
The other attractions include a carousel, shoot-the-chutes, dancing pavilion and Ferris wheel, all of which are

bidder, this plan having been found better than a percentage arrangement. There is a large pavilion in which organizations visiting the park may hold business or social meetings.

The territory in which the Albany & Hudson Railroad Company looks for its park business embraces a population



ARRIVAL OF A PARTY OF ALL AGES AT ELECTRIC PARK



A GOOD CROWD IN THE COVERED VAUDEVILLE THEATER

owned and operated by the company. A penny arcade is under consideration, as is also the installation of a roller coaster and a miniature railway. Amusements for children are provided by numerous swings, a pony, goat and donkey track and a small menagerie. The restaurant and refreshment booths are rented out for the season to the highest

of some 225,000 to 250,000. During the season the park is advertised in twenty-five newspapers covering Rensselaer, Troy, Albany, Schenectady, Cohoes, Watervliet, Hudson, Coxsackie, Catskill, etc. The company also owns or controls some electric signs, painted bulletins and a number of billboards, the balance of its billboard work being

placed by a billboard agency. The park is also advertised in the local trolley guides and very prominently on the window cards and dodgers of the organizations holding picnics there.

The company has a thorough and systematic method for securing the picnic business of large social bodies every season. Early in the spring the man who is to do the personal solicitation goes through all the directories of the towns from which traffic is desired, to get the names of all the high-class associations, such as the churches, Sunday-schools, lodges, etc. The solicitor finds out where the society had its picnic the preceding year and then visits the members of the different entertainment committees, pointing out to them in what respects a trip to Electric Park would be more enjoyable and cheaper than any other. The railroad company offers to handle all details of printing posters, tickets, etc., leaving the organization to carry no responsibility other than naming a date. On many of these ex-

cial rates amounting to 25 per cent reduction in fare are given to parties of 100 and over, including the free printing of tickets such as those mentioned. The company has been very successful in attracting church and lodge business from towns like Troy, Watervliet, Cohoes, Albany, Schenectady, and, in fact, the park has become a standard resort for organizations of that character. There is also a good deal of individual travel from these and other towns. Some of the excursion rates to the park are as follows: From Athens, Catskill and Coxsackie, 50 cents; from Schenectady and Saugerties, 75 cents; from Albany and Hudson, 40 cents. Connections with the Schenectady and Troy cars are made at State Street and Broadway in Albany, and there are also arrangements with Hudson River steamboat companies for taking passengers from towns up and down the river.

The employees of the Boston Suburban Electric Com-

MID-SUMMER OUTING
—OF THE—
Ancient City Lodge, No 452, F. & A. M.
... OF ALBANY ...
TO ELECTRIC PARK
Via Albany & Hudson Railroad Co.
TUESDAY, JULY 30th, 1907.
TICKET 75 CENTS

This ticket includes trolley ride to Electric Park and return, luncheon and reserved seat in theatre. Special cars leave corner State and Broadway, Albany, at 12:00 noon, 12:30, 1:00 and 1:30 P. M., returning leave Park immediately after the evening performance. Tickets good going and returning on all cars on above date. Hourly cars, A. M. Half hourly cars, P. M.

606

Albany & Hudson Railroad Co.
ELECTRIC PARK
TO
ALBANY
This ticket good only Tuesday, July 30th, 1907.
Acc't Ancient City Lodge, No. 452, F. & A. M. of Albany
General Passenger Agent.

606

Electric Park Restaurant

LUNCHEON

This ticket good only Tuesday, July 30th, 1907.

606

Electric Park Rustic Theatre

ADMIT ONE

This ticket good only Tuesday, July 30th, 1907.
This coupon to be exchanged at box office for reserved seat check.

606

Albany & Hudson Railroad Co.
ALBANY

ELECTRIC PARK

This ticket good only Tuesday, July 30th, 1907.
Acc't Ancient City Lodge, No. 452, F. & A. M. of Albany
General Passenger Agent.

606

COMBINATION PARK AND FARE TICKET, INCLUDING LUNCHEON

EXCURSION
—OF THE—
Green Island Methodist Church and Sunday School
OF GREEN ISLAND
TO ELECTRIC PARK
Via Albany & Hudson Railroad Co.
TUESDAY, JULY 30th, 1907.
CHILD'S TICKET

This ticket good only for children under 12 years of age.
Boat leaves foot of Broadway, Troy 10:30 A. M., returning leave Park 6:00 P. M.
Tickets good going and returning on any boat of the Albany & Troy Steamboat Co., and on any car of the Albany & Hudson Railroad Co., on above date. Hourly boats and hourly cars A. M., Half hourly boats and half hourly cars, P. M.

101

Albany & Hudson Railroad Co.
Acc't Albany and Troy Steamboat Co.
ALBANY
TO
TROY
This ticket good only Tuesday, July 30th, 1907.
CHILD'S TICKET
Acc't Green Island Methodist Church and Sunday School of Green Island
General Passenger Agent.

101

Albany & Hudson Railroad Co.
ELECTRIC PARK

TO
ALBANY

This ticket good only Tuesday, July 30th, 1907.
CHILD'S TICKET
Acc't Green Island Methodist Church and Sunday School of Green Island.
General Passenger Agent.

101

Albany & Hudson Railroad Co.
ALBANY

TO
ELECTRIC PARK

This ticket good only Tuesday, July 30th, 1907.
CHILD'S TICKET
Acc't Green Island Methodist Church and Sunday School of Green Island.
General Passenger Agent.

101

Albany & Hudson Railroad Co.
Acc't Albany & Troy Steamboat Co.

TO
TROY

This ticket good only Tuesday, July 30th, 1907.
CHILD'S TICKET
Acc't Green Island Methodist Church and Sunday School of Green Island.
General Passenger Agent.

101

SPECIMEN OF COMBINATION TICKET, ISSUED TO VISITING SOCIETIES

ursions it is arranged that a certain percentage of the receipts go into the treasury of the organization, or, in the case of Sunday-schools, that the children are carried free and given lunch, seats in the theater, etc. Having secured the contract, the railroad company arranges to print all the tickets, both for adults and children. These tickets, specimens of which are shown, often embrace coupons for lunch, theater and other pay attractions that may be included in selling the ticket at a fixed price. The societies are not asked to advance any money whatever, but after the tickets have been sold and the money collected the receipts are divided in accordance with the agreement. The railroad company has exercised so much care in selecting organizations to come under these conditions that it has never lost any money nor had any disagreements. An important feature about these excursion tickets is that they are good on any train during the day of the picnic, so that the picnickers can go whenever they please. This tends to equalize the traffic during the day, instead of making it necessary to run four or five crowded cars at a time. Spe-

panies met at the Newton Club, Newton, Mass., in January and organized themselves into a club to promote good-fellowship and better acquaintance and to discuss matters pertaining to street railway operation. There were some thirty-six persons present, including M. C. Brush, vice-president and general manager, and Mr. Grant, treasurer, of the Boston Consolidated Gas Company. C. A. Sylvester and G. M. Cox acted as committee of arrangements. Both Mr. Brush and Mr. Grant spoke of being heartily in favor of the movement and assured the company of their support. The club decided on the name "The Suburban Railway Club" and organized as follows: F. P. Quackenbush, president; W. S. Scamman, vice-president; C. F. Cormier, secretary; J. C. Gauthier, treasurer; J. Solomon, S. E. Walker and C. A. Sylvester, executive committee. At a meeting of the club held early this month J. H. Neal, auditor of disbursements, of the Boston Elevated Railway, Chief Mitchell, of the Newton Police Department, and John Lyndall, superintendent of rolling stock and shops of the Boston Elevated Railway, addressed the club.

OPENING OF THE HUDSON RIVER TUNNEL SYSTEM

On Feb. 25 the first of the Hudson & Manhattan Railroad Company's tunnels under the Hudson River was opened to the public. Readers of this paper are familiar with the general features of this system from previous articles. Experimental trains have been run through the tunnel for two or three months to accustom the motormen to the service and to perfect the details of operation. The section put in service Feb. 25 includes only that extending from Hoboken, N. J., to Sixth Avenue and Nineteenth Street, New York, a distance of about 3 miles. This section is generally designated as the Morton Street or uptown tube. The entire system comprises about 18 miles of track and is very nearly finished. It was not considered necessary, however, to delay the opening of the uptown tubes for the completion of the entire project, as the section put in operation can be operated by itself, and the large traffic now carried by ferry between Hoboken and New York indicates that there will be no lack of passengers.

The stations on the uptown section in New York will be at Christopher and Greenwich Streets, Christopher Street and Sixth Avenue and on Sixth Avenue at Fourteenth Street, Nineteenth Street, Twenty-third Street, Twenty-eighth Street and Thirty-third Street.

A description of the cars to be used in the tunnel was published in the STREET RAILWAY JOURNAL for June 8, 1907, and an account of the passenger stations in the STREET RAILWAY JOURNAL for March 9, 1907. It will be necessary, therefore, to mention only the history of the enterprise, and give an account of the third-rail construction adopted.

The project of building a tunnel under the Hudson River had its inception in 1878, when D. C. Haskins, a civil engineer, conceived the idea of constructing a brick tunnel from Hoboken to New York through which he proposed to run railroad trains having a grand railroad terminal in the vicinity of Washington Square. His plan embodied simply a tunnel for the purpose of gaining access to New York for a terminal and did not contemplate the extensive system of connecting lines now being completed.

With much difficulty a company was formed to undertake the great work and after a large sum of money had been spent, and about 1200 ft. of tunnel built, the company failed and in 1880 the undertaking was temporarily abandoned.

In 1890 another company was organized with English capital and the contracting firm of Pearson & Son, now engaged in constructing the East River section of the Pennsylvania tunnels, resumed work where the Haskins company had left it.

This company, after adding about 1800 ft. to the part already built, also failed and once more the enterprise was checked. The original tunnel was constructed of

brick and masonry, in the old way, but it was the first time compressed air had ever been used in horizontal work of this sort. As far as it went the tunnel was well constructed, but it was the generally accepted conclusion that with steam locomotives the tunnel, if completed, would have been a failure because of the accumulation of smoke and gases.

In 1901 William G. McAdoo, who came to New York in 1892 to engage in the practice of law, became interested in the project of rapid transit between New York and New Jersey and organized a company to go on with the tunnel. The 3500 ft. of old tunnel was acquired and the tube finished with the steel ring method. Work on the second parallel tube was also completed. These are the tunnels to be opened Feb. 25, but to them has been added the extension under Sixth Avenue on the New York side.

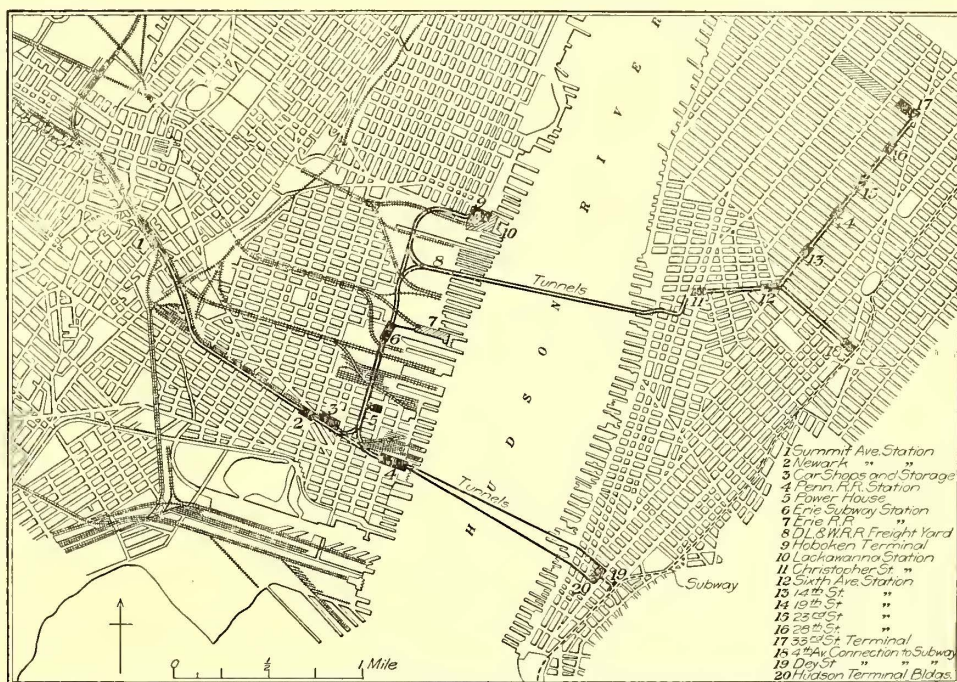


FIG. 1.—MAP OF SYSTEM OF HUDSON & MANHATTAN RAILROAD COMPANY

After the entrance of Mr. McAdoo and the Hudson Companies into the project the plan was extended to provide for the system indicated on the accompanying map and a number of improvements were introduced into the method of conducting the work. One of the most important of these was the plan by which the silt through which the tunnel is driven was not excavated, but was pushed to one side by the head shield. Up to this time the silt had been taken into the tunnel as the work progressed and was then removed by cars and elevator at the mouth of the tunnel. The change not only greatly reduced the cost of construction, but the time required. Under the old method in the original tunnel 5 ft. of progress in 24 hours was considered a large output. With the new method the Cortlandt Street tunnel has been advanced 72 ft. during 24 hours.

The diameter of the tubes is 15 ft. 3 in. in the clear and the depth of the tunnels below the surface of the Hudson River varies between 60 ft. and 90 ft. Under the river the tubes are about 30 ft. apart for the greater part of the distance. The system of separate tubes for north and south bound travel is maintained under Sixth Avenue and elsewhere in New York, although there the tubes are close together and at passenger stations are joined so as to afford

space for an island platform between the tracks. There are also side platforms as exit and egress platforms are kept separate.

The use of separate tubes permits of ventilation by the piston action of the trains, which draws in fresh air from

engineer. During a part of the time since the work began as many as 6500 men have been employed at one time. The cost of the system when fully completed will be about \$70,000,000.

THIRD-RAIL CONSTRUCTION OF THE HUDSON & MANHATTAN RAILWAY.

The third-rail construction used in the tunnels of the Hudson & Manhattan Railway Company is similar in every respect to that employed in the East River Tunnel of the Interborough Rapid Transit Company, so that a description of one suffices for both. The construction was designed by Hugh Hazelton, electrical engineer of the Hudson Com-

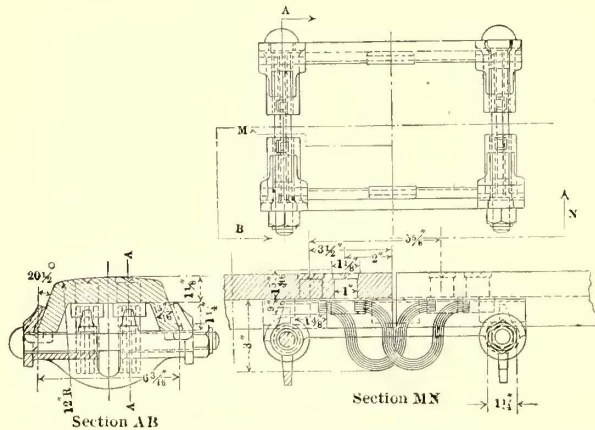


FIG. 2.—SECTION OF THIRD-RAIL AND THIRD-RAIL ANGLE PLATE.

either end and forces the foul air out in front. In addition, the company has installed all along the line apparatus for artificial ventilation, which may at once be put into use if for any reason the tunnels or stations require an additional supply of fresh air.

The men who have been conspicuous in the work are Walter G. Oakman, president of the construction company,

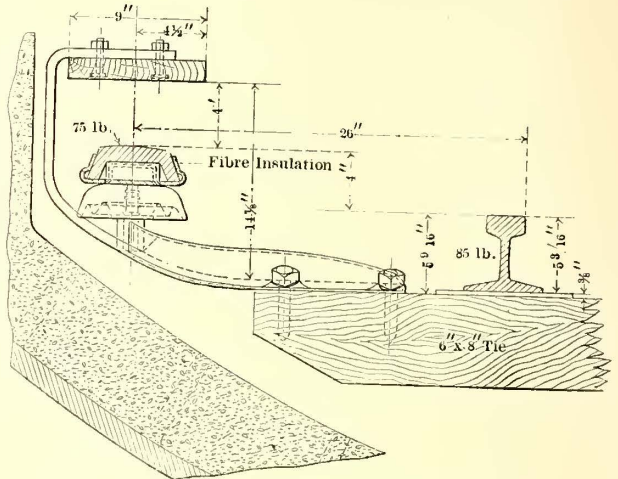


FIG. 3.—STANDARD BRACKET AND PROTECTION BOARD

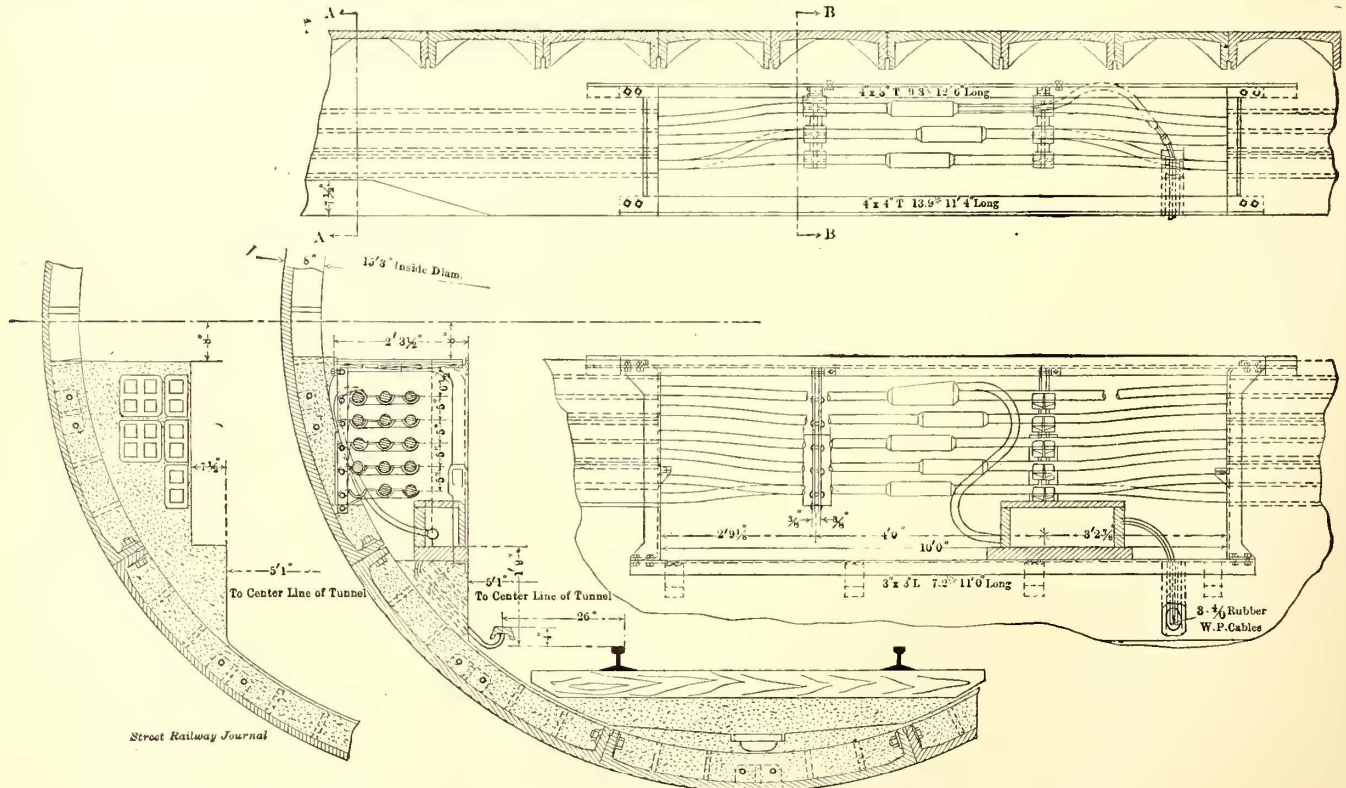


FIG. 4.—SECTIONS THROUGH MANHOLE SHOWING METHOD OF FEEDING THIRD RAIL

known as the Hudson Companies; William G. McAdoo, president of the Hudson & Manhattan Railroad Company, the operating company, and Pliny Fisk and William N. Barnum, of the banking house of Harvey Fisk & Sons. The engineering features were worked out by Charles M. Jacobs, chief engineer, and J. Vipond Davies, deputy chief

panies, in conjunction with L. B. Stillwell, consulting engineer for both companies, and was installed in each instance by Latey & Slater under the direction of Mr. Stillwell.

The third-rail is of the channel or inverted V section shown in the accompanying drawing and was rolled by the

Lackawanna Steel Company in 60-ft. lengths. It weighs 75 lbs. per yard and the specifications for composition were the same as that for the Manhattan third-rail, viz.:

- Carbon, 0.10.
- Manganese, 0.55.
- Phosphorus, 0.10.
- Sulphur, 0.08.
- Silicon, 0.03.

This composition gives a conductivity, as compared to copper, of 1:8.5. The third-rail is bonded at every joint with two 550,000 circ. mil bonds, supplied by the Electric

in. long, clasping the lower part of the channels and held together by two 3/4-in. bolts.

INSULATOR

The third-rail insulator is of porcelain with double petticoat 7 1/2 ins. in diameter and 3 1/2 ins. high. It is mounted

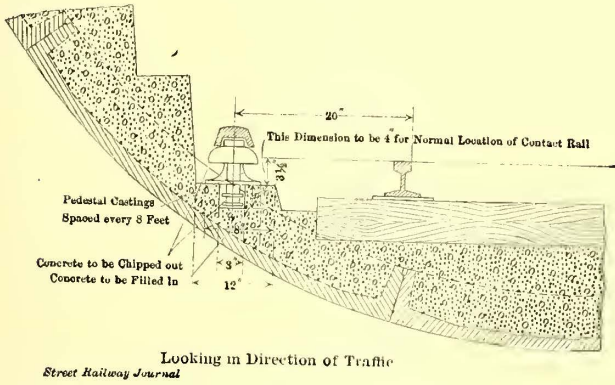


FIG. 5.—ALTERNATIVE METHOD OF SETTING THIRD-RAIL INSULATOR IN CONCRETE

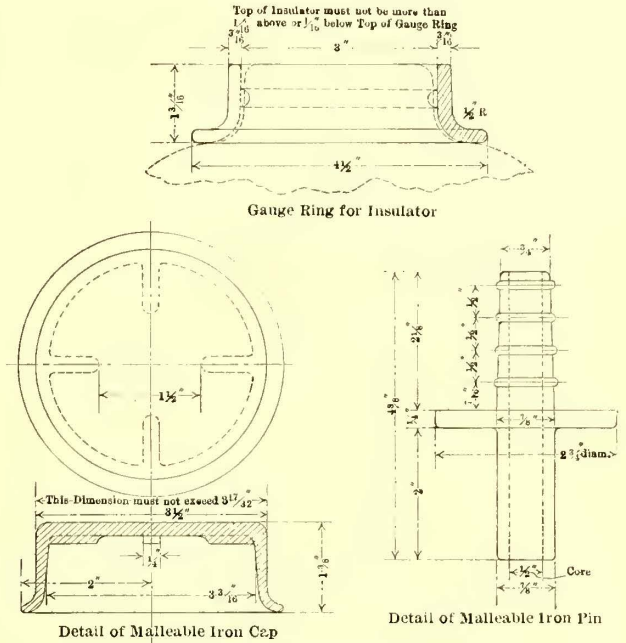


FIG. 6.—THIRD-RAIL INSULATOR

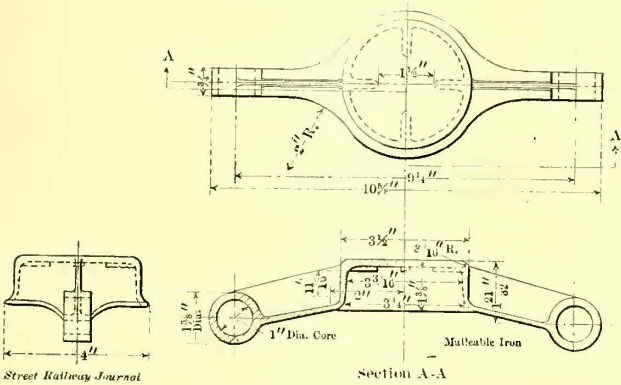


FIG. 7.—YOKE FOR ANCHORING THIRD-RAIL

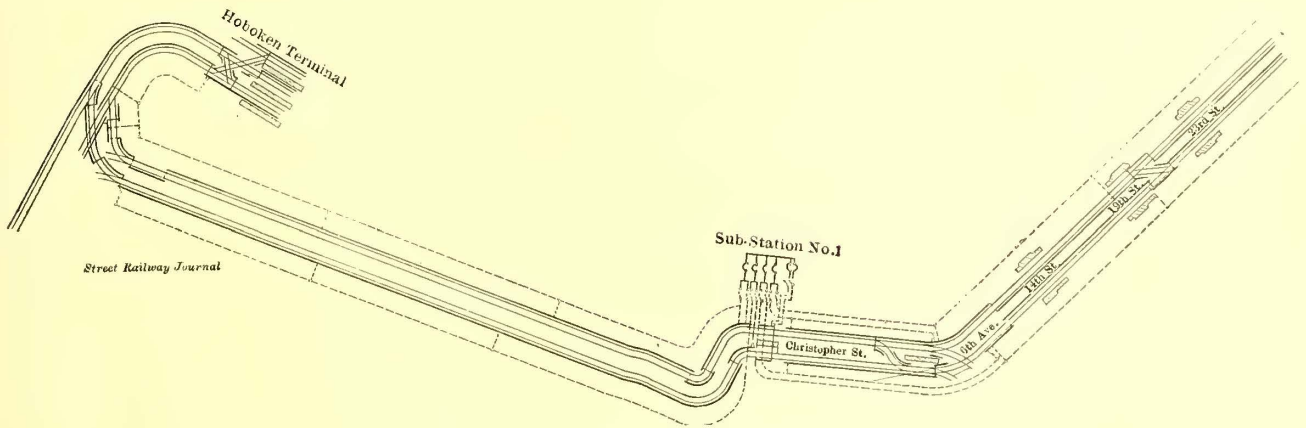


FIG. 8.—THIRD-RAIL FEEDER DIAGRAM

Service Supplies Company. These bonds have compression terminals which extend through the head of the rail. After the heads are expanded they are filed down to give a smooth-running surface to the third-rail.

A novel form of angle plate is used at the third-rail joints and is illustrated in Fig. 2. It consists of two clips 11 1/2

on a malleable iron pin and is surmounted by a malleable iron cap on which the third-rail rests. The third-rail insulators are spaced 9 ft. apart, and as a rule are supported on a malleable iron bracket which is held to the tie by screw spikes. Where the clearance would not admit of this construction a pedestal casting, illustrated in Fig. 5, is used,

sunk into the concrete walls of the tunnel. Some of the insulators were supplied by the Ohio Brass Company and some by the Electric Service Supplies Company.

The third-rail is anchored at its middle point by a special cap of malleable iron, shown in Fig. 7, and by a pair of angle plates. Where this cap is used the smaller cap is not employed. The bolts of the angle plate pass through the extension arms of the anchoring cap.

PROTECTION BOARD

A protection board is carried over the third-rail, as indicated in the drawings. This protection is made of Jarrah plank, 2 in. x 9 in. x 9 ft., and is supported on brackets on every other tie or at 36-in. centers. The ends of the planks are joined by a special splice plate consisting of 3/16-in. steel, 9 in. wide and 6 in. long and with a 1 5/16-in. channel bent down on each side to keep the planks in line. This

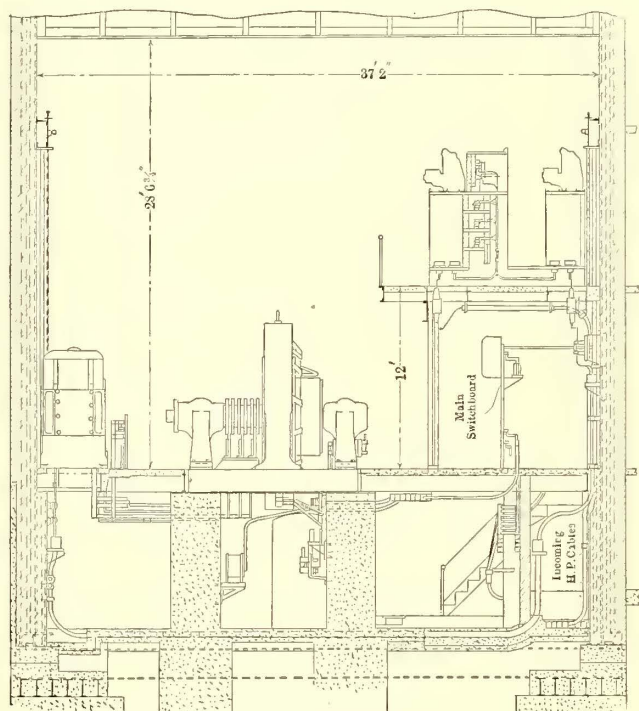


FIG. 9.—SECTION OF SUBSTATION AT CHRISTOPHER AND GREENWICH STREETS

splice plate is bolted over the top of the protection board with 1/2-in. x 2 3/4-in. bolts.

TRACK RAIL BONDING

The track rails are 85-lb. A.S.C.E. section and are bonded with two 300,000 circ. mil protected bonds of the Electric Service Supplies Company. Screw spikes are used for the track rails as well as for the third-rail.

SUBSTATION

As the large power house which the company is constructing in Jersey City has not been completed, and as only a small portion of the system was put in operation Feb. 25, arrangements have been made for securing all of the power necessary at present from the New York Edison Company. The Hudson & Manhattan Railway Company has its own substation, however, at the corner of Greenwich and Christopher Streets, adjoining its Christopher Street passenger station. Here the company has installed four 1500-kw General Electric rotary converters and twelve 550-kw General Electric air-cooled transformers. The substation has a capacity for two more machines of the same size. The diagram of the feeder connections from this station is given in Fig. 8.

TURBINE ECONOMIES

BY J. R. BIBBINS.

In the STREET RAILWAY JOURNAL of Jan. 4 W. L. R. Emmet presented a very striking comparison of Curtis and Parsons turbine efficiency. It is rather surprising, however, that he has allowed himself to fall into technical errors which are clearly manifest upon even the most cursory analysis. Presumably these errors are chargeable to a too hasty examination of the subject; but as the casual reader is certain to be misled, I feel it my duty to present the problem in a more accurate form. And I rather think that Mr. Emmet himself, upon reviewing the facts of the case, will not be able to extract much comfort from his own argument.

With most evident inconsistency he has drawn certain relative comparisons between turbine performances under different conditions, ostensibly upon the basis of "published data," but actually upon entirely unpublished data of the Curtis turbine. And finally he begs the question altogether by arguments for higher vacuum unsupported in actual practice.

Now, this discussion has nothing whatever to do with the ultimate value of extreme vacuum. That is a question by itself and will be determined upon its merits. If higher vacuum is a good investment, we may expect to see future power plants designed on that basis. The question of an extra inch of vacuum, however, will never be the deciding factor as to type of turbine; for, as far as the turbine itself is concerned, the advantage of high vacuum over low vacuum will, regardless of type, be unquestioned. The important point is, however, that these extreme vacua are not at present usually obtained. I do not believe we should find 1 per cent of the condensing stations of this country carrying 29 in. of vacuum the year around. Most engineers would to-day regard 28 in. as rather high, and less than that is more common. The turbine user is concerned only in the commercial aspect of this question. He is, therefore, interested only in results—not those which he might get under conditions which he does not or cannot afford, but those obtained under the conditions which really exist.

The general question, then, is one of relative inherent economy of two prominent types of steam turbines, as evidenced by recorded performance, while the immediate discussion bears upon a comparison of two recent tests of these two types under different conditions of operation; and I had previously attempted to show that the Curtis turbine results, under conditions obtaining in the Chicago Edison tests, were inferior to the Parsons when equated with those prevailing during the New York Edison tests.

At the outset, I cannot permit, without the fundamental data, the introduction of another series of economy curves, CC (Jan. 4, page 21), purporting to represent Curtis turbine performances under two different operating conditions—the one corresponding to the moderate conditions of the New York Edison Parsons test, and the other to the high conditions of some unpublished tests on the Chicago Edison turbine. Under both conditions the Parsons turbine is depicted as hopelessly inferior to the Curtis, and moreover, the accuracy of both the Parsons tests brought into the comparison (one made by H. G. Stott at the Interborough plant, and the other by J. P. Sparrow at No. 2 Waterside station), are directly brought into question by Mr. Emmet in his misunderstanding of results—a fact requiring no further comment. He has thus—perhaps un-

consciously—diverted attention from the one point at issue, stated above, viz., the direct comparison of the original Chicago Edison with the New York Edison tests under the reasonable operating conditions of the latter plants.

Now it is evidently a hopeless task to discuss effectively a comparison of this kind if additional complications, extraneous in character, are to be continually introduced. If such complete tests had been made at Chicago by independent parties under all conditions of load, pressure, vacuum and superheat, that results could be taken for comparison "without appreciable correction," as he claims, would it not facilitate matters (permission assumed) to place on public record the original results obtained directly under such conditions, particularly under moderate vacua

porting to represent Parsons economies for both high and moderate operating conditions, are so greatly mislocated as to lead directly to an absurdity. Compare them with the original test, line I, and also with the true water lines IV and V*. I feel safe in saying that no characteristic yet exhibited by the steam turbine would result in such a sudden departure of the water line to a decided curve tangent at about 5000-kw load as Mr. Emmet's deductions indicate. This will be apparent from the fact that curve II crosses the original water line at 4500 kw. Can we bring ourselves to believe that any turbine would have the same steam consumption at 150 lb., 2.2 per cent moisture and 28 in. as at 177 lb., 96 deg, and 27.31 in. vacuum? The difference in water, due to this difference in conditions,

should be roughly 16.7 per cent decrease for pressure and superheat and 3.7 per cent increase for vacuum, leaving a net decrease of 13 per cent, as shown by the true curves, IV and V. Again, following the same reasoning for curve III, which also tends to intersect the original tests at a load of 3500 kw, the absurdity is likewise apparent, for this intersection would indicate that an increase of 27 lb. and 100 deg. superheat is exactly offset by 1 in. in vacuum. Imagining an immediate line for 28.5 in. vacuum, it is hard to believe that at 4000-kw load, the probable intersection, an increase of 27 lb. and 100 deg. superheat results in no improvement in economy. From the irrational nature of these curves, only one inference seems possible. Lines IV and V, however, representing true Parsons results, are quite rational. For these, correction factors sanctioned by test and usage, as outlined under "Technical Analysis," were used. (See Appendix.)

(2) Non-agreement of Parsons Tests.—Mr. Emmet's figures indicate some 8 per cent difference in the results of the New York Edison and the Interborough Parsons tests, but with the proper location of his curves BB, the wide discrepancy disappears; likewise his inference of gross error in one or both of the tests. Point VI shows this New York Edison test plotted from original data uncorrected and directly comparable with line IV deduced from the Interborough test. Point VII shows these same tests reduced to Chicago conditions and directly comparable with the corresponding Interborough line V. These Parsons tests then show a difference in economy so small as to be quite negligible. Certainly 2 or 3 per cent variation between two different machines operated in different plants and under widely differing conditions of load cannot be called excessive.

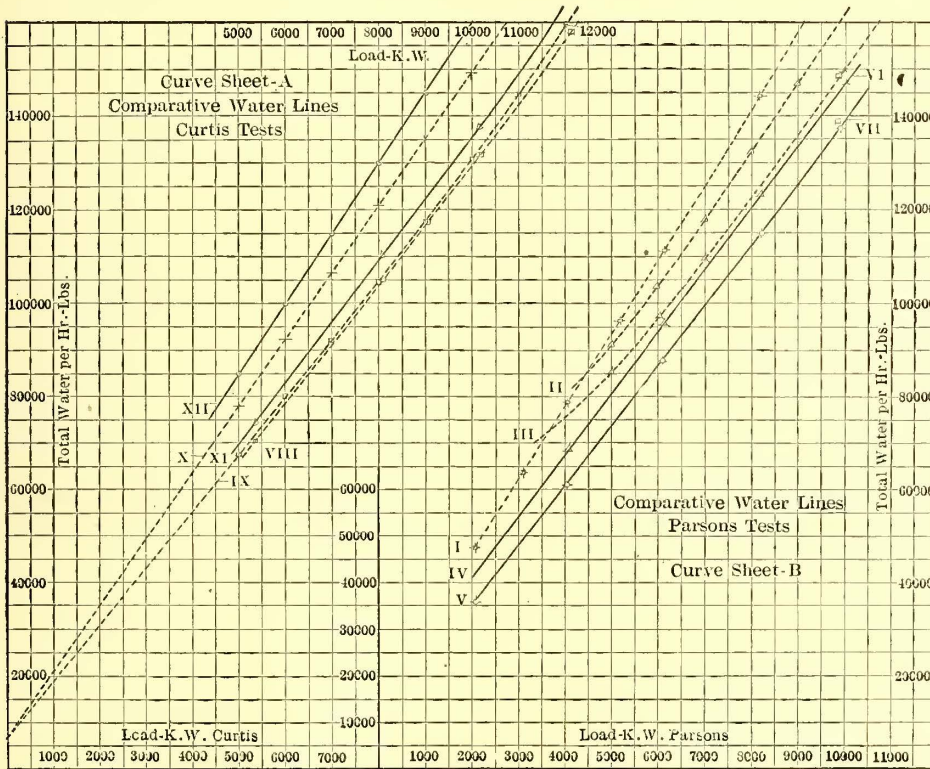


FIG. 1.—Curve I.—Original tests, 5500-kw Parsons turbo-generator, Manhattan station, by H. G. Stott. Approximate conditions, 150 lb., 2.7 per cent moisture and 28 in.
 Curve II.—The same, as corrected by Mr. Emmet, to conditions of New York Edison Parsons test, 177 lb., 96 deg. and 27.3 in.
 Curve III.—The same, as corrected by Mr. Emmet, to Chicago Edison conditions, 180 lb., 125 deg. and 29 in.
 Curve IV.—The same, properly corrected to conditions of New York Edison Parsons test.
 Curve V.—The same, properly corrected to Chicago Edison conditions.
 Curve VI.—Actual test of 7500-kw Parsons turbine, New York Edison, Waterside station, uncorrected. Conditions, 177 lb., 96 deg. and 27.31 in.
 Curve VII.—The same properly corrected to Chicago Edison conditions.
 Curve VIII.—Original tests, 8000-9000-kw Chicago Edison Curtis turbo-generator, Fisk Street station. Approximate conditions, 190 lb., 150 deg. and 29.5 in.
 Curve IX.—Unpublished tests of Chicago turbine reported by Mr. Emmet, for conditions, 180 lb., 125 deg. and 29 in.
 Curve X.—The same, for conditions of New York Edison test.
 Curve XI.—Original Chicago Edison Curtis tests corrected to 180 lb., 125 deg. and 29 in.
 Curve XII.—The same, properly corrected to Chicago Edison conditions, 180 lb., 125 deg and 29 in.

and superheat, such as obtained during the New York Edison tests? Unauthenticated and irrational curves such as have been presented will manifestly not suffice for the purpose.

In order, therefore, to confine the issue to existing published data, as Mr. Emmet desires, I shall consider only the points noted in order below, and each as briefly as possible for the benefit of those who have not the time nor patience to follow the more detailed analysis appended. I desire to point out here, however, that upon this analysis alone rests the merits of this comparison, and the specific errors involved should be pointed out in any rejoinder.

(1) Parsons Tests Improperly Presented.—The original curves BB, replotted as lines II and III, sheet B, pur-

*To facilitate the examination of the results presented, I have first used the total steam, or water-consumption line, instead of the water rate curve, which is infinitely more valuable in turbine work for revealing irrational results.

(3) Curtis Results Irrational.—Coming now to the new data introduced from unpublished tests of the Chicago turbine, I find that both the original curves *CC*, replotted as lines *IX* and *X* for moderate and for extreme operating conditions, are entirely inconsistent, neither do they agree in any respect with the original Chicago tests now on record. I will content myself, therefore, in simply pointing out the inconsistency of these special tests, basing final calculations on the original tests and using correction factors advocated by Curtis turbine engineers, as already on

represented by the original curves *CC* (Jan. 4). These inconsistencies must involve error in one or three sources: (a) The original Chicago tests; (b) the basis of correction; (c) the subsequent tests. No data are at hand for analyzing the last. No glaring irrationality attaches itself to the first test. We are, therefore, face to face with the proper method of correction.

The Curtis results, properly corrected, are, however, consistent, as shown by lines *XI* and *XII*. Here again the slight divergence is due to the increase in superheat, as in the case of Parsons lines *IV* and *V*.

(4) True Relative Economy.—Coming finally to the principal point at issue, curve sheets *C* and *D* indicate the true relative* economy of these two machines to be as follows: Parsons, 15.08 lb. per kw-hour; Curtis, 16.05 lb. per kw-hour—a difference of 6½ per cent—both under New York Edison conditions—177 lb., 96 deg. and 27.3 in., 9865 kw-load.

I now recall my former statement and find that it is borne out in fact, as well as in principle, viz., that under test the New York Edison Parsons machine shows the superior relative economy; this, and no more, was stated in the original report of the New York Edison tests. (Proc., Am. St. & Int. Ry. Eng'g Assoc., 1907.) And further, the Interborough tests indicate a superior economy

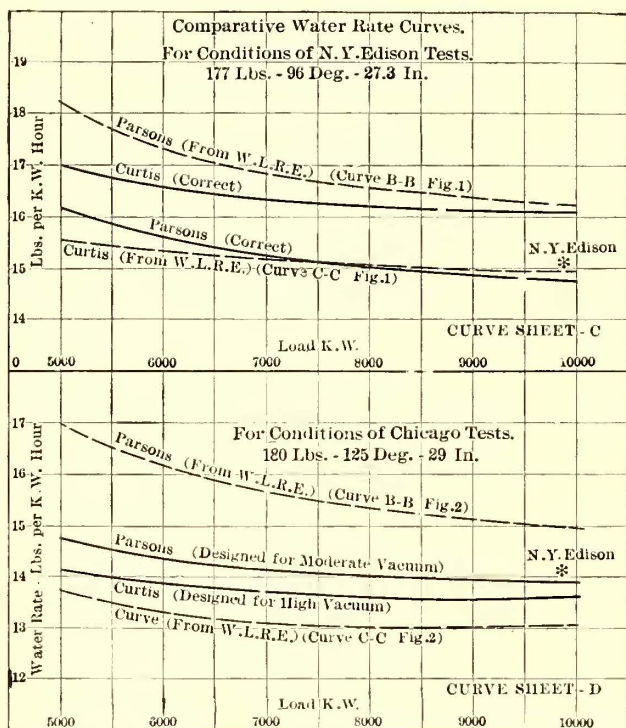


FIG. 2.—CURVE SHEETS C AND D

record before various scientific societies. (See methods of correction, Appendix.)

First, note the extremely small difference between curves *VIII* and *IX*, both stated to be uncorrected tests. Analyzing this difference, we are confronted by the conclusion that the Chicago machine at full load showed a negative rate of improvement between 29 and 29.5 in. vacuum, of less than 0.1 lb. per kw-hour per inch of vacuum (see Appendix), roughly, 1/10 of that claimed for these Curtis turbines, and this a negative, not a positive, improvement.

Second, note the wide divergence of curves *IX* and *X*, which tend to intersect at about no-load. Can we avoid this inference that at no-load the Chicago machine required the same amount of steam at 96 deg. and 27.31 in. as for 125 deg. and 29 in.; or even neglecting the 29 deg. increase in superheat, is the increased vacuum of no value? This extra 1.7 in. vacuum should result in a practically constant decrement of water per hour at all loads, amounting to nearly 12 per cent of the full-load consumption. Compare the Parsons water lines, *IV* and *V*, for the same conditions. Their rational character is shown by the fact that they are nearly parallel through the entire range of load, the slight divergence being due to the increased superheat.

In spite of unanimous statements to the contrary by Mr. Emmet and his associates, the data he presents thus indicate that the value of extra vacuum progressively decreases to zero at no-load. This is so absurd upon the face of it that in addition to other disagreements pointed out above, it has influenced me in not considering further the tests

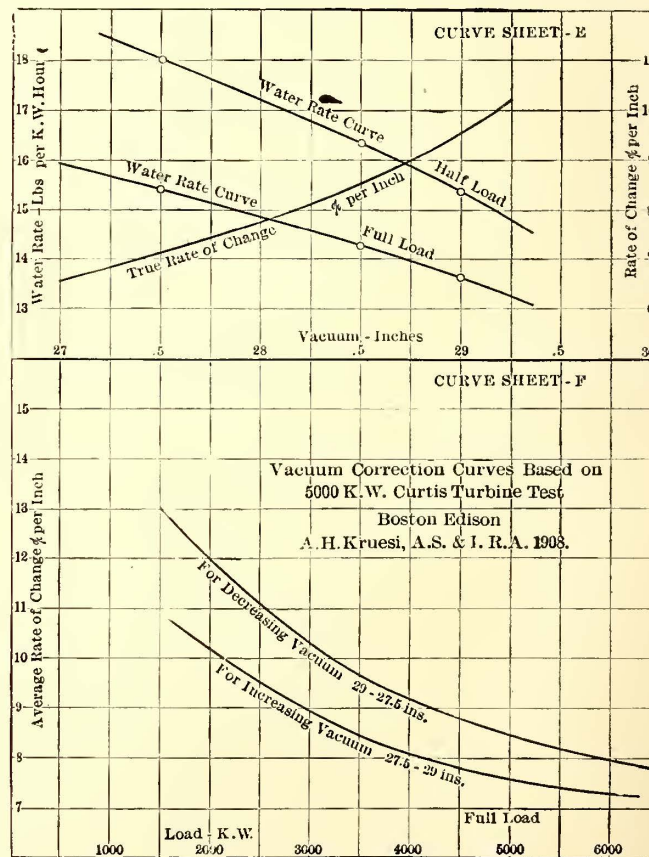


FIG. 3.—CURVE SHEETS E AND F

not only at this but at all loads. On the other hand, from the relative location of the 29-in. vacuum curve, it appears that the Curtis turbine is slightly better than the Interborough tests indicate this particular machine would be at the same vacuum. The Interborough turbine, however, was built for 27.5 in. vacuum. Had it been designed for 29 in. the improvement with the higher vacuum would undoubtedly have been greater. And, from its good per-

*This comparison is based entirely upon results obtained during the middle six hours out of the continuous eight-hour test at the New York Edison plant, permissible owing to fall in load and high-condenser leakage, and the fact that this machine had been under full load for only ten minutes prior to the beginning of the eight-hour test.

formance under its designed vacuum, I should anticipate better economies at 29.5 in. than these Chicago Curtis tests show. This, however, is a question irrelevant to the discussion.

For the actual performance of a Parsons machine designed for and tested under favorable conditions, I may refer to the Parsons tests at Carville station, Newcastle, at 5164-kw load, 200 lb. pressure, 120 deg. superheat and 29 in. vacuum—13.19 lb. per kw-hour, intrinsically a better result than obtained at Chicago, as the water rate was but 0.29 lb. higher with 0.5 in. lower vacuum.

(5) Thermal Efficiency from Actual Tests.—If it still be held that all corrections for operating conditions are misleading and inadmissible, there remains one basic relation upon which heat-engine efficiencies can be correlated, viz., kinetic efficiency of thermal efficiency ratio: i. e., the ratio of the actual water rate to the ideal water rate of the Rankine-Clausius cycle, for the conditions involved. It is therefore pertinent to the subject in hand to present these efficiencies based upon uncorrected test data. This basis of comparison is quite definite, with one exception—the specific heat of superheated steam—and in the following comparison a variable value around 0.56 has been used in accordance with the more recent expositions of the subject by Professors Thomas, Knoblauch and Jacob.

1. The Curtis machine at 10,186 kw, 176 lb., 147 deg. and 29.47 in. gave a water rate of 12.9 lb. per kw-hour. This is equivalent to a kinetic efficiency or ratio of ideal to actual of 62.1 per cent.

2. The New York Edison Parsons turbine at 9865 kw (six-hour constant load test), 177 lb., 96 deg. and 27.31 in., gave a

$$x = d \div 2\lambda = 400 \text{ in.}$$

water rate of 14.98 lb. per kw-hour. This is equivalent to a kinetic efficiency of 67.3 per cent—5 per cent higher efficiency than the Curtis with its desired high vacuum. Again, therefore, I repeat my statement as to the efficiency record now being held by the New York Edison machine in American turbine practice, as based upon actual tests.

Reviewing the letter in general, our critic would accord the poor, old-fashioned Parsons turbine a humble place, indeed, in relative ability to transform steam into kilowatts, yet he actually expresses the belief that he has done it "more than justice" in his deductions. But we cannot allow him to find refuge in the ethereal joys of 29.5 in. vacuum either as a standard operating condition or a basis for commercial testing. In fact, he himself admits as much in the statement that at Chicago the vacuum only "sometimes" reaches 29.5 in. This, to be sure, is fair condenser performance with 32 deg. water, but hardly to be considered as a normal operating condition in present turbine practice. Notwithstanding, we are treated to a delectable series of tests under these particular conditions as a characteristic measure of Curtis turbine efficiency. Does it seem reasonable that if other builders seek to meet the prevailing commercial demand for a more reasonable vacuum they should be compelled to relinquish the very considerable advantage which the high-vacuum advocate claims as his special perquisite? Such is the argument in this, as well as previous comparisons, by the same author, particularly with reciprocating engines (*Proceedings*, N. E. L. A., 1907). Such eagerness for the last fraction as is here displayed almost suggests the inherent necessity therefore, of which other builders are inferred to be in blissful ignorance. "Where high vacuum can be secured it is folly to use low vacuum." But bear in mind that a higher rate of improvement from better operating conditions carries

with it the converse proposition that the internal losses are greater when the vacuum and superheat drop. It seems to me that if your correspondent cannot "hitch his wagon to a star" in fact, as well as fancy, he is treading on dangerous ground.

It is claimed by the high-vacuum advocates that any amount of investment in a high-vacuum plant will be well repaid from an ultimate commercial standpoint. Is this true? Has anyone ever endeavored to determine the average effective vacuum for the year around, even on tide water? For water temperatures around the freezing point the high vacuum is, of course, admitted, but how about warm weather? Note the following table:

POSSIBLE VACUUM—WATER TEMPERATURES.				
Temperature cooling water.	Theoretical possible vacuum.	Perfect condenser, no temp. dif.	Actual condenser, 15° dif.	Actual condenser 15° dif.
Ratio water to steam	Infinite.	60 to 1.	60 to 1.	100 to 1
32	29.83	29.67	29.43	29.54
60	29.5	29.12	28.56	28.82
70	29.3	28.77	27.72	28.38
75	29.1	28.51	27.37	28.11

With 70 deg. water, a perfect condenser can give a maximum vacuum of only 29.3 in. And as modern surface condenser equipments seldom discharge less than 15 deg. below steam temperature, the maximum vacuum possible at this temperature and a reasonable water ratio of 60 to 1 is 27.7 in. With 60 deg. water we may maintain 28.6 in., and with 75 deg. water only 27.4 in.

Now, 29 in. vacuum is by no means unusual in winter on lake or tide water, and is certainly not confined to the Chicago Edison station; but it is hardly logical from any standpoint to construe the geographic as a strictly technical advantage in comparisons of tests. The question that usually confront the manufacturer is not the design of a machine to meet conditions only occasionally arising, but rather to meet the average operating condition that will obtain in the actual plant.

To conclude, I cannot help but feel that this entire subject of the effect of operating conditions on turbine economy, and the commercial considerations arising therefrom, is at present in an exceedingly muddled state. There is nothing mysterious about the subject which the turbine builder must guard as an invaluable secret. In fact, it is quite as definite as, for instance, the correction for temperature rise in generators, at different initial air temperatures, or the corrections for different initial temperatures of measurement.

It seems to me it lies within Mr. Emmet's power to establish very effectively his position in this entire matter. He and others who have published results on the Curtis turbine have quite uniformly adhered to conditions of high vacuum and superheat only, and have, therefore, made it necessary to introduce corrections for purposes of comparison with other units. In view of the present discussion he might give us the original results obtained from a Curtis turbine of about the same size working under approximately the same conditions—in fact, standing alongside of the New York Edison Parsons turbine, whose economy I have discussed above.

APPENDIX.—TECHNICAL ANALYSIS.

The technical analysis involves two important points—analysis of total water lines and correction factors used. Let us discard for the moment water curves and examine the results by means of the total water or steam consumption line—a valuable turbine characteristic. Experience has shown this to conform faithfully to a straight line, as in the Willans law, regardless of the method of governing* employed; i. e., within

*Incidentally, the Willans law is supposed to apply only to the principle of pure throttle governing. Hence, it is quite reasonable that the Parsons type should show this characteristic; also the Rateau. That the Curtis likewise conforms, indicates how closely the multiple nozzle system of governing approximates that of pure throttling.

almost the entire range of load controlled by primary admission of steam. This is true of the Curtis, as well as the Parsons type, and it has been illustrated so often in turbine literature that no further proof is necessary. On the other hand, the water line of a cut-off engine shows a radical curvature approximating the Willans law only in the neighborhood of best economy. We also know that the effect of a change in vacuum is to displace the total water line practically parallel to itself, while with superheat, the displacement is divergent about an origin usually representing zero steam consumption. This is quite reasonable, for we know that while an increase in both vacuum and superheat adds to a definite and constant percentage of energy to each pound of steam, their effectiveness in reducing internal fluid friction are quite different in kind. Vacuum operates progressively from exhaust to admission; superheat the reverse. With higher vacua, the mean effective density (if I may use the term) is little affected at heavy loads; with superheat at light loads. Upon these premises, it follows that the rate of change in economy due to superheat will be approximately constant at all loads; for vacuum, variable, decreasing with increasing load. Such a vacuum relation may be found in tests of 5000-kw Boston Edison turbine (Kruesi, Proc., Am. St. & Int. Ry. Eng. Assoc., 1907, Fig. 1). Curve sheet *E* represents the fall in water-rate with increasing vacuum at full-load and half-load, respectively. Both curve downward more rapidly on the higher vacua, indicating a greater proportion of gain in this vicinity. This is borne out by the curve showing "True Rate of Change." Around 27 in., the change in economy per inch is 6.6 per cent; 28 in., 7.8 per cent, and 29 in., 9.5 per cent, corresponding to 1.3 lb. per kw-hour per inch. At half-load the change is even more pronounced on high vacuum.

Now the rate of change (slope of curve) is quite a different matter from improvement in water-rate between two definite limits, i. e., the average. And, furthermore, much depends upon which way the change is made. Thus, for a total range from 29.0 in. to 27.5 in., the average increase in rate is (at full-load) 1.17 lb. per kw-hour per in., or 8.5 per cent per in.; while from 27.5 in. to 29 in. the average decrease in rate is but 7.6 per cent. Carrying this analysis one step farther. Sheet *F* shows this rate of change for various loads under these two conditions—increasing and decreasing vacuum. For example, 1 in. decrease below 29 in. results in an increase in water-rate of 11.1 per cent per inch at half-load, as compared with 8.5 per cent at full-load.

These last curves may now be used as a basis for calculation for the Curtis turbine under discussion. That they seem reasonable is evident from Mr. Emmet's statement (Proc. N. E. L. A., 1907), "the available energy with 29 in. is 10 per cent higher than that with 28 in. vacuum, * * * and between 28 in. and 28.5 in. the gain is very nearly proportionate to theory." Likewise, Mr. Kruesi (Proc. Am. St. & Int. Ry. Eng. Assoc., 1907) says, "raising the vacuum from 28 in. to 28.5 in. makes 5 per cent more energy available, and of this the turbine realizes an improvement of from 0.5 lb. to 0.6 lb. per kw-hour at rated load," equivalent to a rate of 1 lb. to 1.2 lb. per kw-hour per inch of vacuum (we have already used 1.17 lb.). Therefore, as the rate is still higher from 29 in. to 29.5 in., I am at least conservative in taking curve sheet *E* as a basis for correcting the Chicago Edison tests.

For the Parsons turbine, the rate is known to be much smaller, and as the Interborough tests are on record, I need not elaborate here. Suffice it to say that I have used a similar factor variable with load and vacuum. As the difference in water due to 1 in. vacuum—about 4500 lb. per hour—holds constant practically within the limits of primary admissions of steam, other loads, including the New York Edison tests, may be found by extrapolation. Thus, at 7500 kw, the average rate of change per inch around 28 in. is 3.42 per cent; at 5000-kw load, 5.1 per cent. In the detailed calculations, due allowance has, of course, been made for increasing and decreasing vacuum, as above outlined in case of Curtis curves.

Both types of turbines seem to benefit about equally from superheat around 100 deg., so that we may assume an equal rate of change—1 per cent per 12.5 deg. (For the total change of 100 deg., however, the Parsons usually benefits 10 per cent.) Likewise, an equal gain for pressure and quality for the former, 1 per cent per 10 lb. change around 175 lb. is assumed—a little less for wide ranges; for the latter, a correction double the percentage of moisture content—this to take account of the well-known effect of moisture in increasing internal friction, a factor with which the reciprocating engine does not have to contend.

To illustrate the method of applying these various factors, take, for example, the derivation of line *IV* from the original test line *I*:

Test: 8174-kw, 149 lb., 27.78 in., 2.7 per cent moisture. Correct to 8174-kw, 177 lb., 27.31 in., 96 deg. superheat.

Pressure: 26 lb. low; correction for this range, say 2 per cent to be conservative, factor = $\frac{1}{1.02}$

Moisture: 2.7 per cent; correction to dry steam for this range, say, 5 per cent, factor = $\frac{1}{1.05}$

Superheat: 96 deg. low, correction for the range, 9.72 per cent, factor = $\frac{1-0.972}{1.00} = 0.903$.

Vacuum: 0.48 in. high, correction for the range, 1.488 per cent, or 3.1 per cent per inch, factor = 1.01488.

Original steam consumption: 144,210 lb. per hour, then,

$$144210 \times \overset{(\text{Sup})}{.903} \times \overset{(\text{Pres})}{\frac{1}{1.02}} \times \overset{(\text{Moist})}{\frac{1}{1.05}} \times \overset{(\text{Vac})}{1.01488} = 123200 \text{ lb. per hour.}$$

$$\text{Corrected water rate: } \frac{123200}{8174} = 15.07 \text{ lb. per kw-hour.}$$

Note here that some of the factors are inverted, depending of course, on which way a correction is made from a given standard. Thus, using 150 lb. as a basis (100 per cent), it pressure factor would be 0.98; with 175 lb. (100 per cent), it is the reciprocal of 1.02, meaning that at 175 lb. the water consumption is $\frac{1}{1.02}$ or 0.98 + of that of 149 lb. For small

changes, the difference is inappreciable, but for large, especially in vacuum, it is material, as already pointed out in curve sheet *D*. This method has been followed in all of the curves involved, for which the factors are given in the appended table.

Finally, one example of the converse synthetic method, as applied to Mr. Emmet's water-lines IX and X leads to the following illogical results already noted above:

Test: 8070 kw, 197 lb., 29.55 in., 116 deg., 13. lb. per kw-hour. Corrected to 180 lb., 29.0 in., 125 deg. Difference, 17 lb. low, 0.055 in. high, 9 deg. low.

$$13.0 \times \overset{(\text{Pres})}{\frac{1.0}{1-0.17}} \times \overset{(\text{Supht})}{\frac{-1-10}{1-0.928}} = 13.12 \text{ lb. per kw-hour for 29.55 in.}$$

Water-rate from line IX, 13.07 lb. per kw-hour for 29.0 in. Negative improvement due to 0.55 in. vacuum = 0.05 lb. per kw-hour.

Note here that the only conclusion permissible from line IX is that $\frac{1}{2}$ in. extra vacuum above 29 in. actually increases the water-rate instead of decreasing it, as it should. This shows conclusively that in line IX, as derived from original curve *CC* sufficient allowance has not been made for operating conditions. This same method of analysis applied to other points in line IX shows a positive improvement with vacuum, as it should, but at an entirely too low rate—less than 0.1 lb. per kw-hour, whereas the rate of improvement claimed is from 1 lb. to 1 $\frac{1}{4}$ lb. per kw-hour.

CHECKING BAGGAGE ON THE FT. WAYNE & WABASH VALLEY

The Ft. Wayne & Wabash Valley has arranged with the local transfer company in Ft. Wayne to check baggage through to residences or hotels. The transfer company has had an agent at the interurban station, but under the new arrangement the duplicate claim checks of the transfer company will be exchanged for baggage checks by conductors on the cars. The conductors will attach the transfer company's checks to baggage before arriving at the terminal and the baggage thus checked through can be unloaded direct into the transfer wagons and delivered without delay. The interurban road has not adequate facilities for caring for incoming baggage, and under the present arrangement it stands on the sidewalk or in the street until called for. It is thought that the new plan will do away with much of this confusion which this old method entailed and will not add materially to the conductor's work. At the same time it will be a great convenience to passengers with baggage.

REPORT ON SUBWAY CAR DESIGN IN NEW YORK

The report of Bion J. Arnold to the Public Service Commission on subway cars was presented to the commission Feb. 18 and was made public Feb. 24. An abstract follows:

There are at present in use in the subway 500 composite cars in which some wood is used, 300 all-metal cars and 50 additional all-metal cars have been ordered, making a total of 850 cars. The plan of the present metal cars, but not of the 50 new cars, is shown in Fig. 1.

An analysis of subway operation shows that the principal delay during rush hours is in loading and unloading passengers.

An analysis of the average time required by an express train at a station platform during the height of the rush hours shows the following figures:

1. To open doors of cars after train has stopped—average, 2 seconds.
2. To unload an average of 163 passengers through 14 doors (15 to 50 seconds)—average, 20 seconds.
3. To load an average of 206 passengers through 14 doors (15 to 30 seconds)—average, 20 seconds.
4. To close the car doors and give the signal by means of bell rope to motorman—average, 13 seconds.
5. Total average time of express trains at station platforms between stopping and starting during the height of the rush hours—average, 55 seconds.

The entrance is often obstructed by passengers waiting

ber of seats, but as they will shorten the station stops, the total number of seats passing any station will be reduced.

REQUIREMENTS OF CAR DESIGN

A successful car for the present subway should possess as many as possible of the following requirements:

1. Separate entrances and exits.
2. A space which can be cleared so as to be ready to quickly receive the passengers boarding a car.
3. Convenient means of circulation inside the car.
4. Standing room space contiguous to the exits.
5. As many cross seats as practicable.
6. Exit and entrance doors sufficiently removed from each other to allow for the car stopping convenient to guiding rails on the platforms.
7. Doors located so as to minimize the danger from open spaces at curve platforms.

The various cars may be classified in accordance with the number of doors in the sides of the cars as follows:

- Cars with central side door and end doors.
- Cars with two quarter side doors.
- Cars with three doors near center.
- Cars with multi-side doors.
- Cars with double doors near ends.

CARS WITH CENTRAL SIDE DOOR AND END DOORS

It has often been suggested that cars provided with an

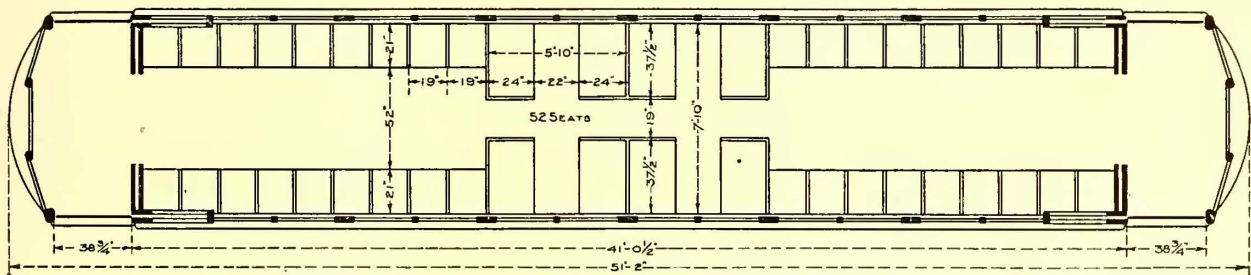


FIG. 1.—PLAN OF PRESENT SUBWAY CAR, SHOWING SEATING ARRANGEMENT AND SINGLE DOORS AT ENDS

to get off at nearby stations, who prefer to hold their positions and thus obtain an earlier and easier exit. Two points which account for a great deal of the train delay in the subway are, first, the excessive use of the transfer privilege, and, second, the use of the same end doors in the cars for both the entering and the leaving passengers. Apparently the only permanent way to improve these conditions is either to reduce or abandon the transfer privilege or to change the car.

It would be possible to reduce the transfer privilege by making the transfer passengers climb up and down stairways or by constructing a fence longitudinally on the express station island platforms, with gates which could be closed at times. These methods, however, would savor of the withdrawal of privileges now possessed, and might add to the congestion. The principle of transfer having been established cannot now be easily withdrawn, and the only remedy is to change the cars. Improvements are also possible in the signal system as recommended in the previous report. By the changes in car design proposed below, it is expected the following schedule can be obtained:

1. To open doors after train is stopped, 2 seconds.
2. To unload 163 passengers through 14 doors and to load 206 passengers through separate doors, both processes being carried on at the same time, 20 seconds.
3. To close doors and give signal to motorman, 8 seconds.
4. Total average time of trains at express stations during rush hours should not exceed 30 seconds.

The addition of doors will necessarily reduce the num-

additional door in the center of each side would at once do away with the conflict of passengers which now takes place at the present end doors of the cars, and at the same time, by providing additional door space, materially reduce the station waits. The present cars could be altered to provide central side doors. The expenses of thus reconstructing the all-metal cars would be \$2,000 per car, and the composite cars altered at a cost of \$1,500 per car. These figures contemplate the reinforcing of the sides of the car and the trussing of the underframes in such a manner as to leave the changed cars practically as strong as the present car. The weight in both cases will be slightly increased by the introduction of the central side doors in the present car.

Cars of this type have been in use on the Brooklyn Bridge shuttle trains for many years. They have recently been introduced for subway and elevated service in Boston and Philadelphia, and have been adopted by the Hudson Companies for use in the new tunnels between Manhattan and Jersey City.

No difficulty in connection with maintaining a circulation of passengers was experienced with the central door cars on the bridge on account of the arrangement of separate loading and unloading platforms, so that little can be learned from the operation of these cars on the bridge that can be applied to the study of the car problem of the present subway.

In Boston the conditions are more nearly similar to the

subway service, although the excessive transfer of passengers at the stations is lacking. But it has been found that the Boston passengers cannot be controlled sufficiently to maintain perfect circulation. Some passengers persist in getting off through the end doors, while others insist on getting on the cars through the central doors, thus causing considerable annoyance to passengers who endeavor to obey the rule, and ends generally in confusion. The operation of the cars in actual practice, therefore, has finally resulted in partially reverting to the old plan of allowing passengers to leave and enter the same door. Under these circumstances, the extra door in the side of the car has reduced the conflict of passengers by providing additional door area, resulting in somewhat decreasing the station wait, although the time of these station waits has not been reduced much below that found in the present New York subway service.

With the Boston experience in mind, it is hard to see how the car of the central side-door type would greatly relieve the New York subway conditions, on account of the usual excessively congested condition in the cars during rush hours. When a passenger boards one of these crowded cars with the intention of getting off at the next station, he should not be compelled to push himself through the standing passengers in the car in the short time which it takes to run between stations, and even if this circulation

which will be more convenient for the support of standing passengers than the usual straps. This car allows the most effective arrangement of seats and standing room that can be devised.

Another combination is the Illinois Central arrangement of center seats with side aisles, but using the central side door and two end doors. If the cross seats are set back this arrangement gives two seats more per car than Fig. 2, but at considerable sacrifice of the efficiency in standing room. Moreover, owing to the narrowness of the aisles, this car is not well adapted for the easy circulation of passengers during rush hours. With walkover seats in the center of the car and two side aisles there would be thirty-six seats instead of forty-two. Still another arrangement of seats would be to have an open space in front of the central door, a center aisle with twenty cross seats, but six longitudinal seats at each end of the car. This would give fifty-two seats, but the car would unload slowly.

CAR WITH TWO QUARTER SIDE DOORS

The use of two quarter side doors has been suggested. This provides the shortest average distance from the door to the seat. This car would therefore cause the passengers to occupy the center of the car and thus use the entire length of the car more effectively than it is now used in the present end-door type.

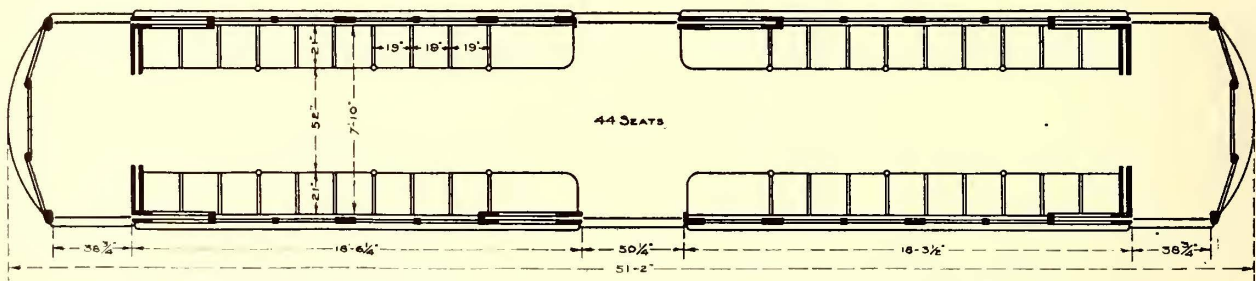


FIG. 2.—CAR WITH CENTRAL SIDE DOOR AND END DOORS. LONGITUDINAL SEATS (44 SEATS)

in the car could be maintained, the movement of the passengers from the end door to the central door would become an objectionable feature, causing nearly as much discomfort to the passengers and delay to the trains as the present method of operation with the single end doors. The Hudson Company's cars will operate under conditions very similar to the Brooklyn Bridge terminal service; that is, a large majority of the passengers will get on the cars at the stations at one end of the line and get off at the stations at the other end. The successful use of the central side-door car in terminal work, however, does not furnish a precedent which demonstrates that this type of car would be satisfactory under subway conditions, whereas the failure of the center-door car on the Boston subway to reduce the length of stop to much less than the time required in the New York subway, even with the present end-door cars, does not furnish any encouragement toward rebuilding the present subway cars so as to provide them with central doors.

The use of central side doors is also complicated at curved platforms, of which there are a number on the subway. Several possible arrangements of seats with the central side doors are shown in the following engravings.

Fig. 2 illustrates a seating arrangement similar to that used in the Hudson tunnels, the Boston and Philadelphia subways and the Brooklyn Bridge cars. This design contemplates the removal of all of the cross seats found in the present car. Vertical hand rods can be introduced,

With cars of this type, each door should be of double width, if it is to accommodate subway traffic, so that two streams of passengers could pass through the doors at the same time; that is, at each quarter of the car there would be practically two doors. The circulation may be provided for by using one set of doors as entrances and the other set as exits. There would be no objection to a division post in the center of the double door with this type of car, as the door openings are large enough to require two separate doors, each of which could close toward the dividing post, and thus do away with the danger of a sliding door opening past the middle post. Owing to the distance of the doors from the end of the car the same difficulties at curved platforms would be met that are encountered with the center-door car.

The location of the train guards would be a problem with this type of car, as these guards could not work to advantage from between the cars as at present. If the guards are moved into the car their most effective location would be at the center of the side of the car, from which position they could not only control the movement of the doors, but also encourage the circulation of the passengers from the rear toward the front exit door. Such car is illustrated in Fig. 3.

Except for the fact that all the passengers entering one car must gather at one place on the platform, and that, therefore, the inevitable crush would take place in loading, this type of car has many advantages. This car, however,

would work much better during non-rush hours than during rush hours. It would be difficult to maintain a circulation of passengers into one door and out the other as soon as the space in the car between the doors became filled with standing passengers. As soon as passengers on the platforms desiring to enter the car became blocked at a time when the exit doors were empty and open, there would be a rush to board the car through the exit doors, as has been proved by the experience with the Boston public. The only way to control the circulation with this car would be by means of platform railings. At stations where it is desirable to divide the Broadway patrons from the West Farms patrons, as is now done at Grand Central, this type of car would not lend itself to a satis-

with this car can be set up in either direction. In maintaining a circulation, however, this car would not have the advantage of a space such as a platform which could be cleared of passengers while moving between stations, so as to provide an opening space for the entering passengers, as with cars of the end-door type. The door openings being on the center and near the quarter lines of the car, would lend themselves conveniently to an effective system of platform guard rails, but the center door would be a disadvantage at curved platforms. Such a car is shown in Fig. 4.

The location of the end doors at the quarter division points of the car, or even nearer to the central door, is practically the only way that the central door can be used

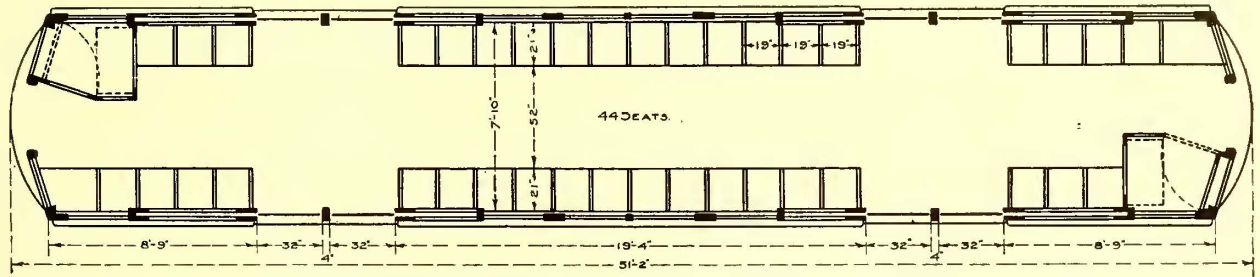


FIG. 3.—CAR WITH TWO QUARTER SIDE DOORS. LONGITUDINAL SEATS. (44 SEATS)

factory division of the platform space, as the doors would bring the passengers leaving one train into conflict with passengers on the platform waiting for the next one.

This car could be modified by using cross seats at the ends, which would add four seats, but passengers who are slow in leaving the cross seats in the rear of the car would no doubt have some trouble in reaching an exit, as they would encounter the stream of entering passengers.

If future subways could be constructed sufficiently in

with success in the subway, as a comparatively easy means of reaching the exit must be provided—otherwise a passenger boarding a car when it is crowded will either find it impossible or will refuse to crowd his way through the standing passengers in the car in order to reach the regular exit, and will insist on leaving the car by the door he entered. As soon as one exemption is allowed to the rule of "in one door and out the other," confusion will at once take place, and the advantage of having the passengers

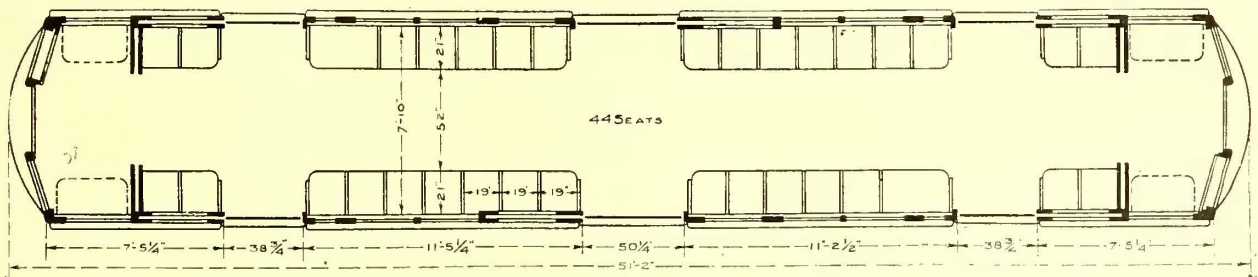


FIG. 4.—CAR WITH THREE DOORS NEAR CENTER. LONGITUDINAL SEATS. (44 SEATS)

advance of the demand for them, then this type of car could be used to good advantage with either cross or longitudinal seats.

CARS WITH THREE DOORS NEAR CENTER

The objections to a car with a central side door, on account of the difficulty which might be experienced by the train guard in controlling the center door from his position between the cars, could be removed by locating the end doors nearer a central door, thus providing practically a large door in the center of the car with two smaller doors, one between the center and each end of the car. This arrangement would also be an improvement over the quarter-door car, as with three doors the moving passengers would be divided into three groups instead of two. This car should be provided with a separate guard for each car, and this guard should be located so that he can see along the side of the car in one direction, and thus be in a position to quickly close all doors at once. A circulation

move together in a predetermined way without hesitation will be lost. This car lends itself to the longitudinal seat plan throughout its length, as there is not enough space in the ends of the car for cross seats, and it would be a mistake to limit the connecting space between the doors by the introduction of an aisle or aisles serving cross seats.

A large double door, say 80 in. total width, could be placed in the center of this car to be used as an entrance, and two small doors, say 40 in. in width, on each side as exits, if desired, as a modification to Fig. 4. Another variation is to put cross seats in the ends of the car.

The troubles with the curved platforms, and the structural difficulties of adapting the present car frame to this design, are serious disadvantages to the use of a car of this type with the present subway.

CARS WITH MULTI-SIDE DOORS

Cars of this type are in successful use on the suburban system of the Illinois Central, in Chicago. These cars are

72 ft. long over all and 10 ft. 6 in. wide over the sheathing and have twelve sliding doors on each side. The present length of the subway cars if constructed of this type would allow for a maximum of eight side doors. The present end doors are each about 38 in. wide, giving a total door area of 76 in. on each side. With eight side doors each 25 in. wide there would be a door opening of 200 in. per car, or nearly three times the door space provided in the present subway car.

To determine the efficiency of this type of car the writer had a large number of observations made of the Illinois Central car in actual operation. During rush hours in Chicago the maximum number of passengers passing through the twelve doors of the car was found to be 4.8 per second. With the eight-door subway car passengers would be unloaded and loaded at a rate of not more than four persons per car per second. With the present car the rate does not vary far from one person per door per second,

ment of the trains. Moreover, the present platforms serve only one of the end doors on each of the end cars of the train and it would be necessary to extend all of the station platforms below Ninety-sixth Street and most of those above that street.

The final serious objection to the multi side door car in the present subway is the fact that practically the entire car bodies now in use would necessarily either be scrapped or used elsewhere, as it would be practically impossible to rebuild them so as to provide eight side doors on each side of each car. Under these circumstances, the cost of the change would mean an expense of at least \$5,000,000 for multi side door cars, and of about \$2,000,000 for platforms, and the improvement to be expected from these changes with the present subway would not justify the investment. If the multi side door car is to be considered for future subways, the station platforms should be arranged so that the unloading can be done upon one station platform, and

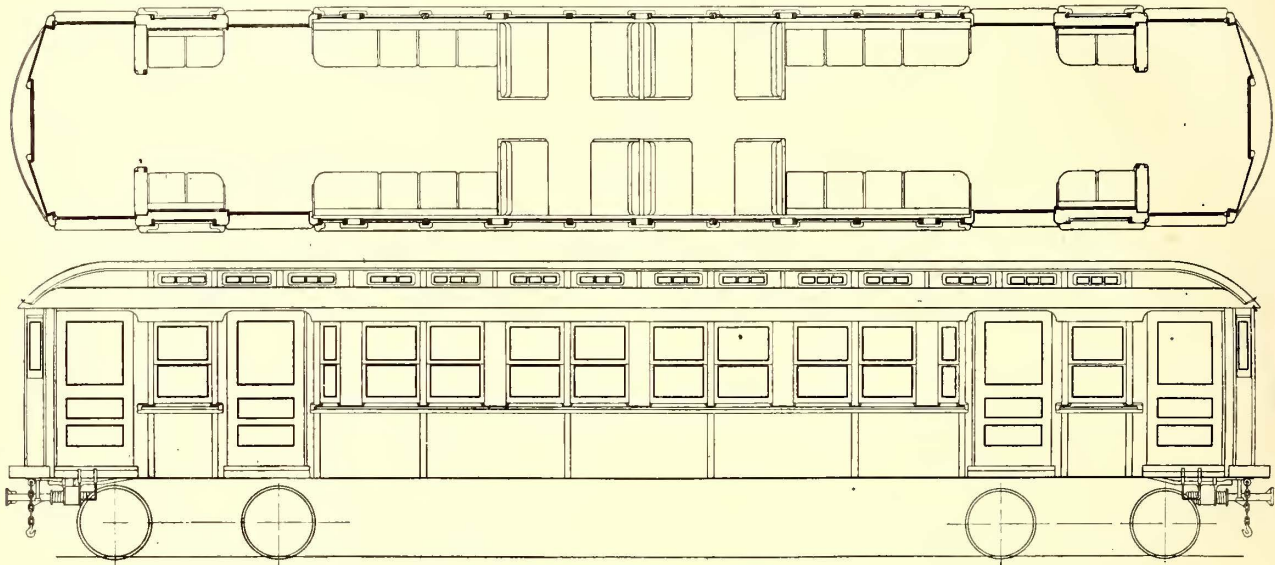


FIG. 5.—SHOWING PRESENT CAR AFTER BEING ALTERED INTO A CAR WITH DOUBLE DOORS NEAR ENDS. RECOMMENDED TYPE

or two passengers per car per second, except under extremely congested conditions, when the rate becomes slightly less. It is difficult to see, therefore, how the multi-side door car would reduce the unloading and loading by more than one-half, and this only on the assumption that the door could be promptly closed by guards. In Chicago, on the Illinois Central, there is apparently no difficulty in doing this, but it should be remembered that during rush hours the subway traffic is fully ten times as large as the Illinois Central traffic during the corresponding period, and experience in the subway has demonstrated that in order to close the car doors during the rush period a corps of uniformed, trained platform guards, in addition to the train guard, is absolutely necessary.

It has further been learned that the only way to move trains through the subway on schedule time is to close the car doors promptly, and thus limit the platform delays. It is difficult to see how this could be accomplished with the multi side door car unless the stream of passengers was stopped before it reached the loading platform. This would transfer the "crush" from the platform in the vicinity of the car doors, as at present, to a platform entrance or a number of entrances, which could be made sufficiently large to considerably reduce the crowding, but the inevitable cutting off of the stream of passengers must be quickly accomplished in some manner, in order to allow the prompt move-

the loading can be accomplished from another and separate platform.

Where multi side doors are used there may be two side aisles with seats in the center or a central aisle with side cross seats. The latter arrangement can be made to seat eighty passengers, but will load and unload slowly.

CARS WITH DOUBLE DOORS NEAR ENDS

Without weakening the present car, or adding materially to its weight, it is possible to introduce additional side doors, one near each end of each side of the car and as near as practicable to the present end doors, the distance between the doors being at least sufficient to furnish a pocket for the sliding doors. It will be seen by referring to Fig. 5 that these additional doors can be added without disturbing the present seating arrangement of the car to any great extent. It is true that the introduction of these doors will make it necessary to remove eight seats from each car, but the operation of the cars in actual service will make it possible to pass so many more cars through the subway that the loss of eight seats in the added cars, and the extra standing room, so convenient to the separate exit, is a feature which will decrease the station waits, and thereby increase the schedule speed.

This proposed change in the present car has many advantages which even a casual study will reveal. The new doors can be used for exits, and the present end doors for

entrances, thus providing at once the means of carrying on the process of unloading and loading simultaneously and without the present conflict which during rush hours has become so objectionable. This car provides a separate space for leaving passengers to collect around the exit doors without blocking the space which should be provided for the passengers entering the car. The result will be that passengers will move in and out much more quickly than at present, and the movement of passengers into the car will facilitate the movement of passengers out of the car.

With this car it would be possible to keep the platforms clear of standing passengers, particularly at the time of approaching a station where considerable additional load is to be expected. With the present cars it is impossible

the passengers, by opening the exit door slightly in advance of the entrance door, which can easily be done by either mechanical or pneumatic means.

This car lends itself readily to the introduction of platform railings at all of the more important station platforms. These railings can be arranged as shown in Fig. 9, which will indicate at once the advantages of collecting the passengers who are waiting for a train at definite loading points, thus leaving the remaining parts of the platform free and ready to receive the unloading passengers. This particular double-end-door car fortunately allows for an arrangement of platform railings in such a way that loading points can be provided for the Broadway passengers separate from those set apart for the Lenox passengers.

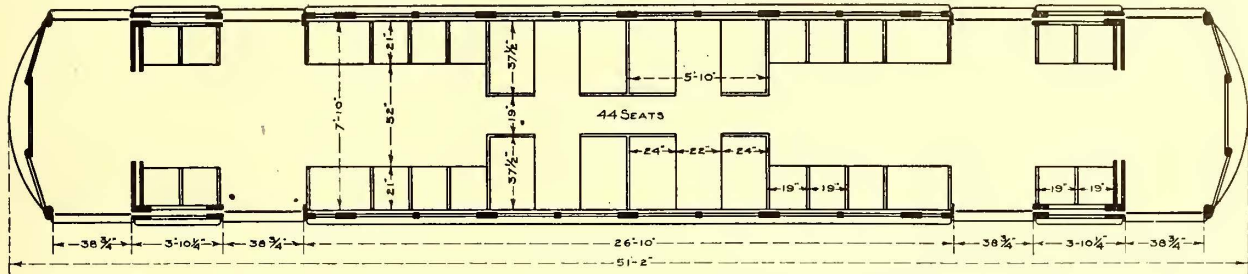


FIG. 6.—CAR WITH DOUBLE DOORS NEAR ENDS. COMBINING CROSS AND LONGITUDINAL SEATS. (44 SEATS.) USING PRESENT CAR BODY AND SEAT SPACING.

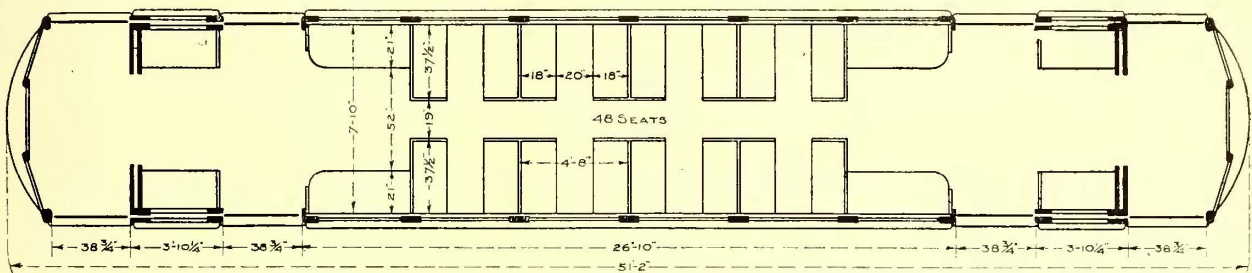


FIG. 7.—CAR WITH DOUBLE DOORS NEAR ENDS. COMBINING CROSS AND LONGITUDINAL SEATS. (48 SEATS.) MORE COMPACT SEATS FOR FUTURE CARS IN PRESENT SUBWAY.

to keep the platform clear, as the passengers readily make the excuse that they are getting ready to leave the train at the next station. With a clear platform there should be none of the discomfort now experienced in boarding a crowded car; the passengers will pass rapidly into the empty car vestibule, and can move at once into the space which has been vacated by the leaving passengers.

There should be no hesitation on the part of a passenger in the selection of an entrance with this type of car, as is so often the case with the multi side door car. Under these circumstances there is no reason why a rate of flow of passengers in and out of the car amounting to at least five passengers per car per second should not be expected with this car with double doors near the end, and this rate is fully as good as the experience in Chicago would lead us to expect from the multi side door cars, even with eight doors distributed the entire length of the car.

While this type of car provides for setting up and maintaining a circulation, this circulation is not obtained at the expense of comfort to the through passengers, as the circulation is confined to the two ends of the car, and it is therefore not necessary for a passenger boarding a train at once station and getting off at another to pass through half the length of the car, with the attendant discomfort to both himself and to all of the other passengers in the car.

Both the exit and the entrance doors are directly under the eye of the guard, who is thus in a position to accentuate the circulation, and, therefore, the rapidity of handling

Should the distance between the doors as shown be considered too close for ease in stopping at the proper points, the distance could be increased by moving the supplemental doors one seat nearer the center of the car.

The standing room in this car can be increased during rush hours by folding up the two seats between the doors, and, while this practice is not to be commended, there will be times, and particularly on heavy days, such as Mondays, when this feature could be utilized.

The present cars can be changed to conform to this arrangement for an expense of about \$2,000 for each steel car, and about \$1,500 for each composite car.

For the present subway this car seems to me to possess more advantages and fewer disadvantages, both from the standpoint of the public and the operating company, than any other type, and its use will increase the capacity of the subway sufficiently to fully justify the expense of altering the present cars into cars of this type.

Several different seating arrangements possible with this car are shown.

The first of these is illustrated in Fig. 5 and also in Fig. 6, in which the dimensions are given, and is well adapted to the present subway car. No great advantage will be secured in attempting to make the doors much wider. While the present width is not sufficient to allow passengers to pass through the doors two abreast, it is found that they naturally stagger themselves and pass through the door much faster than if they were forced to move in single file. As soon

as the doors are made much wider, as in the Brooklyn Bridge shuttle cars, the crowding passengers make an effort to pass through the door three abreast, much to the discomfort of the middle passenger. To avoid this difficulty a dividing post in the center of a wider door might be introduced, but with a sliding door for cutting off the flow of passengers this center post would serve to multiply the danger and increase the accidents.

Fig. 7 shows an arrangement of seats which is more economical of space. In the present subway there are

conveniently located so as to guide and support the passengers standing in the open spaces at the end of the car.

RECOMMENDATIONS

In conclusion the author summarizes his recommendations as follows:

First. That every car used in regular passenger service in the present subway be provided with two additional side doors, located near the ends approximately; as shown in Fig. 5.

This car is recommended for the following reasons:

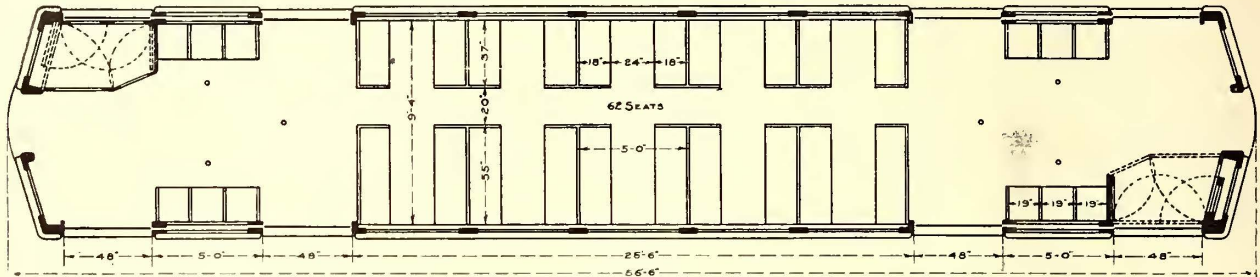


FIG. 8.—CAR WITH DOUBLE-END DOORS (FOR FUTURE SUBWAYS). BACK-TO-BACK SEATS ON 60-IN. SPACING. (62 SEATS.)

70 in. between the center of the backs of these seats, which is taken up by two 6-in. back cushions, two 18-in. seats and a clear space between seats of 22 in. For double side seats, served from a center aisle, a clear distance of 20 in. between seats is sufficient, and the allowance of 18 in. for each seat, together with its back, has been found satisfactory, thus making a total over-all distance of 56 in. for one bank of seats. The width of 18 in. for each passenger for the cross seats and of 19 in. for the longitudinal seats in the present

1. The double-door space at each end of the car will greatly reduce the present station waits.
2. The separate exits and entrances will remove the present uncomfortable conflict at the car doors.
3. The present cars can be altered into this type of car without detracting from their structural strength, or materially altering the present seating arrangement.
4. The result in increased carrying capacity due to the changes will abundantly justify the investment.

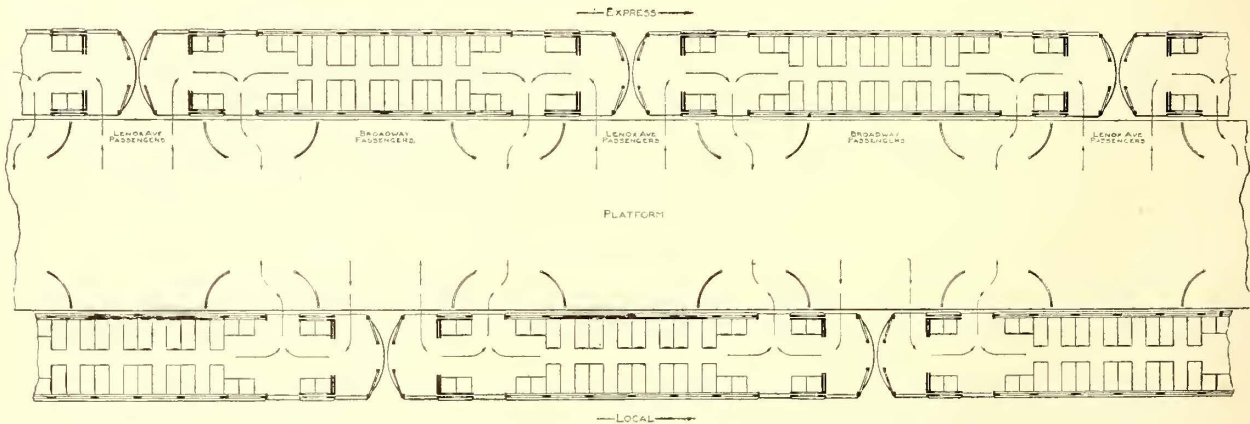


FIG. 9.—SHOWING ARRANGEMENT OF GUIDING RAILS ON STATION PLATFORMS, TO BE USED IN CONNECTION WITH RECOMMENDED TYPE.

car is good practice. With the more economical arrangement of cross seats, more space can be devoted to such seats and at the same time the seating capacity of the car can be increased. This improvement should be kept in mind in ordering future cars for the present subway.

Still another modification of this type of car is shown in Fig. 8. As it is probable that future subways will be larger than the present one, the cars can be made wider, and thus increase the carrying capacity per linear foot of car, an increase not practically obtainable in any other way. The widening of the car could be carried to any reasonable degree, but in Fig. 8 it is designed to allow for five seats abreast. The 60-in. spacing of the seats will provide convenient access to the inside seats. There is but one aisle the width of which is ample and the standing room is convenient to the exit. During rush hours this standing space can have a ledge arranged to provide a comfortable support for part of the standing passengers. Vertical posts can be

5. This is the only type of car with additional doors that will not materially increase the present trouble due to curved platforms.

Second. That all cars be provided with either pneumatic or other means for quickly opening and closing the doors, and with signals, which will automatically indicate to the motorman when the last door is closed.

Third. That all new cars be of metal and provided with seats more economically arranged, as shown in Fig. 7.

Fourth. That when the cars of the double-end door type are put into service, a system of platform railings, similar to that shown in Fig. 9, be provided to direct the passengers.

Fifth. That for future subways a wider car should be considered. This car may be a multi side door car, if separate platforms can be arranged for each class of trains, and if the stations can be designed to control the flow of passengers at the entrance to the platform, instead of

directly at the car doors. If, however, it is found that it is impracticable to design stations with sufficient room for waiting passengers independent of the station platforms, it will probably be found that the best car for future subways is a wide car of the type with double doors near ends.

Sixth. That if it is found that future subways cannot be built without the occasional use of curved platforms, the cars for these future subways should be designed so as to allow the station platforms to extend under the car in such a way that the necessity for sliding platforms will be obviated.

CHANGING TRANSFORMER CONNECTIONS IN EMERGENCIES

The transmission line of the Wabash-Anderson division of the Indiana Union Traction Company was originally designed for 15,000 volts. It supplies six sub-stations from the main power house of the company at Anderson on the south end. The transformers at the power house and at all of the sub-stations were designed for that potential and the line insulation as well. About a year ago it was decided to rebuild the line for 30,000 volts transmission in order to cut down the line loss and to make it conform to the standard line construction of the Indianapolis Northern division. To save the cost of installing new transformers throughout, the old 15,000-volt apparatus was connected up in star instead of in delta. This gave a line potential of approximately 26,000 volts, but introduced the disadvantage of interruption of transmission in case any one of the transformers break down. So far no failures have occurred, but to provide for making quick changes in connections from star to delta in case of emergencies G. H. Kelsey, superintendent of power, has devised a simple device which has been installed in the power house and in all of the sub-stations.

The transformers are arranged side by side with the line wires strung on insulators carried on a stout wooden frame above them. A two-way switch has been put in over each transformer, the movable contacts being attached to a wooden rod 1 in. x 1 in. extending across above the transformers and supported in guides on the insulator frames. This rod can be moved to the right or left by a pivoted handle at one end. When the rod is pushed to the right the right-hand tap of each transformer is connected to a common ground wire through the switch contacts. The left-hand taps are permanently connected to the line wires. When the rod is moved to the left the ground connections of the right-hand taps are broken and they are suitably connected to the line wires through the other switch contacts. The switches are intended to be moved only when current is off of the line and they consist simply of a single copper leaf which is forced between two spring leaves.

In case of emergency the operators at each of the sub-stations can change over in a few seconds on notification and transmission can be resumed within a minute. The connections to the switches are all permanent and no mistakes can be made in the excitement. In the summer time, during heavy storms the connections are frequently changed and the line voltage lowered temporarily to relieve the strain on the apparatus.

The Twin City Rapid Transit Company has prepared for the information of its agents a rate sheet quoting the rates for all points where the fare is more than 5 cents. This includes the charges made for chartered cars and steamboats.

PROPOSED TRACK CHANGES AT NINETY-SIXTH STREET, NEW YORK SUBWAY

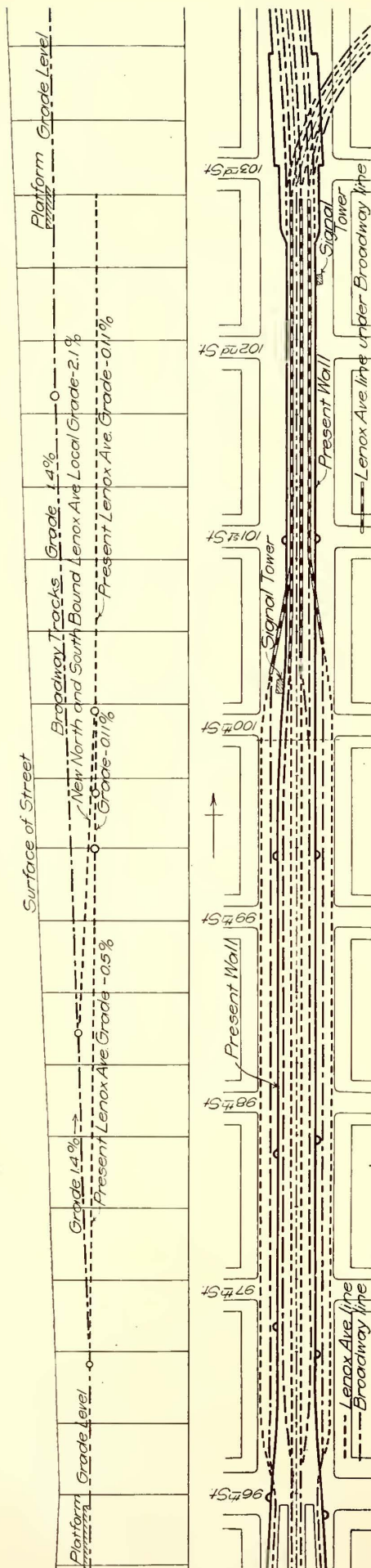
As noted in the STREET RAILWAY JOURNAL of Feb. 15. extensive track changes have been proposed to relieve the congestion of traffic in the New York subway at the Ninety-sixth Street junction of the Broadway and Lenox Avenue division. The latest plan, which differs somewhat from the last published, will do away with all crossings at the same grade and transfer the switches for the separation of the local and express traffic of each division to a point near 101st Street. This will be done by constructing four new tracks, two on each side of the present subway, and extending from Ninety-sixth to 101st Street. The proposed changes will obviate any interference between express and local trains immediately north of Ninety-sixth Street. Going north a break for a single track is made in the present wall of the subway at Ninety-sixth Street for the local trains. Immediately outside the present wall the track divides into two separate tracks, one for the Lenox Avenue and one for the Broadway trains. These continue side by side at the same grade, which is that of the present Broadway line, until near Ninety-eighth Street, where the Lenox Avenue trains drop on a 2.1 per cent grade, which continues until the difference in elevation is sufficient to allow the Lenox track to pass beneath that of the Broadway line. In this position, one vertically above the other, they connect with their respective tracks.

There is absolutely no change in the present trackage for handling the express trains under the new arrangement, those of the two divisions being separated by a switch at Ninety-sixth Street and following the same tracks at the same grades as now in use. Between 101st and 103d Streets the Lenox Avenue local will make use of a third track in the sub-subway, which is now dead-ended and used as a storage track. This will keep the northbound Lenox Avenue express and local trains separated until the point of division at 103d Street is reached.

The separation of the express and local traffic southbound is effected at 101st Street, where turnouts are placed to take off the local trains in the upper level and in the sub-subway. The local tracks continue one above the other for only a short distance, the Lenox Avenue line swinging outward and starting up on a 2.1 per cent grade to reach the level of the Broadway tracks. This is accomplished near Ninety-eighth Street opposite the point where the grade separation for the northbound trains starts. The two local tracks, now at the same level, continue parallel to Ninety-sixth Street, where they merge into one and pass through the wall of the present subway.

A considerable saving in cost is effected by carrying the local trains of the two divisions through the present subway walls at the same point, instead of starting to effect their separations and connections within the limits of the present subway.

Among the alternative plans was one that provided for a single northbound local track to a point about midway between Ninety-sixth and 101st Streets, and the placing of a switch at that point for the separation of the trains of the two divisions. Though it possessed the good points of lessening construction cost, it would have introduced an extra slow point and lengthened the running time. There is necessarily a slow point at Ninety-sixth Street, due to the stop at the station, so that by placing the switch at this point, advantage is taken of this factor. For this same operating reason it would have been advisable for the northbound Broadway locals to pass through on a separate track



PROPOSED TRACK ARRANGEMENT AND GRADES AT THE 98TH STREET JUNCTION OF THE NEW YORK SUBWAY.

to 103d Street before entering on the local express tracks, since a stop must be made at the station. It was considered, however, that this operating advantage did not sufficiently offset the increased construction cost. Similar reasoning would prompt the lengthening of the southbound Broadway local track also northward to 103d Street.

The introduction of two local tracks from 101st to Ninety-sixth Street, southbound, was made to allow for storage of trains awaiting for signals to proceed on the common tracks south of Ninety-sixth Street. These tracks will each hold two 500-ft. trains.

The plans provide for keeping the present grades of the tracks now in place undisturbed. The new Broadway local track will continue at the same elevations and grades as the present Broadway tracks, while the new Lenox tracks will run at the Broadway grades and elevations until just north of Ninety-eighth Street, where a new gradient is introduced for overcoming the difference in the track levels of the two divisions. The continuation of this new grade backward toward Ninety-sixth Street to get smaller gradients was proposed, but again the high cost made it advisable to adopt the steeper grade and save in excavation and retaining walls. The placing of the new Broadway local tracks immediately alongside of the present subway wall and at the same grade as the Broadway express track on the other side of the wall will enable the latter to stand undisturbed, which would not have been the case had the new Lenox Avenue local track been placed next to the wall.

Alternate methods of carrying on the new construction without disturbing the present traffic have received considerable attention and are now being worked out in detail. The roof of the subway is very close to the street level at this point and consequently all of the reconstruction work will have to be carried on by the cut-and-cover method. This will introduce a difficulty in providing for the maintenance of the street traffic. Further difficulties will be experienced because of the changes which will have to be made in sewers, water and gas pipes and electric conduits which were disturbed in the construction of the original subway. Special fittings and changes then made in them will make their handling at the present time even more difficult than were the original changes.

The proposed plan has been worked out under the direction of Henry B. Seaman, chief engineer of the Public Service Commission, and has been accepted by the Interborough Rapid Transit Company, Geo. H. Pegram, chief engineer. The estimated cost of the work is \$850,000.

EXTENSION REQUIRED IN BOSTON

A rather unusual decision was handed down by the Massachusetts Railroad Commission the other day in response to a petition from South Boston residents for action requiring the Boston Elevated Railway to extend its surface tracks in the Summer Street extension for about a mile over flat lands occupied only by a few manufacturing establishments to a connection with existing surface lines near L Street and Broadway, South Boston. The commission practically declined to make any finding other than that some additional "means or methods" must very soon be adopted to meet the traffic needs of the growing section where the petition originated. This decision virtually leaves the company free to determine whether it will provide more cars over existing trackage or build the extension asked for; but accompanying this freedom is the hint that some relief must be granted.

**REPRESENTATIVES OF INDIANA ELECTRIC RAILWAYS
AND THE RAILROAD COMMISSION DISCUSS
OPERATING RULES**

In compliance with a call sent out by the Indiana Railroad Commission about one hundred representatives of some sixteen electric railway companies of Indiana met the members of the railroad commission in the Senate Chamber at Indianapolis Feb. 18. The meeting was called to order by U. B. Hunt, president of the railroad commission, who stated that the commission was gratified at the large attendance. In stating the object of the conference, Mr. Hunt said that it was not the purpose of the commission to formulate rules for the operation of the roads, but to co-operate with the companies to the end that a general system to govern operation may result. He then called attention to the rules adopted by the Central Electric Railway Association at Columbus, Ohio, Sept. 6, 1907, which he said were satisfactory in the main, but there were a few instances where he thought they could be improved. He then expressed regret that the rules included nothing in regard to the maintenance of way department, and said that before the committees appointed began their work he would ask Chief Inspector Shane, of the commission, to give the conference the benefit of his views of the defects to be corrected and the best method of correcting them. In concluding his remarks Mr. Hunt said that in the discussion of such matters as rules, car orders, qualifications of motormen and conductors and all other matters that might come up for consideration, he hoped all the members of the conference would feel perfectly free to express themselves, as it was only by full expressions both from the railroad officials and the commission that a proper and satisfactory understanding could be arrived at.

Following President Hunt, J. W. Woods, a member of the commission, said he wished to call attention to the act passed by the last Legislature providing for the holding of such meetings or conferences with both steam and traction men, and said the meeting was the first of its kind ever held in the United States. He called attention to the accident bulletins issued by the commission every three months, and said he felt sure the interurban managers would do whatever is possible to minimize accidents and to this end would co-operate heartily with the commission.

President Hunt next introduced Alexander Shane, chief inspector for the commission. Mr. Shane said while the majority of the accidents are due to negligence or defects, many of them are due to carelessness, and cited the fact that thirty-eight persons were killed during the last quarter of 1907 while trespassing upon the electric railways in Indiana and that fifteen persons were killed at highway crossings largely because of their own carelessness. He emphasized the fact that the violation of rules by employees could be punished, so far as the railway companies are concerned, only by suspension or dismissal. He believed that the legislature might take up to advantage the passage of a statute inflicting a penalty upon such disobedience.

Ex-Governor Durbin, a director in the Chicago, South Bend & Northern Indiana Railway, declared in favor of strict discipline. He said that the public should feel that such is being maintained by the companies. He approved Mr. Shane's suggestion in regard to legislation on the subject.

Chief Inspector Shane, asked to enumerate briefly some

of the defects he had observed, which in his judgment should be corrected, said the majority of defects were matters of detail rather than lack of construction, and that lack of signals, lack of whistles, lack of signs and rules relative to operation were the principal things to be corrected. He said it was important that every motorman should know every railroad crossing and that it was equally important that the traveler upon the highway, about to cross the track, should be apprised by signs where the railroad is. Both are responsible in the matter of railroad crossings. He said he had also found defective lights at switches. Mr. Shane suggested that there should be two books of rules—one for the operation and one for the maintenance of the lines.

J. W. Woods, of the commission, suggested some sort of an organization or form of program to be followed during the meeting. He said many roads of the State were awaiting the proceedings and results of this meeting. He suggested that a committee be appointed to formulate a program for the afternoon session. Charles Lohman, of the South Bend & Northern Indiana Railway, said the matter was too important to dispose of rapidly or at a single meeting, and suggested that the two inspectors be made members of the committee to formulate the program.

Mr. Nicholl, general manager of the Indiana Union Traction Company, called the commission's attention to the books of rules already adopted by the Central Electric Railway Association and suggested that they be made the basis of the rules to be adopted by the conference.

C. D. Emmons, general manager of the Ft. Wayne & Wabash Valley Traction Company, moved that a committee be appointed to act with the two inspectors for the commission to prepare a program for the afternoon session. On that committee President Hunt appointed C. D. Emmons, H. A. Nicholl, Chas. G. Lohman, Sol. A. Wood and Fletcher Durbin.

At the opening of the afternoon session the committee appointed to prepare a program submitted the following report:

HON. UNION B. HUNT,

Chairman of the Railroad Commission, Indianapolis, Ind.

Dear Sir: It is the sense of your committee that the good work of the railroad commission and its inspectors be endorsed by this conference, and in furtherance of the objects and in order to aid them further in their work for the betterment of the operation and maintenance of the interurban roads of this State, we recommend the appointment of two committees consisting of five members each to be appointed by the chairman of the Railroad Commission from among the representatives of the various traction companies, Mr. Shane and Mr. Matthews to serve on both committees in addition to the five members named by the chairman. One committee to investigate and report on operating train rules, using as a basis for such rules the standard code of rules adopted by the Central Electric Railway Association at Columbus, Ohio, Sept. 26, 1907, and the other committee on maintenance of way, including roadway and overhead construction. These reports to be made at a future conference to be called by the chairman of the commission.

Respectfully submitted,

C. D. EMMONS,
H. A. NICHOLL,
CHAS. G. LOHMAN,
SOL. A. WOOD,
FLETCHER DURBIN.

COMMITTEE ON MAINTENANCE OF WAY RULES

A. A. Anderson.....Indianapolis & Louisville
T. B. McMath.....T. H., I. & E. T.
J. J. Brennen.....Ft. W. & W. V. T.
J. W. Moore.....Indianapolis & Cincinnati
W. C. Sparks.....Indiana Union Traction

COMMITTEE ON RULES FOR TRAINMEN

C. D. Emmons.....	Ft. W. & W. V. T.
H. A. Nicholl.....	Indiana Union Traction
C. H. Lohman.....	C., S. B. & N. I.
C. C. Reynolds.....	T. H., I. & E. T.
F. M. Durbin.....	E. & S. I. T.

The report of the committee was adopted and conference was adjourned to meet again at the call of the commission, when the committees advise the commission that they are ready to present to the conference a code of rules on maintenance of way and for the trainmen.

Among those present were: S. A. Moore, vice-president of the Angola Electric Railway & Power Company; Chas. G. Lohman, general superintendent of Chicago, South Bend & Northern Railway Company; A. Benham, general manager Ohio & Toledo Electric Railway Company; C. H. Batton, general manager Evansville & Mt. Vernon Traction Company; F. M. Durbin, general manager Evansville & Southern Indiana Traction Company; Gus Mulhausen, general manager Evansville Suburban & Newburg Railway Company; T. Batton, general manager Evansville & Eastern Traction Company; C. D. Emmons, general manager Ft. Wayne & Wabash Valley Traction Company; R. C. Gunn, superintendent of transportation Ft. Wayne & Wabash Valley Traction Company; F. I. Harding, chief dispatcher Ft. Wayne & Wabash Valley Traction Company; A. A. Anderson, general manager, D. C. Ward, assistant general manager, W. A. Carson, assistant superintendent, P. G. Thompson, assistant manager, of the Indianapolis & Louisville Traction Company and the Indianapolis, Columbus & Southern Traction Company; A. E. Hauffman, general manager Indiana, Chicago & Western Traction Company; H. A. Nicholl, general manager, A. Baldwin, manager transportation, M. W. Surratt, superintendent, of the Indiana Union Traction Company; H. C. Marshall, superintendent Kokomo & Western Traction Company; M. E. Cole, general manager Louisville & Northern Traction Company; C. C. Reynolds, general manager, C. J. Jeffries, superintendent, C. E. Morgan, superintendent Brazil division, J. W. Reynolds, superintendent Northern division, Terre Haute, Indianapolis & Eastern Traction Company; H. C. Dickey, superintendent, C. O. Sullivan, assistant superintendent, Winona Traction Company; C. L. Henry, general manager, G. S. Henry, traffic manager, G. D. Nicol, mechanical engineer, Indianapolis & Cincinnati Traction Company; L. K. Burge, general superintendent Lake Shore Electric Traction Company; W. T. Durbin, director Chicago, South Bend & Northern Railway Company; C. S. Hernley, secretary Indianapolis, New Castle & Toledo Traction Company

UNDER-RUNNING THIRD RAIL FOR BELGIAN LINE

Frank J. Sprague has learned that the Belgian Government will adopt the under-running third-rail for its electric line at the Parc de Laeken, near Brussels. This decision was made upon the recommendation of M. Em. Uytborck, electrical engineer of the government railways, who some months ago visited the United States and spent considerable time investigating heavy electric traction conditions here. License has been taken on behalf of the Belgian Government to use the Wilgus-Sprague type of protected third-rail, and orders for much of the necessary material, it is stated, have already been placed in this country.

DISCUSSION ON ELIMINATING THE STEAM LOCOMOTIVE IN CHICAGO

At the February meeting of the Western Society of Engineers, W. E. Symons, formerly superintendent of motor power of the Kansas City Southern, presented an illustrated paper on "The Passing of the Steam Locomotive." After renewing the early history of locomotive development in England and the United States, the speaker led up to the railroad problems of the immediate future in Chicago and the territory surrounding that city.

Of primary importance to the citizens of Chicago was the abatement of the smoke nuisance, and the author presented some estimates of the relative amount of smoke produced by locomotives operating within the city limits and by industrial power plants. There are 650 locomotives operating on the steam roads within the city, and estimating the daily consumption of coal for each at five tons, the amount burned per day is 3250 tons. The total consumption of bituminous coal per year for all purposes is about 11,000,000 tons, so that the steam locomotives contribute on the basis of relative consumption of fuel about 13 per cent of the smoke. As a remedy for this the speaker proposed the establishment of central heating, lighting and power stations using smokeless furnaces to provide for all industrial and domestic wants, and on the railroads the creation of an electric zone with a minimum radius of 12 miles from the City Hall. Estimates show that all passenger trains entering Chicago could be operated from one central station having a capacity of between 40,000 and 50,000 kw. This is less than half the ultimate capacity of the new Fisk Street station of the Commonwealth Edison Company. The difficulties of electrification presented to the railroads entering Chicago are not as great as those encountered by the New York Central, the New Haven and the Pennsylvania in New York, and the cost of making the change would be proportionately less.

The speaker concluded by making some prophecies of the future development of steam and electric roads in the Mississippi Valley. Basing his estimates on the rate of growth of population in the past, he believed the population of the United States would be 150,000,000 persons 20 years hence, and that the Mississippi Valley would hold then 85,000,000 people, or more than the entire population of the United States at the present time. The transportation facilities necessary to care for the commerce of this region would have to be correspondingly increased. He believed this increase would be along the lines of canals and canalized rivers for transporting bulk freight, broad gage steam roads for handling the enormous volume of through freight between important commercial centers, high-speed steam or electric trunk lines for through passenger travel exclusively and electric interurban lines for feeders and to care for local freight and passenger traffic. Taking into consideration the present deficiency of existing transportation facilities and the increases needed to meet future development of traffic, he estimated that in 1928 the present railway mileage would be more than doubled. He believed that the steam locomotive afforded the best and most economical means of transporting much of the traffic, especially freight, and estimated that 75,000 additional steam locomotives would be required by that time. Counting motor cars as locomotives he estimated the number of additional electric locomotives required by that time to be 25,000.

W. L. Abbott, chief operating engineer of the Common-

wealth Edison Company, in opening the discussion said he believed that the railroads were responsible for more than 13 per cent of the smoke nuisance because some of the largest consumers of coal in Chicago were using smokeless furnaces. He was of the opinion that the general electrification of trunk lines was nearer at hand than the author of the paper had admitted. The principal engineering difficulty in the way of main line electrification has heretofore been the safe and uninterrupted transmission of large amounts of power, but this difficulty he believed had been satisfactorily solved and there was no reason, from an engineering standpoint, why power could not be transmitted from central power houses located at the coal mines to any point in the Mississippi Valley, from the Lakes to the Gulf and from the Alleghenies to the Rocky Mountains. The cost of fuel by this arrangement, he thought, could be reduced more than one-half.

J. N. Hatch took the view that the electrification of steam railways was not so much a question of whether they could afford to make the change as whether they could afford not to make it in view of the success of the electric roads. He cited the case of the Third Avenue cable line in New York City, which was built at an enormous cost, but which five years later was converted for electric operation because it could not afford longer to operate by cable. The street railways in Chicago were another case of the same thing. The cable has had to go in the city streets and the steam locomotive will have to go on the railroads.

CONTRACTORS FOR PARK ATTRACTIONS

Under the heading "The Equipment of Pleasure Resorts" in the issue of Jan. 25, a list was published of some of the attractions for street railway parks offered for the season of 1908. Additional information on this subject is presented herewith.

MOVING PICTURES

The moving picture companies do a large business with street railway parks by renting films and machines and furnishing operators. Some of them are also prepared to do the advertising necessary to bring a show forcibly to the attention of the public, and, in fact, will contract for the entire undertaking, furnish all the help necessary and conduct the stage arrangements. They will go over the situation with those who contemplate using the moving pictures, and as experts offer their advice as to details of arrangement. Among the companies that might be mentioned in this connection are Miles Brothers, of New York; Harstn & Company, of New York; Actograph Company, New York; George K. Spoor & Company, of Chicago, the Electrograph Company, of New York; Lyman H. Howe, of Scranton, Pa.; American Mutoscope & Biograph Company, New York, and F. J. Howard, of Boston, and O. T. Crawford's Film Exchange, St. Louis.

THE ROLLER COASTER, CARROUSEL, ETC.

To the names given in the last park issue of the STREET RAILWAY JOURNAL of the makers of such attractions as the scenic railway, roller coaster, shoot-the-chutes and kindred devices, an addition should be made. This is the Philadelphia Toboggan Company, of Philadelphia, which manufactures the forest coaster, toboggan slides and carrouseles, and sells them outright or arranges for their operation on a percentage basis.

MUSICAL INSTRUMENTS

Where conditions do not justify a permanent band, or where there is such an organization and the demand still exists for music where the band is not available, the me-

chanical music boxes and elaborate orchestrians, combining in one instrument all the woodwinds and brass of a good sized band, frequently offer a solution of the problem. Among the makers of such instruments are Lyon & Healy, of Chicago, whose orchestrians embody any number of instruments. This company has equipped many prominent resorts and hotels, among them the Cliff House in San Francisco and the Arlington House, Washington. Johannes S. Gebhardt & Company, of Philadelphia, also make a specialty of mechanical musical instruments.

FURNITURE AND FURNISHINGS

Among the companies making a specialty of park furniture and furnishings are the J. L. Mott Iron Works, of New York; A. H. Andrews & Company, of Chicago, and the Columbus Wire & Iron Works, of Columbus, Ohio. The Mott Works devote attention to ornamental iron work, including fountains, benches, railings, etc. Andrews & Company make metal furniture, including benches, stools, tables, etc. The Columbus Wire & Iron Works make ceilings, grills, window guards, fences, etc.

VAUDEVILLE ENGAGEMENTS

While previous articles in this paper have discussed vaudeville attractions, but little has been said of the system followed by the booking agencies in staging their acts and keeping in touch with the progress and success of the performances. This plan affords many advantages over the direct engagement of performers by the average railway manager who is usually willing to be relieved of the details, provided the results are satisfactory. By means of a system of weekly reports the agency then keeps fully informed as to the success of the different performers, and changes are made from time to time as they appear to be necessary. In this way only the fittest survive. It is also possible under this method of supervision to suggest improvements in individual acts and to insure the appearance of the performers on schedule time.

Among the agencies soliciting electric railway park business are the following: W.S. Cleveland's Prudential Vaudeville Exchange, New York; The United Booking Offices of America, New York; William Morris, New York; J. W. Gorman, Boston; Geo. Gould, Providence; Heller & Gladning, Philadelphia, and Felix Reich, New York.

EQUIPMENT CONTRACTOR

The planning, building and equipping of amusement parks on a single contract is a work being carried on by Eugene J. Stern, of New York, who has acquired control of the patent rights of a number of safe, clean and enjoyable attractions which are offered individually or collectively. Among them are a scenic railway, Venetian canal, shoot-the-chutes, Mollycoddle, traveling carrousel, House that Jack Built, Figure Eight, Coaster, Circle Swing, Sawsaw Railway, Sea-on-Land, the Glides, the Scrambler. Mr. Stern believes that many of the troubles encountered by park managers could be avoided by combining the architect and contractor into one, so that the completed park or building would be ready and suited for the work required. This he is prepared to carry out.

ARCADE EQUIPMENT

Of the companies that make a specialty of slot machines and of equipping arcades may be mentioned the American Mutoscope & Biograph Company, of New York; Diamond Novelty Company, of Syracuse, New York; Automatic Drink Machine Company, of Syracuse, N. Y.

PRINTERS AND LITHOGRAPHERS

Among the companies making a specialty of posters and programs are the U. S. Lithograph Company, of Cincinnati,

Ohio, and the Edwards & Deutsch Lithograph Company, of Chicago, Ill.

ROLLER SKATES

A maker of roller skates that caters especially to park trade is M. C. Henley, of Richmond, Ind.

AIRSHIPS AND BALLOONS

Carl E. Myers, of Frankfort, N. Y., offers a number of sensational acts with airships and gas balloons.

THE TROLLEY IN PERU

Special Agent Charles M. Pepper, writing from Lima, Peru, to the United States Department of Commerce and Labor concerning the use of electricity in that country, says in regard to the electric railways:

"The future of the electric railway has definite bounds, since Peru has only a small number of cities where street car systems are required, and most of these are already provided with trolleys or have contracted for them. Lima and Callao made the change from horse cars some years ago and their local systems and the lines joining them are electric lines. One steam railway between Lima and Callao, which is controlled by the local trust or Associated Electrical Companies, will have its motive power changed from steam to electricity and be used for freight. The largest extension is of the lines between Lima and the residence suburbs and bathing beaches on the seashore, the most important of which is Chorrillos. A parallel and competing line between Lima and Chorrillos, which depends on steam instead of on water-power for its motive force, was built. Ancon, a seaside resort, 30 miles from Lima, may have the steam railway replaced by the trolley. In the towns of Trujillo and Chiclayo existing electric systems are being extended, while the trolley may also be introduced in Paita and Piura. At Arequipa, in southern Peru, an extension of the use of electric power is under way.

CONTINUOUS-CURRENT RAILWAY SWITCHBOARDS

The General Electric Company, in Bulletin No. 4544, describes the present design of switchboards for railway use. These represent the result of continuous improvements in previous designs, and among the improved features claimed for them are simplicity of arrangement, facility of installation, reliability and safety in operation and long life. Although each panel is an independent unit and may be ordered separately, the panels are especially designed to be used together to form switchboards. The Bulletin covers several classes of panels, all of which are for 600-volt continuous current railway service with the negative bus grounded. The following types are described: Generator panels, including circuit breakers and equalizer switch panels, rotary converter panels, feeder panels for one circuit, feeder panels for two circuits with one ammeter per panel, and feeder panels for two circuits with two ammeters per panel. The various forms of apparatus used in connection with the panels, details of construction, etc., are described and illustrated, and complete tables giving catalogue numbers, capacities, etc., and dimension sketches, are given.

NEW SIGNAL SYSTEM FOR SINGLE-PHASE LINES

In order to meet the requirements of single-phase electric railways and steam railroads, the Blake Signal & Manufacturing Company, of Boston, has developed the type of signal illustrated herewith. These signals are similar in

every detail to the well-known Blake dispatcher's signals for telephone train dispatching now in use on many 500-volt interurban electric railways, except the signal light for use after dark. On 500-volt lines the most effective as well as simplest and cheapest method of getting the light for night use is to connect the 500-volt trolley or feeder to an incandescent lamp circuit through a resistance, the circuit being closed by a knife-blade switch when the semaphore is set in the horizontal position. With single-phase lines or steam railroads this comparatively low voltage is not available at the line signal, and it becomes necessary to devise some other means for getting the necessary signal light for night use. This has been accomplished by supporting a standard four-lens railway switch lamp on a substantial hanger, the shaft of which goes up through the base of the signal. The end of the shaft is so connected with the semaphore shaft that when the semaphore drops to the horizontal position the lamp shaft and lamp are given a quarter turn, so that where the lamp shows a white or



SIGNAL IN "CLEAR" POSITION

green light up and down the track when the semaphore is in the vertical or "clear" position, it will show a red light up and down the track when the semaphore is set to the horizontal or "stop" position. The weight of the hanger and lamp is supported on a spiral, so that not only does the weight of the lamp



SIGNAL AT DANGER

assist rather than retard the dropping of the semaphore to the horizontal position, but should the rod or pin connecting the lamp shaft with the semaphore shaft be broken the lamp would of its own weight make a quarter turn and show a red light. This is on the side of safety and makes it impossible for the lamp to show anything but red when the semaphore is set at danger. As with all switch lamps, whether fork or socket type, it is impossible for a lamp to be put up showing the wrong light, that is, a light at variance with the position of the semaphore. All of the working parts of this lamp hanger are under the signal cover, where they are thoroughly protected against the weather. It is this type of signal which has been furnished for the Annapolis branch of the Washington, Baltimore & Annapolis Railroad.

FINANCIAL INTELLIGENCE

WALL STREET, Feb. 26, 1908.

The Stock and Money Markets

The stock market remains in the same dull, listless and extremely professional state in which it has been for a month or more past, and there does not appear to be any reason to anticipate relief from existing conditions for some time to come. Even the professional operators are not disposed to take a positive stand one way or the other, and in the absence from Wall Street, on account of their customary winter vacations, of many of those who ordinarily exert a greater or less influence on the course of values, the result is seen in a narrow and decidedly irregular movement of prices. However, all things considered, it must be admitted that the general market displays a rather remarkable undertone of strength, especially in view of the marked depression and somewhat sensational declines that have developed in certain quarters, notably among the shares of some of the railroad companies. Very naturally, the steady downfall in those issues has at times exerted a depressing influence elsewhere, and in addition to this the market has suffered considerably from the proposed investigation by the Interstate Commerce Commission into the existing relations between the railroads and their employees to ascertain if there is any basis for the much-mooted proposed reduction in wages of the latter. It is noteworthy in this connection that a number of the leading railroad corporations, including the New York Central, have already announced that they will not make any wage reductions, and as this course, it is thought, will be followed by similar action on the part of many other transportation companies throughout the country, the threatened general labor troubles will no doubt be averted.

While this phase of the situation has undoubtedly improved somewhat, there are still in evidence a number of factors which tend to prompt conservatism in the making of new stock market commitments, and which account for the prevailing indifference to the immediate course of values. A hardening tendency in the market for time money, the call of the United States Government made upon National bank depositories for a return of about \$35,000,000 of public funds, the prospect of a large treasury deficit at the close of the current fiscal year, and the announced intention of several railroads to come into the market as borrowers, are matters that call for careful and serious consideration at this particular period. The decision in favor of E. H. Harriman in the Illinois Central-Union Pacific fight has been well received, but like pretty much all other happenings of a similar nature, it failed to arouse speculative interest to any extent. The same also applies to the action of certain industrial companies in resuming dividends, but the effect of this has been nullified by suspensions of profit distributions to stockholders in other kindred enterprises and expectations that some of the railroads may be compelled to adopt a similar policy on account of diminishing earnings. Crop conditions on the whole are somewhat more encouraging than they have been and there are indications of a moderate improvement in certain industrial lines, notably the copper metal trade, nevertheless these elements do not seem powerful enough to force the stock market out of its present rut of dulness, nor to cause any substantial advance in prices, even though it is freely conceded that practically everything of an unfavorable nature has long since been fully discounted.

The proposed revival of the fight for a five-cent fare to Coney Island on the lines of the Brooklyn Rapid Transit, even after the recent court decision against it, has had no appreciable effect upon that stock, as it is felt that it will go the way of all similar attempts, while the steadily increasing revenues of all the other local traction companies have served to keep their securities more or less in the public eye, with the result that they have exhibited relative strength. The opening up to regular traffic of the MeAdoo tunnel under the North River to Jersey has aroused new and decidedly keen interest in the entire local traction situation and has directed further attention

to the immense possibilities which this whole field holds out to present and prospective investors.

Philadelphia

There was no decided improvement in the local traction issues during the past week. Trading generally was upon a decreasing scale, and prices, although irregular at times, showed very slight net changes. Philadelphia Rapid Transit was unusually quiet at 15½. Union Traction sold at 49¼ @ 49, and Philadelphia Company common declined ½ to 36½. Philadelphia Company preferred sold at 37¾. Philadelphia Traction was exceptionally strong, the price advancing ¾ to 87½ on light purchases. American Railways was unchanged at 43 and United Companies of New Jersey sold at 239.

Chicago

Trading in the Chicago market was extremely dull and apart from the sale of Chicago Union Traction at 3, the market was devoid of special feature. It is said that the Chicago Railways Company has sold \$4,250,000 of its total issue of \$5,000,000 5-year 6 per cent notes at about 97¾, which show a yield of about 6½ per cent. All of these securities were sold to Chicago institutions. Rumors are current to the effect that the directors of the Metropolitan West Side Elevated are considering a plan for the sale of extension mortgage bonds. While no official information is obtainable, it is said that some of the largest interests in the property are strongly in favor of the plan.

Other Traction Securities

The traction shares market at Baltimore was rather quiet during the week. More issues were traded in than for some time past, but the individual totals were extremely small. United Railway issues were quiet, but fractionally higher, the 4 per cent bonds advancing ¼ to 86½, while the incomes rose to 46¾. The stock lost ⅝, to 10⅞. Other transactions included Charleston Consolidated Railway 5s at 101, North Baltimore Railway 5s at 110½, an advance of 1 per cent; Knoxville Traction 5s at 101 and City and Suburban 5s at 108. In the Boston market Boston Elevated advanced over a point to 126¾, but the West End stocks were weak, the common declining from 82½ to 80⅞, while the preferred declined from 98 to 97. Massachusetts Electric common was unchanged at 10, but the preferred advanced 1½ to 43. Boston & Worcester common sold at 15 and the preferred at 56.

Bids for Cleveland Electric stock ranged from 42 to 42½ at Cleveland. Holders insisted on better prices, however, and Monday the asked price was 45½. The approach for final negotiations in the proposed leasing plant may have had something to do with this. Northern Ohio Traction & Light common sold at 20½, while several blocks of Washington, Baltimore & Annapolis pooling certificates changed hands at 9½.

Security Quotations

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

	Feb. 18.	Feb. 25.
American Railways	43	42½
Boston Elevated	125	126
Brooklyn Rapid Transit.....	38¾	40½
Chicago City	160	172
Cleveland Electric	—	42
Consolidated Traction of New Jersey.....	64	63
Detroit United	33	33
Interborough-Metropolitan	7¾	6¾
Interborough-Metropolitan (preferred)	18¾	17¾
International Traction (common).....	—	33
International Traction (preferred) 4s.....	—	60
Manhattan Railway	123	121
Massachusetts Elec. Co. (common).....	10	10
Massachusetts Elec. Co. (preferred).....	41	42
Metropolitan Elevated, Chicago (common).....	17	17
Metropolitan Elevated, Chicago (preferred).....	45	45
Metropolitan Street	15	16
North American	43	42¾
Philadelphia Company (common).....	37½	36
Philadelphia Rapid Transit.....	15	15
Philadelphia Traction	86	86½

Public Service Corporation certificates.....	58	58
Public Service Corporation, 5 per cent notes.....	—	—
South Side Elevated (Chicago).....	65	65
Twin City, Minneapolis (common).....	80	80
Union Traction (Philadelphia).....	49	49

a Asked.

Metals

Greater activity is reported in the steel trade, a number of the steel companies having resumed operations during the past week, while in other instances the working forces were increased. At a meeting of the officials of the various steel companies recently held it was decided to make no change in prices.

Some improvement is noted in the copper metal trade and it is stated that some of the large producing companies have materially reduced their stocks since Jan. 1. While a very large proportion of the purchases have been made for foreign account, there has been a decided improvement in the domestic demand. Prices for the week show an advance of about 3/8c. a lb. in all of the leading grades. Quotations follow: Lake 12 5/8@12 7/8c., electrolytic 12 1/2@12 3/4, and castings 12 3/8@12 5/8.

THE RIGHT TO MAKE EXCURSION RATES IN OHIO

In the complaint of Charles U. Shryock, of Zanesville, against the Baltimore & Ohio Railroad Company, the State Railroad Commission has rendered a decision to the effect that a railroad may issue commutation rates between certain stations on its line and not between others. This is permissive under Section 8 of the statutes governing the operation and regulation of railroads, but there is nothing obligatory about it. The law does not permit class distinction in making railroad rates. Companies may make a reduction to school children between certain points and not to children traveling in the ordinary way without violating the law. This is a voluntary selection by the company for the good of a cause and not an attempt at discrimination. Excursion tickets, party rates and other rates of this kind were not taken up, but they come under the section on which the decision of the commission was based. This is the second complaint that the same man has lodged against the Baltimore & Ohio Railroad Company and in both instances the decisions were against him.

CHICAGO CITY RAILWAY REPORT FOR YEAR

On account of the change in the method of accounting, the report of the Chicago City Railway Company for the year cannot be compared in every item with the reports of the preceding years. The increase in passenger earnings for the year was 4.1 per cent, in comparison with 9.5 per cent in 1906 and an average increase of 5.2 per cent since 1900. This falling off has been attributed to business depression and the reconstruction of the lines, necessitating delays. Although \$633,831 was paid to the city, the earnings on stock show an increase of \$191,736 over the earnings of the preceding year. The increase in gross earnings was \$324,563. The explanation of the increased earnings on stock lies in the smaller charge to operating expenses and depreciation. Under the ordinance this charge during the period of rehabilitation is 70 per cent, against 78 per cent in 1906. The large charge to depreciation since 1903 apparently accounts for the smaller earnings on stock. The first reports of operation under the ordinance make a favorable showing both for the city and the stockholders of the company. The report follows:

INCOME ACCOUNT.

GROSS EARNINGS.

Passenger receipts (January excluded).....	\$7,460,635
Receipts from other sources (January excluded).....	102,059
	<u>\$7,562,694</u>

TOTAL EXPENSES.

Operating expenses, taxes, renewals and interest on capital investment, as approved by Board of Supervising Engineers..	6,410,272
Net earnings for 11 months.....	\$1,152,421
City's proportion, 55 per cent, as per ordinance.....	633,831
Company's proportion, 45 per cent, as per ordinance.....	\$518,590
Interest on capital as certified by Board of Supervising Engineers	1,116,386
Income from operation for 11 months.....	\$1,634,976
Other income from January operation, etc., net.....	281,582

Net income.....	\$1,916,558
Dividends (decrease \$405,000).....	1,215,000
Surplus for the year.....	<u>\$701,558</u>
Value of property December 31, 1907, as per certificate of Board of Supervising Engineers.....	\$28,168,980
Percentage of annual income on above valuation (based on 11 months' operation).....	6.33
Percentage of net income to capital stock at par.....	10.64

Since 1900 the passenger receipts, balance for stock, dividends paid and per cent earned on stock have been as follows:

Date.	Passenger receipts.	Gross earnings.	Balance for stock.	Divs. paid.	Per cent earned on stock.
1907.....	\$8,087,001	\$8,195,730	\$1,916,558	6	10.64
1906.....	7,773,446	7,871,126	1,724,822	9	9.58
1905.....	7,240,671	7,322,080	1,679,473	9	9.33
1904.....	6,609,501	6,668,979	1,746,859	9	9.70
1903.....	6,381,246	6,435,565	1,687,224	9	9.37
1902.....	6,367,358	6,415,182	1,896,678	9	10.54
1901.....	5,856,386	5,900,271	1,747,159	12	11.09
1900.....	5,506,314	5,543,180	1,680,301	12	12.80

Statistics for the year compare as follows:

FURTHER STATISTICS.

	1907.		1906.		Per cent
	Inc.	Per cent	Inc.	Per cent	Inc.
Mile single track.....	244.30	.01	242.56		.24
Fare passengers.....	162,422,148	3.99	156,177,363		7.34
Transfer passengers.....	97,171,371	2.69	94,623,106		7.63
Fare and transfer passengers	259,593,519	3.50	250,800,469		7.45
Percentage of transfers to fare passengers.....	59.83%	*.76	60.59%		60.42
Per cent expense to gross.....	70.00%	*8.08	78.08%		1.02
Per cent earned on capital stock	10.64%	1.06	9.58%		.25

*Decrease.

At the meeting of stockholders Simon R. Flynn, president of the Live Stock Exchange National Bank, was elected director to succeed S. M. Felton, who resigned on account of removal from the city. R. B. Hamilton, formerly secretary, was elected vice-president, and Thomas F. Hoffman, secretary and treasurer, J. J. Duck being retained as auditor. The directors re-elected T. E. Mitten president.

Concerning the year's operations, President T. E. Mitten said:

"The settlement ordinance, passed by the City Council, Feb. 11, 1907, and ratified by a vote of the people April 2, 1907, was by its terms made effective as of Feb. 1, 1907. The result obtained from the operation of your property for the year 1907 is, therefore, composed of eleven months' operation under the partnership arrangement, as contained in the ordinance, and one month (January) for individual account.

"The passenger earnings for the year were \$8,087,000.88, an increase of 4.1 per cent.

"With an increase of 3.99 per cent in passengers paying fare, there was a slight decrease in the per cent of passengers using transfers. The statistics show that but 59.83 per cent of passengers paying fare took advantage of transfers, as against 60.59 per cent for the preceding year; the average fare being unchanged, namely, 3.1 per cent per passenger carried.

"As the operating expenses for eleven months of the year were arbitrarily fixed at 70 per cent, to comply with the provisions of the ordinance, there is no opportunity for comparison as against the result of previous years.

"Three hundred cars of the new 'pay-as-you-enter' type have been purchased, 150 of which have been placed in service, resulting in almost entirely eliminating the large number of accidents brought about by passengers attempting to board or leave moving cars. The proportion of fares collected to passengers carried has also been materially increased, due to the collection of fares by conductor upon the rear platform.

"The double-truck cars required to be supplied under the ordinance during the three-year period have now been secured.

"Thirty-one and one-half miles of new track has been reconstructed during the past year, of which approximately ten miles was in replacement of cable tracks removed.

"Three new modern substations, suitably located for the distribution of power, have been sufficiently completed to permit of their being put into service.

"Two new car stations of large capacity and modern equipment are practically completed, which when in use will make possible the systematic and economical inspection and cleaning of cars."

INTERBOROUGH-METROPOLITAN FINANCES

President Shonts, of the Interborough-Metropolitan Company, has issued a statement to the company's stockholders in which he says, in part, as follows:

In order to remove an erroneous impression which seems to prevail, it should be stated that no railroads of any kind are operated by the Interborough-Metropolitan Company. That company is a business corporation—a holding company—owning stock in (a) Interborough Rapid Transit Company, operating the subway and elevated systems in New York City; (b) Metropolitan Street Railway Company (now in the hands of receivers), which owns a system of street surface railways operated prior to the receivership, under lease by the New York City Railway Company, and (c) Metropolitan Securities Company, which owns the stock of the New York City Railway Company.

Securities of the Interborough-Metropolitan Company have been issued as follows:

Collateral trust 4½ per cent bonds—	
Total amount authorized.....	\$70,000,000
Issued and outstanding.....	67,825,000
Preferred capital stock—	
Total amount authorized.....	\$55,000,000
Issued and outstanding.....	45,740,000
Common capital stock—	
Total amount authorized.....	\$100,000,000
Issued and outstanding.....	93,262,192

The following shows the general balance sheet of the company's books as of Dec. 31, 1907:

ASSETS

Interborough Rapid Transit Company capital stock, at cost in securities of this company.....	\$104,563,042
Metropolitan Street Railway Company capital stock, at cost in securities of this company.....	68,684,455
Metropolitan Securities Company capital stock, at cost in securities of this company.....	28,329,695
Metropolitan Securities Company, loans secured by three-year 5 per cent improvement notes and stocks and bonds of subsidiary companies as collateral.....	8,844,701
Real estate, at cost.....	594,765
Office furniture and fixtures.....	5,461
Engineering, in suspense, additional subways.....	50,115
Metropolitan Securities Company stock, full paid.....	36,773
Cash and accounts receivable.....	1,835,802
Total	\$212,944,509

LIABILITIES.

Capital stock—common.....	\$100,000,000
Reserve against outstanding stocks not acquired..	6,737,808
Capital stock—preferred.....	\$55,000,000
Reserve against outstanding stocks not acquired..	9,260,000
Collateral trust 4½ per cent bonds.....	\$70,000,000
Reserve against outstanding stocks not acquired..	2,175,000
Notes payable.....	67,825,000
Accounts payable.....	4,545,000
Accrued interest for three months to Jan. 1, 1908, on Interborough-Metropolitan 4½ per cent bonds (covered by dividend of Interborough Rapid Transit Company, paid Dec. 31, 1907).....	763,031
Income account, surplus.....	766,917
Total	\$212,944,509

The income account for the calendar year ended Dec. 31, 1907, follows:

Surplus balance of income account, Dec. 31, 1906.....	\$524,924
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RECEIPTS.

Div. of 2¼ per cent on 339,128 shs. Int. Rap. Tr. cap. stock:	
For quarter ended:	
March 31, 1907.....	\$763,038
June 30, 1907.....	763,038
Sept. 30, 1907.....	763,038
Dec. 31, 1907.....	763,038
.....	\$3,052,152
Div. of 1¼ per cent on 427,400 shs. of Met. St. Ry. cap. stock:	
For quarter ended:	
March 31, 1907.....	\$747,950
June 30, 1907.....	747,950

Int. on bank bal., loans, etc.....	1,495,900	205,500	\$4,753,561
Total .....	.....	.....	\$5,278,485

DISBURSEMENTS.

Int. on \$67,825,000 Int.-Met. 4½ per cent col. tr. bonds, 9 mos. end Sept. 30, '07	\$2,289,094		
Accrued int. thereon for 3 mos. from Oct. 1 to Dec. 31, 1907.....	763,031		
.....	.....	\$3,052,125	
Div. of 1¼ per cent on 457,400 shs. Int.-Met. pfd. stock:			
For quarter ended:			
March 31, 1907.....	\$571,750		
June 30, 1907.....	571,750		
.....	.....	1,143,500	
Expense account.....	\$212,184		
Taxes	103,760	315,944	
.....	.....	.....	\$4,511,569
Surplus income			\$766,916

The earnings of the Interborough Rapid Transit Company continue good; the surplus for the year ending June 30, 1907, after the payment of all interest charges, the guaranteed dividend on Manhattan Elevated Railway Company stock and dividends on its own stock, being \$566,443, as against \$281,390 for the previous year, an increase of \$285,053. The surplus for the last six months of the calendar year shows a gain over the corresponding period of last year, and the under-river section of the Brooklyn extension, which was opened for operation on Jan. 9, 1908, is adding to this surplus at the estimated rate of \$700,000 per annum. It is also anticipated that a further increase will result from the opening of the remainder of the Brooklyn extension about April 1, 1908.

The dividends of 9 per cent per annum upon the Interborough Rapid Transit Company's stock, received by the Interborough-Metropolitan Company, are used exclusively for the payment of the interest upon the Interborough-Metropolitan Company's 4½ per cent bonds, against which the Interborough Rapid Transit Company's stock is held in trust as collateral. Any dividends earned and declared over and above this amount will inure to the benefit of the Interborough-Metropolitan Company.

TWIN CITY RAPID TRANSIT COMPANY'S REPORT FOR YEAR

The Twin City Rapid Transit Company has issued its full pamphlet report for the year ended Dec. 31, 1907. The income account compares as follows:

	1907	1906
Gross receipts.....	\$6,055,742	\$5,644,988
Operating expenses.....	2,980,435	†2,675,379
Net	\$3,075,307	\$2,969,609
Int. and taxes.....	1,223,170	1,137,427
Surplus	*\$1,852,137	\$1,832,182
Dividends	1,215,000	1,162,500
Surplus	\$637,137	\$719,682
App. for renew.....	506,000	482,000
Surplus	\$131,137	\$237,682

*After deducting 7 per cent on the preferred stock, the balance for common dividends before charging off depreciation is equal to 8.1 per cent on the \$20,100,000 outstanding.

†In consequence of court decisions against the company on claims outstanding at the close of 1906 having proved much higher than was anticipated, it was found that the reserve for injuries and damages was inadequate. An adjustment of \$50,000, the estimated amount of the deficiency, has accordingly been made in the accounts of that year, thus reducing the surplus by a corresponding amount. The reserve fund now set aside amounts to \$89,995, an amount somewhat in excess of estimated requirements based on previous experience.

The earnings and expenses in detail compare as follows:

	1907	1906
Gross earnings:		
Passenger	\$6,020,541	\$5,592,079
Miscellaneous	35,201	52,909
Total	\$6,055,742	\$5,644,988
Operating expenses:		
Mt. of way and struct.....	\$192,200	\$195,023
Maint. of equip.....	269,748	240,230
Oper. of power plts.....	513,866	467,264
Car service.....	1,340,962	1,167,999

General expenses	412,518	354,341
Injuries and damages.....	203,131	202,522
Insurance	48,000	48,000
Total	\$2,980,435	\$2,675,379

The general balance sheet of the Twin City Rapid Transit Company as of Dec. 31, 1907, compares as follows:

ASSETS

	1907	1906
Rdwy., eq., real est., etc.....	\$41,629,306	\$39,972,152
Notes and accts. receiv.....	136,611	39,089
Cash	743,776	1,107,797
Constr. mater.....	283,148	254,752
Stores, mater. and sup.....	219,300	169,834
Invest. funds.....	940,243	428,572
Total	\$43,952,386	\$41,972,197

LIABILITIES

Com. stock.....	\$20,100,000	\$20,100,000
Pfd. stock.....	3,000,000	3,000,000
Fund. debt.....	17,900,000	16,546,000
Unpd. vouch. and accounts.....	189,383	178,844
Bills pay.....	250,000	
Int. accrued.....	294,033	283,116
Com. div. pay.....	251,250	251,250
Taxes acerd.....	379,232	331,637
Reserve fd.....	316,593	97,062
Renewal fd.....	855,920	590,450
Inc. acc. surp.....	424,973	593,837
Total	\$43,952,386	\$41,972,197

President Thomas Lowry says in part as follows:

A comparison with the accounts of last year shows an increase in gross passenger earnings of \$428,462. But for the financial crisis in the last quarter of the year, the increase would probably have aggregated \$500,000. Operating expenses increased \$305,055. Net earnings thus show an increase of \$105,698.

The car service has been considerably improved, the car mileage being increased 2,513,089 miles. The rates of wages paid to all employees have also been increased, as has been done on previous occasions when the earnings warranted it, without any demands from them.

The property of the company has been well maintained. From the surplus earnings of the past year a sum of \$506,000 has been appropriated to the renewal fund. In addition to this, \$17,500 interest has accrued on its investment. The renewals made during the year amounted to \$258,029. These were charged to the fund, which thus stands at \$855,920. The full amount, excepting \$420 cash, is now invested in the 5 per cent bonds of this company by the purchase during this year at par of 492 bonds of \$1,000 each.

New construction work to the amount of \$1,657,154 was done during the year.

There were issued and sold to the public \$800,000 consolidated 5 per cent bonds, due 1928. There were also issued and purchased by the company, for the renewal and reserve funds as stated above, \$574,000, thus making a total issue during the year 1907 of \$1,374,000.

BANQUET OF A. I. E. E.

The "Public Service" banquet of the American Institute of Electrical Engineers was held at the Waldorf-Astoria, Feb. 19, and was largely attended. The title was derived from the fact that the control of public service corporations by commissions is now a live topic and that the speakers were asked to discuss themes connected with this subject.

President Stott, of the Institute, acted as toastmaster and referred to the modern history of political economy, which he dated from Adam Smith, in 1776. He then called upon Walter C. Kerr, of Westinghouse, Church, Kerr & Company, to respond to the toast "The Ethics of Public Service." After some humorous stories, Mr. Kerr declared that public service was essentially a monopoly, because the evils of competition in public service have been found as a rule to be greater than their benefits. Mr. Kerr said: "The public server must be compelled to serve well. The strongest impelling force is the hope of gain. Fortunately, bad service never pays in the long run, and good service stands a fair chance of profit. The spirit of service is unselfishly doing something that does some one else good. It always pays, and when this spirit is sufficiently culti-

vated, then those who wish to yield public service will be given full, fair and right opportunities to do it."

The next speaker was Hon. Frank W. Stevens, chairman of the Second District Commission of New York. Mr. Stevens' toast was "State Control of Public Service Corporations, Past and Present," but he said that he would limit his discussion to the control of railroad corporations in New York State. Legislation in New York on railroads commenced in 1825 and might be divided roughly into four periods. The first was from 1825 to 1850, in which each railroad was authorized by direct act of legislature. The conditions under which each road was to be built was mentioned in the act, and, as a rule, the maximum amount of fare to be charged was specified. There were some amusing restrictions, as in the case of the Mohawk & Hudson River Railroad Company, from Albany to Schenectady, where the cost of transportation was limited to that charged on the Erie Canal for the same distance. At that time it was thought that the railroad would be operated in the same manner as the canal, that is, every customer would, or might, furnish his own carriage. Another charter, that of the Geneva & Canandaigua Railroad, in 1828, authorized the company to collect tolls not exceeding in the aggregate 14 per cent of its capital stock. Another road, the New York & Erie Railroad, was permitted to build its road in New York State, but was forbidden to connect with any railroad in Pennsylvania or New Jersey without special permission of the Legislature. The second era in legislation was that between 1850 and 1883, during which the "laissez faire" school of political economists was flourishing. It was believed that every problem in political economy could be solved by giving full play to the spirit of competition. A general railroad law was passed allowing any thirteen persons to incorporate as a railroad company, under certain restrictions as to capital, but very few in other particulars. This period resulted in destructive competition between the railroads, high rates to non-competitive points and loss to the stockholders, owing to lack of control over capitalization. Then followed the period from 1883 to 1907, during which the railroads were under the control of a railroad commission. By the latter year it was found that this commission did not have sufficient powers, and last year the public service commissioners were appointed. The principle upon which these commissions are based is that everything which an individual has is at the control of the public whenever the public demands it, from his life to his pocketbook. The public service laws do not contemplate that the members of the commission should act as a board of directors to manage the business of the corporations; it would be futile to attempt this. In the Second District of New York State there are between six hundred and seven hundred corporations subject to the supervision and jurisdiction of the commission. All that a board can do is to correct evils and abuses and secure a fair deal to all mankind.

President Stott then introduced Chas. R. Huntley, of the Buffalo General Electric Company. Mr. Huntley spoke of any public service company as being practically a manufacturing corporation turning out watts, where another manufacturer makes shoes or sewing machines. He believed the people to be fair when they understand the facts the danger lies in a lack of knowledge. Owing to this ignorance, the public have come to look askance at many public service companies. The latter in turn have been reticent and reluctant to discuss the details of their business. Here is where the Public Service Commission will be valuable; it can get the facts and can determine the remedy and require its introduction. It can dispel erroneous ideas in the public mind.

President Stott then introduced Mr. T. Commerford Martin, editor of the ELECTRICAL WORLD, who spoke on the subject, "The Technical Press and the Public." Mr. Martin referred to the fact that all of the great modern utilities of electric lighting, traction, power transmission and the communication of intelligence by telegraph and telephone were represented by the activities of the electrical engineers. Heretofore the engineers have had to satisfy only two classes, the bankers and the public, but now a third element, the Public Service Commission, had been established. It was very necessary, in view of the vast powers committed to these commissioners, that they should be possessed of the technical knowledge concerning engineering, which enters so largely into the workings of the utilities under their supervision. But, so far as he knew, the members of the institute had not been considered in the appointments. The situation is complicated by the envenomed attack on public service corporations of the yellow press, much of which seem intent on creating an instinct of hate.

ANNUAL MEETING OF LOUISVILLE COMPANY

The annual meeting of the stockholders of the Louisville Railway Company, Feb. 19, resulted in the re-election of all the officers and directors. T. J. Minary, president, read his annual report, which showed an increase in the gross earnings of \$5,510 over the fiscal year of 1906. The operating expenses jumped during the year from 53½ per cent of the gross to 58 per cent. The increase in expenses is accounted for by the two strikes and the increased cost of coal and supplies.

The net earnings of \$407,071.66 show a comparative decrease compared with the net earnings of the two previous years. In 1906 they were greater by \$147,339. The gross earnings on city business fell short \$4,490 compared with 1906, but the entire earnings of the company, with the increased interurban traffic, showed the increase in gross earnings of \$5,510.

The company, as shown in Mr. Minary's report, acquired during the year the franchise for a double track on Thirty-first and Twenty-ninth Streets from High to Bank Streets, completed part of the Bardstown line and closed a contract with the Northern Indiana Traction Company by which its cars are to be operated from the Kentucky side of the K. and I. bridge over the Louisville Railway Company's tracks to the Third Avenue station. The dividend on the common stock was \$371,737.50, the equivalent of three per cent dividends. The fourth per cent dividend was passed Jan. 1, as the surplus for dividends at that time was only \$35,000. In last year's report nothing was charged against depreciation, against \$70,000 for the previous year, but an accident fund was started.

The officers re-elected were: President, T. J. Minary; vice-president and general counsel, Alex. P. Humphrey; secretary and treasurer, Samuel G. Boyle. The directors are: Charles T. Ballard, Harry Bishop, Samuel Casseday, Attila Cox, Alex. H. Davis, Oscar Fenley, H. H. Littell, Alex. P. Humphrey, T. J. Minary, J. B. Speed, John Stites.

The annual statement of the company for the year follows:

Gross earnings:—	
From passenger city limits.....	\$2,497,467
From passenger interurban lines.....	128,125
Income from other sources.....	42,552
Total receipts for the year.....	\$2,668,146
Operating expenses.....	\$1,551,948
Taxes for the year.....	216,000
Interest on debt (paid and accrued).....	368,126
Dividend on preferred stock.....	125,000
	2,261,074
Net earnings.....	\$407,071
From which deduct dividend on common stock.....	371,737
	35,334
Surplus earnings.....	35,334
Set aside for accident fund.....	16,326
	\$19,007
Balance carried to profit and loss.....	\$19,007

THE CLEVELAND SITUATION

In an effort to reach an agreement on the percentage of gross receipts to be charged to operation, Mayor Johnson and F. H. Goff last week heard a report from Professor Bemis, who has been investigating the matter for the Mayor. His estimate is 68 per cent, or about 10 per cent more than that of Secretary Davies, of the Cleveland Electric Railway Company. The difference is mainly on the item of track maintenance, including pavement. Secretary Davies has all along held to a lower estimate than the Mayor is willing to allow. Mayor Johnson says that 65 per cent is a fair percentage, and President Andrews has suggested that a compromise be made at his original offer of 62½ per cent, which he feels would be about right. The subject will be discussed in detail this week. Professor Bemis is the superintendent of the waterworks in this city, but at one time was one of the experts in the settlement of a dispute at Detroit.

Throughout the week Mr. Goff and the Mayor discussed franchise expirations. Mr. Goff has finally agreed to accept the rule for valuing franchises by which Engineer Bunning, of the Forest City Railway Company, reached an average date of expiration of three years and three months from the time of the first expirations. This, it is said, will provide for all the lines, except the stretch in Glenville and the one extending to Euclid Heights. The two men believe they will be able to

reach a satisfactory agreement on these lines, as the Mayor has already agreed to yield to half of Mr. Goff's claims on the Glenville portion. Mr. Goff, however, refused to make the settlement on this basis. On the East Fifty-fifth Street line he has agreed to the Mayor's proposition to consider the life of the franchise from Broadway north to have been extended to 1914 and allow the portion south of Broadway to be reckoned as of no value.

At one of the meetings the Mayor suggested that some idea be expressed as to the disposition of the property after a settlement is reached, whether the Cleveland Electric Railway Company will purchase the low-fare lines or whether the Forest City Railway Company shall take over the Cleveland Electric. Mr. Goff said he thought the Cleveland Electric should take over the low-fare properties and then lease the whole thing to the Municipal Traction Company or some other holding company. The Mayor seems willing for any move that will finally place the properties in the hands of a holding company. Mayor Johnson thinks that the company which takes over the other two companies should not bear the name of either, but that the old name should not be done away with entirely. While he said that this is a matter for the owners to discuss, he suggested that the Cleveland Railroad Company would be a good name for the merger company. The Cleveland Electric officials seem to care little for that part of the arrangement.

Some trouble was encountered in making a call for a stockholders' meeting of the two companies that would cover everything and anything that might come up in connection with the negotiations. They finally framed one, however, that will cover all that now seems possible, from the purchase of the Cleveland Electric properties by the Forest City Railway Company or any other company to the purchase or lease of the low-fare properties by the Cleveland Electric Railway Company or any other company. All the intermediate points are taken in, including leasing to a holding company, increasing and decreasing capital stock and approving actions that may have been taken by boards of directors and officials. Just how to handle franchises that may be granted during the lapse of time until they become operative, should a security franchise be granted soon, was also discussed.

Mayor Johnson has yielded a point in the franchise valuations in agreeing to compute them on the gross earnings per car mile rather than the passenger earnings.

ANNUAL CONVENTION IOWA STREET & INTERURBAN RAILWAY ASSOCIATION

The 1908 convention of the Iowa Street & Interurban Railway Association will be held at Des Moines April 23 and 24. The headquarters will be at the Savery Hotel. There will be a paper on "Reinforced Concrete in Electric Railway Construction," by N. M. Starke, of Des Moines, Ia., a concrete specialist who has to his credit much notable construction in this line. "Depreciation" will be handled as a paper by L. D. Mathes, manager and purchasing agent of the Union Electric Company, of Dubuque. A paper by Arthur W. Gross, general claim agent of the Omaha & Council Bluffs Street Railway Company, will be presented, entitled "Claims: Methods of Handling Same by Electric Railways." "Advertising by Electric Railways" will be a general discussion. P. P. Crafts, general manager of the I. & I. Railway Company, of Clinton, Ia., and Pittsburg Railways Company, of Pittsburg, Kan., will read a paper on "Handling Fares on Interurban Railways."

The association is dropping one paper on the program for the 1908 convention, feeling that it can get more value from the discussions by not trying to crowd in too many numbers.

Ample space will be provided for those who desire to make exhibits, and for this space there will be no charge. The association, in conjunction with the Iowa Electrical Association, has rented the ballroom of the hotel, which will provide ample accommodation for exhibitors. Allotment of exhibition space will be secured through application to W. G. Owen, general superintendent of the Des Moines City Railway Company, Des Moines, Ia. The entertainment feature will be taken care of by the officials of the Des Moines City Railway Company, Interurban Railway Company and the Des Moines Edison Light Company. The officers of the association are: F. J. Hanlon, president; P. P. Crafts, vice-president; L. D. Mathes, secretary and treasurer.

JANUARY EARNINGS IN ST. LOUIS

During the month of January the United Railways Company, of St. Louis, more than doubled its net income over the corresponding month in 1907. The net income in January, 1907, was \$16,926, while in January, 1908, the net income was \$39,585. The large increase in the net income arises from a marked reduction in the operating expenses.

In January the temperature was very uniform, and there was an absence of heavy frosts alternating with thaws. This, together with the fact that recent improvements in the roadbeds have been of a permanent character, have kept down repair expenses. This reduction in operating expenses is shown despite the fact that on Jan. 1 this year the company began to pay the motormen and conductors who have been with the company for five years 25 cents an hour instead of 23, as formerly.

The auditor's statement for the month of January for two years is as follows:

	1908.	1907.
Gross earnings and other income.....	\$827,398	\$826,337
Expenses, taxes and depreciation.....	554,359	577,870
Net earnings.....	\$273,039	\$248,467
Charges	233,454	231,541
Net income.....	\$39,585	\$16,926

ROANOKE RAILWAY & ELECTRIC COMPANY SELLS OLD CAR BARN AND POWER STATION PROPERTY

The Roanoke Railway & Electric Company, Roanoke, Va., has sold to the Norfolk & Western Railway Company the property on Earnest Avenue, near the center of the city, on which its car barn and power station are located, the consideration being \$40,000 cash and the conveyance to the Railway & Electric Company of three small parcels of land on Walnut Street, adjoining its new power station, which is practically completed. The Railway & Electric Company is to remove the buildings and their contents from the property sold the Norfolk & Western, but retains possession for eighteen months. During that time the Electric Company will build a new and modern car barn on Walnut Street. The property sold the Norfolk & Western Railway fronts 125 ft. on its yards and is adjacent to the property purchased about two years ago for a new freight station.

NEW INTERURBAN ROAD FOR ATLANTA

A contract has been awarded by Captain James W. English, of Atlanta, president of the Atlanta & Carolina Railroad Company, to the contracting firm of Cook & Lowry for the construction of the first section of an interurban electric railway ultimately to connect Atlanta, Augusta and West Point, Ga. The work will be begun in about 60 days; according to present plans. The first section will lie within the city limits of Atlanta, the terminus being at the intersection of Alabama and Broad Streets. The route covered will be from the above terminus through Alabama Street, Madison Avenue and Garnett Street to Pulliam Street, where the line will divide into two branches, one being carried to the Soldiers' Home and thence ultimately to Augusta, and the other terminating beyond Fort McPherson at College Park. The Augusta line will pass through Lithonia, Couyens, Jersey, Walnut Grove, Monroe, Good Hope, High Shoals, Watlansville, Athens, Crawfordville, Lexington, Washington and Augusta. The officers are: J. W. English, president; M. Mason, vice-president, general manager and chief engineer; M. T. Edgerton, secretary. General Manager Mason is now in Chicago in connection with the inauguration of the enterprise, which is expected to form the nucleus of an important network of trolley lines in Georgia.

MARCH MEETING OF THE A. S. M. E.

The March meeting of the American Society of Mechanical Engineers will be held on Tuesday evening, March 10, at 8:15 clock in the Engineering Societies Building. The meeting will be addressed by Dr. Charles P. Steinmetz, member A. S. M. E., past president A. I. E. E., and professor of electrical engineering, Union University, the subject being "The Steam Path of the Steam Turbine."

CAMDEN & TRENTON—TRENTON & NEW BRUNSWICK RAILROAD INSOLVENCY

The appointment of Wilbur F. Sadler, Jr., of Trenton, N. J., as the receiver of the Camden & Trenton Railway, which application for receivership was mentioned in last week's STREET RAILWAY JOURNAL, was quickly followed by the appointment of David F. Carver, of Newark, as receiver for the Trenton & New Brunswick Railroad Company and the New Jersey Short Line Railroad Company, and the appointment of J. Kearney Rice, of New Brunswick, as receiver for the New York-Philadelphia Company, which controls all the roads mentioned. A rule was made to show cause on March 2 why the receivership should not be made permanent.

In the case of the Camden & Trenton Railway Company the application for a receiver was brought by Henry V. Massey, of Merion, Pa., who was formerly president of the company. In the case of the companies, Stern & Silverman, of Philadelphia, brought the suit on behalf of their company and other creditors. It is a civil suit, and the outcome of the failure of the Camden & Trenton Company, and of A. N. Chandler & Company, of Philadelphia.

The New York-Philadelphia Company has \$2,535,000 of common stock outstanding to cover the holdings in the other companies; the New Jersey Short Line Railroad Company has \$803,000 of common stock outstanding, while the Trenton & New Brunswick Railroad Company has \$1,000,000 common stock issued and outstanding. A mortgage for \$1,000,000 was given by the New York-Philadelphia Company to the Guaranty Trust Company, of New York, and to secure the payment of these bonds there were deposited with the trust company nearly 10,000 shares, or all, of the Trenton & New Brunswick Railroad Company, 111,840 shares of the Camden & Trenton Railway Company, and 8,030 shares of the New Jersey Short Line Railroad. Of this issue of bonds, \$374,000 worth are outstanding. A further sum of \$375,000 (par value) of bonds has been issued and deposited with the trust company to secure the payment of three six-year gold notes of the defendant company to the amount of \$261,000. A further sum of \$23,742.25, with interest thereon, the bill goes on to say, is due Stern & Silverman, and over \$10,000 is due the Chandler Company upon a demand note. Other sums of \$900 from the New Jersey Short Line Railroad Company; \$2,675 on an open account, and \$80,101.46 on demand notes from the Trenton & New Brunswick Railroad; about \$10,000 in par value of the bonds of the Short Line, and \$200,000 for money loaned the Camden & Trenton Railway.

The Camden & Trenton Railway Company owns and operates 31 miles of electric railway, beginning at Riverside and running northeasterly to Trenton, and also operates the Trenton Terminal Railway, an extension from the city line at Liberty Street to a point in Hamilton Township, Mercer County, where connection is made with the tracks of the Trenton & New Brunswick Railroad. The Camden & Trenton road is of 5-ft. gage, so that the cars may run from Riverside to Camden over the tracks of the Camden & Suburban (Public Service Corporation), while the Trenton Terminal, Trenton & New Brunswick and New Jersey Short Line are standard gage—4 ft. 8½ in. The Camden & Trenton runs through a very populous territory, and, being essentially a street railway, does a good local business, but not a great deal of through business. On the other hand, the Trenton & New Brunswick Railroad runs through a very thinly populated territory for 23 miles, to Milltown Junction, whence the cars run over the tracks of the Elizabeth & Raritan River Street Railway (Public Service Corporation) to New Brunswick. Nearly all traffic is through.

From 1903 to 1906 the receipts of the Trenton & New Brunswick Railroad increased from \$39,194.49 to \$71,582.11, while the operating expenses increased from \$33,000 to \$50,793.25. The receipts for 1904 and 1905, when a through service to New York was operated, were slightly higher than during 1906. No report has been issued for 1907, but it is probable that it will show lower receipts than for 1906, on account of a further curtailment of the through service. During the same period the Camden & Trenton Railway receipts increased from \$85,578 to \$175,932, while the expenses for operation increased from \$42,493, or about 50 per cent, to \$131,868, or about 75 per cent. The New Jersey Short Line Railroad is under construction between the northerly end of the Trenton & New Brunswick Railroad, at Milltown, to Elizabeth, but no work has been done for some months, owing to a lack of funds.

AFFAIRS IN NEW YORK

President Shonts, August Belmont and George W. Wickersham, counsel for the Interborough Rapid Transit Company, held a conference Thursday with Chairman Willcox, of the Public Service Commission, relative to the purchase by the city of the Steinway tunnel, which has been completed for some time, but not placed in operation because of the question of the legality of the franchise. It is understood that a tentative offer was made to sell the tunnel for \$7,000,000, whereas its cost is supposed to have been \$8,000,000. There was also an informal discussion concerning the third-tracking of the East Side elevated lines. Chairman Willcox urged the company to make some definite propositions.

The Central Trust Company, of New York, has filed in the County Clerk's office a notice of the pendency of a suit in the United States Circuit Court brought by the Central Trust Company, of New York, against the Third Avenue Railroad Company, New York City Railway Company, Adrian H. Joline and Douglas Robinson as receivers of the New York City Railway Company, and as receivers of the Metropolitan Street Railway Company, and against the Pennsylvania Steel Company, the Degnon Contracting Company and the Morton Trust Company, trustee under a mortgage of March 21, 1902, made by the Metropolitan Street Railway Company. The suit is to foreclose the mortgage or deed of trust dated May 15, 1900, made by the Third Avenue Railroad Company, and the Morton Trust Company as trustee, to secure the payment of the principal and interest of a series of bonds of the Third Avenue Railroad Company "to be issued in an amount not exceeding in the aggregate the principal sum of \$50,000,000 at any one time outstanding." Bowers & Sands, counsel for the Central Trust Company, filed the notice of the suit.

The Public Service Commission has begun proceedings inquiring into the right of the Brooklyn Rapid Transit Company to charge double fares from the Brooklyn Bridge to Flushing and North Beach by ordering a hearing on two complaints from those localities questioning the right of the company to exact a 10-cent fare. The company answered the original complaint, stating that the fare cannot be reduced without depriving the road of a reasonable profit, and that a reduction would be confiscatory. The hearing is set for March 9.

PAY-AS-YOU-ENTER CARS FOR ST. LOUIS

Two types of pay-as-you-enter street cars which are being constructed by the St. Louis Car Company will be tried by the United Railways, of St. Louis, in the near future. The St. Louis cars are somewhat different from those in use in Buffalo and Chicago. The variations in the types are in the appliances and attachments in the vestibule for permitting the ingress and egress of passengers. The rear platform of the new cars will be 8 ft. 4 in. in length, with passageways through which passengers may enter and leave the car. The conductor will be stationed at the curve of the entrance passageway and collect the fares as the passengers go through the vestibule. In this way there will be two doors on the rear platform, each 30 in. wide. The last door will be the entrance, while the forward one will be the exit. There will be a door at the side of the front vestibule in the motorman's cab to be used as an exit. Passengers will all enter the car by the rear door and through the vestibule where the conductor stands. In one type of car the passenger will move a flap before entering the main section, and so registers the fare. In the other type the conductor will register the fare. The passengers will get off the car through the door of the front platform or through the forward door of the rear platform.

It is reported that the Pay-As-You-Enter Car Company has closed a contract with the North American Company by which the United Railways Company, of St. Louis, and the Milwaukee Electric Railway & Light Company have the privilege of introducing pay-as-you-enter cars on their systems.

REPORT OF THE J. G. BRILL COMPANY

The annual report of the J. G. Brill Company was submitted by President Rawle at a meeting of the stockholders held in Philadelphia on Feb. 12, 1908. The following is a summary: The output from the four plants owned and controlled by the company for the twelve months ending Dec. 31, 1907, together with the nine months' output of the Wason Manufacturing

Company, which was acquired by the J. G. Brill Company on April 1, 1907, amounted to \$9,211,825.72. This was an increase over 1906 of \$1,403,491.51. After writing off \$120,441.65 for depreciation, and charging to repairs to buildings, machinery and tools \$180,250.60, the total amount of profit on the output of \$9,211,825.72 was shown to be \$1,368,949.45. The earnings as referred to above consist of the profit in the manufacture of cars, trucks and sundry material, and the output represents the largest in any year in the history of the business. Three quarterly dividends at the rate of 7 per cent per annum on the preferred stock and of 4 per cent per annum on the common stock were declared and paid prior to Dec. 31, 1907. These dividends amounted to: Preferred stock, \$228,725; common stock, \$150,000; deducting from the net earnings as shown of \$1,368,949.45, the amounts of these dividends, \$378,725, leaves \$990,224.45. This amount of \$990,224.45 has been credited to the surplus account, making this account, as of Dec. 31, 1907, amount to \$1,699,953.95. At a directors' meeting, held on Jan. 24, 1908, a fourth quarterly dividend at the rate of 7 per cent per annum was declared on the preferred stock, payable Feb. 1, 1908, and a dividend at the rate of 4 per cent per annum on the common stock, payable March 14, 1908.

President Rawle says further that last year the company purchased to acres of land directly adjoining the Brill plant, which was the only suitable land desirable, by reason of its proximity to the present works. To meet the increased demand last year, it was determined in the early part of the year to erect at the Brill plant a new truck shop and also a new spring shop, and to increase the capacity of the forge shop. These increased facilities, which were placed in operation in October, enabled the company to get the largest output that it has ever had. The company also had the opportunity to purchase a small tract of land adjacent to the American Car Company's plant, and availed itself of this opportunity. The physical condition of the various plants is excellent. The lessening of business throughout the country which has taken place this year has, of course, affected the company's business as well as that of others, and it is not at all probable that the total business which the company will be able to do during 1908 will equal that done in 1907. The general outlook has somewhat improved within the last thirty days, but it is yet somewhat problematical as to what the outcome of the present year will be. The following is a condensed balance sheet, as of Dec. 31, 1907, and also a condensed statement of the sales and expenditures for the year 1907, which show the total profits, together with the surplus, as of Dec. 31, 1907:

THE J. G. BRILL COMPANY AND SUBSIDIARY COMPANIES' COMBINED BALANCE SHEET, DECEMBER 31, 1907.

ASSETS.	
Cost of properties.....	\$8,331,993.85
Material, raw, in process and finished.....	2,026,977.70
Investments	16,700.75
Bills and accounts receivable.....	2,024,668.19
Cash on hand and in banks.....	624,690.83
	\$13,025,031.32
LIABILITIES.	
Preferred stock.....	\$4,580,000.00
Common stock.....	5,000,000.00
Bonds (John Stephenson Co.).....	400,000.00
Bills and accounts payable.....	1,345,077.37
Surplus account	1,699,953.95
	\$13,025,031.32

THE J. G. BRILL COMPANY AND SUBSIDIARY COMPANIES' SALES AND EXPENDITURES FOR THE YEAR 1907.

Total sales.....	\$9,211,825.72
Less operating expense, depreciation, general and administration expenses.....	7,842,876.27
Profit undistributed, added to surplus.....	\$1,368,949.45
Surplus account from previous year.....	\$882,669.32
Less dividends paid.....	\$378,725.00
Interest, incorporation expense, including incorporation bonus to state, and adjustment of accounts prior to February 1, 1907.....	172,939.82
	551,664.82
Profit, as above.....	\$331,004.50
Total surplus	1,368,949.45
	\$1,699,953.95

CEREMONIES AT OPENING OF HUDSON & MANHATTAN TUNNEL

As announced elsewhere in this issue, the tunnel of the Hudson & Manhattan Railroad Company from Nineteenth Street, New York, to Hoboken, was officially opened Feb. 25. The first public train west left the Nineteenth Street station in New York at precisely midnight on that date and at the same time a train was started east from the Hoboken station.

Earlier in the day there was a notable gathering of State and city officials, engineers and railroad men to mark the opening of the tunnel by appropriate ceremonies. The latter began with the despatch of a train with invited guests at 3:30 p. m. from the Nineteenth Street station. The first car carried Governor Hughes of New York, and Governor Fort of New Jersey, and their staffs, together with the leading officials of the railway company and construction company. The signal to put the line in operation was given by President Roosevelt, and was telegraphed by pre-arrangement from Washington, when the President was notified that everything was ready. While waiting for the signal the car lighting circuits were supplied with current from storage batteries. Upon the receipt of the message from Washington, the substation switch was thrown in and soon after the train started. There were no intermediate stops and the trip to Hoboken, about 3 miles, was made in about 11 minutes. The State line was marked by an arch of red, white and blue lights.

At Hoboken the party left the train and went to the square above the station, where a platform had been erected. Walter G. Oakman, president of the Hudson Companies, then announced to Mr. McAdoo, president of the Hudson & Manhattan Railroad Company, the completion of the tunnel from Hoboken to upper New York, and turned over the property to him. Mr. McAdoo, in accepting the property, read the message from President Roosevelt which had been received that afternoon, in which the President expressed his great regret that he could not be present, but referred to the tunneling of the Hudson River as a notable achievement and congratulated all connected with it on its successful completion. Addresses were also made by the Governors of the two States.

In the evening the ceremonies were continued by a banquet at Sherry's, at which Governors Hughes and Fort were the guests of honor. At the guests' table were, in addition to the two Governors, Walter G. Oakman, president of the Hudson Companies; William M. Barnum, W. C. Fisk and C. J. Fisk, of the banking firm of Harvey Fisk & Sons, which handled the financing of the system; Judge E. H. Gary, chairman of the United States Steel Corporation; Chief Engineer Charles M. Jacobs, William G. McAdoo, the originator of the enterprise; President Patrick F. McGowan of the Board of Aldermen, Samuel Rea, vice-president of the Pennsylvania Railroad; Charles Steele, of J. P. Morgan & Company; President Underwood, of the Erie; Chairman William C. Willcox, of the Public Service Commission, and others.

Mr. Oakman acted as toastmaster. The speakers consisted of the two Governors, William H. Barnum, of Harvey Fisk & Sons, and Messrs. McAdoo and Jacobs. Those connected with the tunnel gave some interesting information in regard to its construction and expected effects. Among other things, Mr. McAdoo stated that one hundred million people now crossed the river annually, and if each saves 5 minutes by the tunnel the annual saving will be nine hundred years. In point of engineering difficulties, the Hudson tunnel was by far the greatest work of its kind ever undertaken. Among other difficulties encountered in the construction was a rock ledge, which was found at the deepest part of the river. This ledge rose at no point higher than 12 ft. above the projected base of the tunnel, whose diameter was 18 ft. The unusual engineering problem was therefore presented of having to build the bottom of the tunnel through rock and the top through silt, with the bottom of the river only 15 ft. above the top of the tunnel. This ledge was encountered in December, 1902, and within twelve months the 800 ft. of tunnel had been blasted out and the successful construction of the tunnel was assured beyond a shadow of doubt. In referring to the small loss of life from caisson diseases since the present management took hold, Mr. McAdoo stated that during the last five years 40,000 ft. of tunnel had been constructed under compressed air, and only two lives had been lost through caisson disease or bends. Under the predecessor of Mr. Jacobs thirteen lives were lost from this disease alone in the construction of only 1800 ft. of tunnel. Mr. McAdoo

also paid a high tribute to L. B. Stillwell and Hugh Hazelton, who had charge of the electrical engineering in connection with the tunnel and its equipment.

CHANGES IN THE NEW YORK CITY ORGANIZATION

It was announced last week that Thomas Millen has resigned as master mechanic of the New York City Railway Company. Mr. Millen has occupied the position of master mechanic with this company and with the Metropolitan Street Railway Company for the past fourteen years. Previous to that time he was master mechanic of the New York & Northern Railroad Company, of which Mr. Vreeland was general manager. Upon the appointment of Mr. Vreeland as president of the New York surface lines, Mr. Millen was offered and accepted the position of master mechanic of the New York system. He has been connected with the company through practically the entire time during which the underground conduit was installed, and was instrumental in solving many of the new problems connected with this work. No successor to Mr. Millen will be appointed. Alexander McIver, superintendent of electric car houses, will take over part of Mr. Millen's work under the title of superintendent of equipment. H. P. Clarke, who is now master mechanic of the 146th Street shops, will be put in charge of all of the shops of the company.

Other changes in the organization are as follows: N. C. Ailes, who has been superintendent of buildings, has resigned. Mr. Ailes' place remains temporarily vacant, the duties being performed by the superintendent of way. In view of the extensive real estate holdings of the company, a real estate department has been created and placed in charge of J. G. Blaine Ewing. Another department which has been in existence only a short time is that of fire insurance. John H. Derby has been appointed in charge of this department, which is quite broad in its scope, as the company has been doing a great deal in the way of improving its fire risks during the last year or two. Mr. Derby was formerly connected with the Underwriters' Exchange in Boston.

INDIANA UNION TRACTION REFUSES TO ARBITRATE WITH STRIKERS

The Indiana Union Traction Company has positively declined to enter into arbitration with members of the Amalgamated Association of Street & Electric Railway Employees who went on strike Jan. 1 last. The second refusal to arbitrate with the strikers as Amalgamated men and to recognize their organization in negotiations was made in a reply to several petitions which were circulated in twenty-nine cities and towns on the lines of the Indiana Union Traction system, and filed by a committee of the strikers at the general offices of the Indiana Union Traction Company. Personal reply to each of the petitioners is being made by Arthur W. Brady, president of the company. President Brady's reply to the petitioners follows:

I beg to acknowledge receipt of a petition bearing your typewritten signature, and relating to the differences between this company and the Amalgamated Association of Street and Electric Railroad Employees of America. The original petition being retained by the Amalgamated committee, I am assuming the copy including your signature to be genuine.

Appreciating your interest in this matter, and believing that you may desire to become fully conversant with the real facts of the differences referred to, I inclose herewith a statement setting forth the position of the Indiana Union Traction Company. You will note that no question of wages, hours, working conditions or unadjusted grievances was involved. In considering the situation, kindly bear in mind that of the total number of motormen and conductors in the service of the company previous to January 1, 1908, only about one-third were dissatisfied with the course followed by the company, the other two-thirds having remained and still remaining at their work. In the interurban service, but 10 per cent of the motormen and conductors left their work; that is, only about 20 out of a total of over 200.

The company was compelled to employ new men to take the places of the men who voluntarily left their work on or about Jan. 1, and all cars have been regularly operated for a number of weeks past. The company can not in fairness to these new men adopt any course which would lead to their discharge in order to find places for the men who walked out, and who since have endeavored to harass and obstruct the company in many ways, including the illegal attempt to establish a boycott. At the same time, the company will, as openings arise, treat with any old employees seeking reemployment without discrimination because of their having participated in the mistake of the strike.

Very truly yours,

ARTHUR W. BRADY, President.

LYNCHBURG AND ROANOKE TRACTION PROPERTIES

A party of some twenty financial men have just returned from a trip of inspection over the lines of the Lynchburg Traction & Light Company and the Roanoke Railway & Electric Company, both of which properties are controlled and operated by Philadelphia and Virginia capitalists. The trip was arranged for and included Charles R. Miller and F. H. Shelton, directors of the company, together with John S. Bioren and Walter H. Lippincott, of the firm of Bioren & Company, and H. B. Ireland, of the bond department of this firm, which has placed the recent issues of these companies. The other members of the party included fifteen bank and trust company presidents from Philadelphia and neighboring suburban towns, who are interested in the property. The party visited the new power plant at Roanoke, which has just been completed. The new power plant on the James River, 3 miles above Lynchburg, was also inspected. The plant develops 4000 horse-power and its capacity can be largely increased at small additional cost. The properties were all found to be in excellent physical condition and the members of the party were all well pleased.

MASSACHUSETTS COMPANIES SET FORTH REASONS FOR INCREASING FARES

M. C. Brush, vice-president and general manager of the Middlesex & Boston Street Railway Company, Natick & Cochituate Street Railway Company, and the Westboro & Hopkinton Street Railway Company, issued on Feb. 21 a public statement showing the capital stock of the company, together with the net earnings applicable to dividends, and the dividends for the past five years, by way of emphasizing the position of the companies in regard to the increase in fares over the lines from 5 cents to 6 cents on March 1. The statement follows:

To the patrons of the Middlesex & Boston Street Railway Company, Natick & Cochituate Street Railway Company and Westboro & Hopkinton Street Railway Company.

We publish below a statement showing capital stock of the above companies, issued with the approval of the State Board of Railroad Commissioners, and paid for at par as follows, together with the net earnings applicable to dividends and dividends paid for the last five years.

The Middlesex & Boston Street Railway Company operated only a portion of the year ending Sept. 30, 1907, this company having succeeded to the possession of the South Middlesex Street Railway Company, which road was in the hands of a receiver from May 3, 1903, to the time that the Middlesex & Boston Street Railway Company took the property, Aug. 14, 1907.

The South Middlesex Street Railway Company during the time mentioned, while it was in the hands of a receiver, did not earn the interest on its outstanding notes.

NATICK & COCHITUATE STREET RAILWAY COMPANY.

	Capital Stock.	Net Divisible Income.	Dividends Paid.
1903.....	\$100,000.00	\$8,107.53	8 per cent.
1904.....	100,000.00	1,345.95	2 per cent.
1905.....	100,000.00	1,702.41*	No dividend
1906.....	100,000.00	8,386.88	6 per cent.
1907.....	100,000.00	2,013.51	2 per cent.

WESTBORO & HOPKINTON STREET RAILWAY COMPANY.

1902†.....	40,000.00	1,441.95	No dividend
1903.....	40,000.00	176.59*	"
1904.....	40,000.00	1,807.91*	"
1905.....	40,000.00	723.34*	"
1906.....	40,000.00	902.02*	"
1907.....	40,000.00	540.48	"

*Deficit.

†Commenced operating Aug. 16.

This statement is published in order that you may realize, as the officers of the companies do, that one of two things must be done: either have the companies go into the hands of a receiver and reduce wages, or change the unit of fare. Although the wages paid by these companies are very much higher than a few years ago, the management is extremely reluctant to reduce wages of its employees at the present time, and, after giving the matter careful consideration, has decided to change the unit of fare from five to six cents; said change to be effective March 1, 1908.

At the same time, i. e., March 1, 1908, the custom of carrying passengers from the Boston & Albany depot in Natick to Saxtonville for one fare unit will be discontinued and the fare-limit point going toward Saxtonville will be a point 33 poles west of Main Street on Plain Street at a red pole in front of the property of one Stephen Como; and the fare-limit point going toward Natick will be the Natick-Wayland town line, past which points an additional fare will be collected.

At the same time, i. e., March 1, 1908, the former custom of carrying passengers from Park Avenue, Natick, to Newton Lower Falls for one (1) unit of fare will be resumed, it being required that passengers desiring to take advantage of this change shall purchase a ticket book printed exclusively for this purpose.

It is hoped by the management that the necessity for this advance in fares will not be permanent, and that the public will give the management their hearty co-operation in this change, necessitated by causes beyond their control.

MIDDLESEX & BOSTON STREET RAILWAY COMPANY,
 NATICK & COCHITUATE STREET RAILWAY COMPANY,
 WESTBORO & HOPKINTON STREET RAILWAY COMPANY.

Signed, M. C. BRUSH,

Vice-President and General Manager.

Feb. 21, 1908.

STATEMENT OF EARNINGS OF DES MOINES COMPANY

The Des Moines City Railway Company has issued the following statement, showing the gross earnings, operating expenses and net earnings for the year ending Dec. 31, 1907:

EARNINGS.			
Passenger Traffic—Cash fares.....	\$424,202		
Tickets	343,300	\$767,502	
Freight and Express.....		1,480	
Mail—Carriers	1,500		
Pouches	1,920	3,420	
Chartered cars.....		262	
Advertising	4,050	\$776,715	
Miscellaneous earnings—House moving...		365	
Foundry		1,406	
Interest, dis. and misc.....		571	2,343
Gross earnings.....			\$779,958
OPERATING EXPENSES.			
Maintenance of ways and structures.....		\$30,609	
Maintenance of equipment.....		49,389	
Conducting transportation—Operating of power plant.....		\$84,955	
Less sales of power.....		26,605	60,349
Operation of cars—Superintendence of transportation		5,872	
Wages of conductors.....		96,441	
Wages of motormen.....		98,756	
Wages of misc. car service employees..		8,207	
Wages of car house employees.....		20,034	
Car service supplies.....		6,031	
Misc. car service expense.....		7,925	
Cleaning and sanding the track.....		7,006	
Removal of snow and ice.....		328	250,603
GENERAL EXPENSES.			
Injuries and damages.....		22,474	
Rent of track.....	11,688		
Less track rentals received.....	4,191	7,496	
Insurance		11,530	
Legal expenses.....		11,197	
Rent of buildings.....	6,195		
Less rents received.....	962	5,233	
Advertising		2,479	
Stable expense.....		2,363	
Store house expenses.....		4,299	
Printing and stationery.....		1,413	
Salaries of general officers.....		17,090	
Salaries of office employees.....		10,776	
Miscellaneous expense.....		13,274	
Ingersoll Park—Nct.....		2,252	
Replacements		42,484	
Extraordinary expenses.....		14,230	\$559,549
Net earnings from operation.....			\$219,509
DEBITS.			
Taxes		21,595	
Interest on bonded debt.....		153,040	
Interest on floating debt.....		5,951	180,587
Net income.....			\$ 38,921

NOTE—As above stated: This net income should be reduced \$22,220.53 on account of depreciation. If this is done, the net income is \$16,701.20.

SECTION MEETINGS OF THE A. I. E. E.

An interesting lecture on the subject of "Gas Power" was delivered before the Schenectady Section of the A. I. E. E. on Feb. 6 by H. H. Supplee, editor of *Cassier's Magazine*. J. M. Knox, of the General Electric Company and recording secretary of the local section, acted as presiding chairman. Mr. Supplee summarized the rapid development of the gas engine and gas turbine within the past ten years and reviewed briefly the history of the air engine. The possibilities of the gas engine in the utilization of waste fuel in large iron works, in the form of gas from the top of blast furnaces and from coke ovens, which is commonly used in part for burning under the boilers, but the greater part of which is wasted, were clearly brought out. The question of the marketing of excess power generated from this fuel is of great importance, the saving of the waste fuel in the form of power being of little advantage without the proper conditions for its commercial utilization. The necessity for the conservation of the world's supply of fuel makes this question of gas engine development of special importance, as with the gas engine the utility of the coal is greatly increased. Furthermore, the fact that low-grade fuels, such as lignites, peats, bone coal and coals having a large amount of impurities such as sulphur and ash, can be more successfully used with the gas engine, gives it an additional factor of merit. Mr. Supplee said it was a mistake to compare the gas engine with the steam engine as if the gas engine were going to supersede it, but that there is room for both and both will play an important part. An interesting series of lantern slides showing gas engine installations, both in America and abroad, illustrated the advance which has been made in the development of gas power.

The Schenectady Section met again Feb. 13. C. J. Mellin, consulting engineer of the American Locomotive Company, addressed those present on "The Design of Steam Locomotives." Mr. Mellin said, in part, that the first consideration in the design of a locomotive is the allowable wheel pressure on the rail, the weight at the driving wheels being determined by that. The number of driving wheels is generally limited to four pairs in freight and three pairs in passenger engines, the length of the rigid driving wheel base being limited to 16 or 17 ft., on account of curves. A two-wheel pony truck is considered most suitable for freight engines, while a four-wheel truck is most generally used in passenger service, but for the varying conditions of service naturally several types of engine are necessary. The different types are distinguished from each other by names and figures, the figures generally representing the grouping of the wheels. The first figure signifies the number of wheels on first truck; second figure, number of drivers, and, third figure, number of wheels in trailing truck. Thus we have the light passenger engine classified as 4-4-0; the medium size, or Atlantic type, 4-4-2; the heavy passenger, or Pacific type, 4-6-2, and the 10-wheel type, 4-6-0, the latter, as well as the Mogul type, 2-6-0, and the prairie type, 2-6-2, being most suitable for mixed or fast freight service. For regular freight service, the consolidation, 2-8-0, has practically become standard.

The required cylinder power is figured on the basis of tractive weight, or weight of driving wheels on the rail. The boiler pressure is always predetermined, and the diameter of drivers is about equal in inches to the speed the engine is expected to run in miles per hour. The stroke is selected so as to give the required maximum train speed to a moderate piston speed. Two of the most important factors in a successful locomotive are the heating surface and grate area. The method of determining those factors which has generally been adopted and gives satisfactory results is to make the heating surface in square feet not less than 450 times the volume of one of the cylinders in cubic feet for passenger engines and 400 for freight, the grate area being about 1-70 of this amount. Diagrams of construction, curves and photographs of locomotives were shown by means of lantern slides. Mr. Mellin also gave a detailed description of the Walschert valve, illustrated by diagrams. On Feb. 20 E. J. Berg, of the General Electric Company, was to deliver a lecture before the Schenectady Section on "Rotary Converters."

On Friday evening, Feb. 7, Charles F. Scott was the guest of honor at the first dinner of the Ithaca Section of the A. I. E. E. Chairman E. L. Nichols presided and introduced Mr. Scott, who in an informal manner told of his relations with the early and present faculties of electrical engineering at Cornell. He stated that it was largely due to the encouragement given by a letter from Professor H. J. Ryan that he was impelled to urge the

formation of university branches. On motion of Professor F. Bedell, telegrams of appreciation were sent to Professor Ryan, who founded the local section, and to Professor William A. Anthony, who offered the first electrical engineering instruction in this country.

After the dinner Mr. Scott addressed an audience of 225 local members and visitors on the topic, "Limitations in High Tension Transmission." In view of the large number of students in his audience, Mr. Scott took the occasion to give his views on the recognition of limitations in general, particularly as applied to conduct. Mr. Scott emphasized the general relation of technical education to engineering practice, pointing out that such subjects as mathematics must be taught with a view to their application. Mathematics, he stated, is a useful tool, or it is nothing. Many engineers do not use mathematics in their work, because they do not know how. They have studied the subject, but are unfamiliar with the applications.

In his lecture on the subject of limitations the speaker showed clearly how development has from time to time depended upon limitations in some part of electrical equipment. For example, the voltage which could be economically developed, or the speed at which generators could be operated, or the sizes in which transformers could be constructed. Special emphasis was laid upon the improvement in the transformer by which the range of operation of electric transmission has been enormously extended.

One of the most interesting features of the lecture was the general explanation of how limitations affect design. For example, if a stronger steel could be found, say, three times as strong as that now in use, the whole nature of bridge design would be affected. Bridges are now designed primarily to support their own weight; with stronger material they could be designed to carry heavier loads. When the walls of buildings were made of stone the wall footings were very thick, especially in tall buildings, in one case the thickness being 20 ft. When steel came into use for the framing of large buildings the thickness of the wall became entirely a secondary matter. In a similar manner the use of elevators has affected the design of buildings, which can now be made as high as may be desirable from other considerations. The elevator has therefore revolutionized the entire design of buildings.

A MEXICAN PURCHASE

The Matamoras & Santa Cruz Street Railway, of Matamoras, Mex., has been purchased by W. K. Bixby, Thomas West, Henry Haarstick, Sam Fordyce, Henry E. Scott and Robert Brookings, of St. Louis. The road was built by Mexican capitalists nearly a half century ago, soon after the establishment of the town of Brownsville. Matamoras is nearly three miles from the ferry landing on the Mexican side, just opposite Brownsville, and the railway runs from the ferry landing on the bank of the Rio Grande to the main plaza of Matamoras. Returning from the plaza the line makes a loop through the main business streets of the town and returns to the main line before the limits of the city are reached. It is a trip of five miles from Brownsville to the station of the National Railroad, and the trip can be made only a part of the way by street car. The road is operated by mule power.

It is planned to erect an electric power station upon the bank of the Rio Grande and completely rebuild the line and equip it with electricity. It is also proposed to extend it to a connection with the National Railroad at its passenger station. The most important of the proposed improvements, however, is that of extending the line into Brownsville, and to make it a part of the Rio Grande Railroad, which runs between Brownsville and Point Isabel, a distance of 22 miles. The Rio Grande Railroad is operated by steam, but it is said it is planned to convert it into an electric railway.

In order to extend the Matamoras & Santa Cruz line to Brownsville an international bridge across the Rio Grande will have to be built. A concession from the Mexican Government and a permit from the United States Government must first be obtained before the international boundary stream can be spanned by the proposed bridge. Application for the concession is pending before the Mexican Government.

The purchasers of the street railway are, for the most part, stockholders in the St. Louis, Brownsville & Mexico Railroad, and it is reported that the proposed bridge across the Rio Grande will be used also by that line to gain entrance to Mexico.

NEW PUBLICATIONS

ELEMENTS OF ELECTRICAL ENGINEERING. Vol. II, Alternating Current, by W. S. Franklin and Wm. Esty, New York. Macmillan Co., 378 pages; illustrated. Price, \$3.50.

Professors Franklin and Esty are to be congratulated upon the logical arrangement and clear treatment which is characteristic, as well of the first volume of the series of which 8000 have already been printed. Hydraulic analogies are used freely to explain the fundamental problems, while later in the book section diagrams are employed with those of the actual circuits to illustrate the operation of the machines or circuits. The series is excellently fitted for text-book purposes.

BOND OFFERINGS. A directory of miscellaneous bonds, 1908 edition, by Roger W. Babson. Published by the author. Wellesley Hills, Mass.; 284 pages; leather. Price, \$5.

This manual gives a list of about 4400 railroad, traction, electric light, gas, industrial and other corporation bond issues, which have been offered in whole or in part by bankers, bond dealers and brokers. The information published includes the names of the dealers making a specialty or offering the bonds, and the maximum and minimum offering prices of the past year. Other data include the maturity (and indirectly the interest periods) of the issues; the states for which certain bonds are legal savings bank investments, and a list of about 350 dealers that issue printed bond circulars. Each book is numbered, and the edition is limited.

ILLUSTRATED TECHNICAL DICTIONARY, IN SIX LANGUAGES: English, German, French, Russian, Italian and Spanish, edited by K. Deinhardt and A. Schlomann; Vol. II, Electrical Engineering; compiled by Chas. Kinzbrunner, with 4000 illustrations. New York: McGraw Publishing Company; 2100 pages. Price, \$7.

The scheme of this book is familiar to students from the first volume, on machinery, published some months ago. It consists of the grouping of the words in subjects and their subsequent arrangement in parallel columns, according to the language. Diagrammatic illustrations are used freely to clarify the text. These may take the form of sketches of apparatus, or of diagram, or, in the chapter on manufacturing, of characteristic sections representing the appearance of different kinds of iron and steel. The subject of electric traction will be taken up in a later volume, so is not included in that just issued.

DIRECTORY OF STEAM RAILROADS AND TRAMWAYS IN FRANCE AND ITS COLONIES, for 1906. Edited by E. Marchal, Paris. Published by H. Dunod and E. Pinat; 1300 pages. Price, 7 francs.

The tramway section occupies 102 pages, and the data given include name, address of principal office, date of charter, officials and gage of track. Other sections of the book give a list of the trunk lines in Europe, with names of officers and certain statistics, the French railway law, constitutions of the various French railroad and tramway associations, and an index of names of individuals contained in the directory.

STREET RAILWAY PATENTS

UNITED STATES PATENTS, ISSUED FEB. 17, 1908.

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

878,566. Means for Keeping Switches Clear from Snow and Ice; Francis G. Shaw, Boston, Mass. App. filed Sept. 16, 1907. Provides a gas burner and a novel construction for handling the gas and feeding it to the burner pipe, and also a novel construction for cleaning the burner pipe whenever such action is necessary.

878,571. Automatic Governing Device; George M. Spencer, St. Louis, Mo. App. filed Nov. 15, 1906. A fluid pressure device for controlling the relief valve of an air brake. An air pump driven from the car axle supplies pressure to the controlling device and operative connections between the brake and air pump for throwing the latter into and out of operation.

878,589. Reinforced Angle-Bar for Rail-Joints; Benjamin Wolhaupter, New York, N. Y. App. filed Jan. 19, 1907. An angle-bar for rail joints provided with a pendant stiffening girder, horizontal extensions arranged to overlie the ties, and a reinforcement for the girder and girder extensions.

878,601. Air-Brake Apparatus; Henry F. Bickel, Plainfield, N. J. App. filed Oct. 15, 1906. This invention relates to air-

brake apparatus and has for its object to provide for the rapid exhaust of air from the brake cylinders to render the release of the brakes very prompt.

878,656. Trolley Wheel; Joseph T. Mishler, Johnstown, Pa. App. filed Aug. 10, 1907. The trolley wheel has spiral grooves converging toward a central groove so as to insure replacement of the wire.

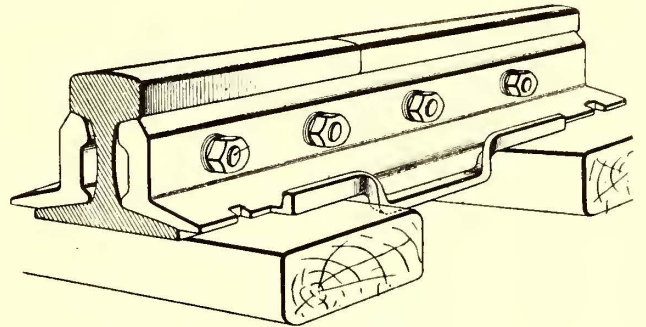
878,756. Controller; Walter J. Warder, Jr., Chicago, Ill. App. filed May 13, 1907. A form of starting or speed controlling rheostat for electric motors having a ratchet mechanism by which it is impossible to turn on the controller too rapidly.

878,828. Semi-Convertible Car; Edward T. Robinson, St. Louis, Mo. App. filed July 29, 1907. Relates to the storing of the windows in the roof of the car.

878,836. Securing Device for Trolleys; Eberle D. Trickey, Blanchester, Ohio. App. filed April 17, 1907. A pair of spring-impelled arms pivoted to the trolley harp and adapted to close over the wire.

878,894. Signal System for Electric Railways; Charles F. Pike, Philadelphia, Pa. App. filed Oct. 19, 1901. Details of circuits of a block signal system making use of special equipment throughout and having certain functions performed by the movement of the controllers on the cars.

878,899. Convertible Car; Edward T. Robinson, St. Louis, Mo. App. filed April 20, 1906. Relates to the storing of the windows, etc.



PATENT NO. 878,589.

878,927. Switch Operating Mechanism; Aaron B. Allen, Pueblo, Col. App. filed June 21, 1907. A switch-throwing lever mounted in a casing in the roadbed and adapted to be engaged by a lever depending from a moving car.

878,961. Controller for Electric Motors; Pearl N. Jones, Pittsburg, Pa. App. filed Aug. 12, 1907. Combines two or more controllers with suitable mechanism whereby the controllers can be simultaneously operated to regulate and reverse the current to the motors.

879,034. Trolley Pole Controller; John J. Coit, Venice, Cal. App. filed Oct. 20, 1906. The trolley harp is pivoted to the upper end of the pole, and a small piston is effective to keep the wheel pressed upward against the wire. Additional pneumatic mechanism operates to retrieve the pole or control it in other ways.

PERSONAL MENTION

MR. V. L. HAVENS has been appointed chief engineer of the Compania Limitada de Tranvias Electricos de Mexico, City of Mexico, Mexico, succeeding Mr. Paul H. Evans, resigned.

MR. HERBERT McNULTA, for several years chief engineer of the Cincinnati Traction Company, has resigned to go with an Eastern company. His duties will be assumed by Mr. Thomas Elliott, consulting engineer for the company.

MR. F. H. KNOX, acting general manager of the Boise & Interurban Railway Company, has resigned. He will be succeeded by Mr. Henry C. Dalton, whose appointment was announced in the last issue of the STREET RAILWAY JOURNAL.

MR. EDWARD B. SMITH, of Philadelphia, has been elected a director of the United Railway Investment Company, which controls the United Railroads of San Francisco and the Philadelphia Company. Mr. George H. Earle, Jr., of Philadelphia, also is a director of the company.

MR. E. J. DICKSON has been appointed to the position of assistant general manager of the Inter-State Electric Railway. Mr. Dickson has been in charge of the Milford, Attleboro & Woonsocket Railway, and in his new office will have jurisdiction between the Attleboros and the Rhode Island line.

MR. R. B. HAMILTON, secretary and purchasing agent of the Chicago City Railway Company, has been elected to the newly created office of vice-president. Mr. F. D. Hoffman, treasurer, succeeds to his duties as secretary, with the title of secretary and treasurer. Mr. Simon R. Flynn has been elected a director in place of Mr. S. M. Felton, resigned.

MR. H. B. TWYFORD has resigned as purchasing agent of the Underground Electric Railways Company, of London, and is now on a visit to this country. Mr. Twyford went from Chicago to London about five years ago to occupy the position which he has recently resigned, so has been connected with the company during practically all of its period of electrification.

MR. W. J. DUNSTON has been appointed master mechanic of the Sterling, Dixon & Eastern Electric Railway. He formerly was connected for five years with the Jacksonville Railway & Light Company, of Jacksonville, Fla., and since April, 1906, has been master mechanic of the Winnebago Traction Company, at Oshkosh, Wis.

MR. FRANK M. ROSS, of the Gulf Refining Company, is dead. While he was not in street railway work recently, Mr. Ross was at one time prominent in traction affairs in Pittsburg, being associated with the late Mr. Mellon in the building of several properties now a part of the Pittsburg Railways system and also being connected with several suburban lines extending out of Pittsburg.

MR. J. A. CAROTHERS, for a number of years president of the Bloomington, Pontiac & Joliet Electric Railway, died at his home in Pontiac, Ill., on Feb. 19, aged forty-five years. Mr. Carothers sold his interest in the company last fall to the Fisher interests of Joliet, and Mr. H. A. Fisher, of Joliet, Ill., has been elected president of the company to succeed him. At the time of his death Mr. Carothers was president of the Pontiac Light, Heat & Power Company.

MR. H. E. CHUBBUCK, of Ottawa, Ill., has been appointed general manager of the Wichita Railroad & Light Company, of Wichita, Kan., succeeding Mr. S. L. Nelson, of Peoria, Ill., and not Mr. N. B. Morrison, superintendent, as previously reported. Mr. Chubbuck has been with the McKinley properties since 1897 and has been general manager of the parent company, the Western Railways & Light Company, since its organization. This company owns the plants at Galesburg and Quincy, Ill., the Illinois Valley Traction Company and the plant at Wichita, Kan.

MR. MURDOCK MCAULEY, superintendent of the Detroit, Monroe & Toledo Short Line Railway, at Monroe, Mich., died of apoplexy on Feb. 11, aged 45 years. Mr. McAuley had been with the Detroit United Railway for a number of years, serving from 1901 to 1902 as car-house foreman, and from 1903 to 1906 as assistant superintendent of its Orchard Lake division. On July 1, 1906, he was appointed assistant superintendent of the Detroit, Monroe & Toledo Short Line, and on Jan. 1, 1908, became superintendent of the road, succeeding Mr. E. B. Taylor.

MR. H. U. WALLACE, president of the Wallace-Coates Engineering Company, of Chicago, has resigned to accept the position of general manager of the Chicago, Lake Shore & South Bend Railway Company, just being completed between South Bend and Kensington, Ill., at which point it connects with the Illinois Central Railway. This line is a single-phase railway and is being built for high-speed traffic. Mr. Wallace is a Purdue graduate. He spent many years on the Illinois Central Railway, working up through the engineering and transportation department to the position of chief engineer. He was superintendent of the Freeport and Louisville divisions for three years and was chief engineer for almost three years. Mr. Wallace resigned from the Illinois Central Railroad to go into the contracting business. He was third vice-president of J. G. White & Company and for the past two years has been president of the Wallace-Coates Engineering Company. Mr. Wallace is a member of the American Society of Civil Engineers; a member of the Maintenance of Way Association; Engineers' Club, Chicago, and Engineers' Club, New York City. He is a son of Mr. J. F. Wallace, ex-chief engineer of the Panama Canal.

EARNINGS OF THE NEW YORK CITY COMPANIES

The following table, giving the capital stock, funded debt, receipts from all sources, charges, dividends and surplus of all the street railway companies in New York City, embracing the boroughs of Manhattan, Brooklyn, Bronx, Richmond and

Queens, has been compiled from the earnings of these companies for the year ended June 30, 1906, as on file with the Public Service Commission of the second district of New York, whose jurisdiction extends over the City of New York. Twenty-nine operating companies make returns, of which ten report a surplus:

TABLE SHOWING CAPITALIZATION AND OPERATING STATISTICS OF THE NEW YORK CITY STREET RAILWAY COMPANIES, REPORTING TO THE PUBLIC SERVICE COMMISSION OF THE SECOND DISTRICT.

COMPANY.	ON JUNE 30, 1907.		YEAR ENDING JUNE 30, 1907.				Surplus or Net Income for Year.	
	Capital Stock.	Funded Debt.	Total Receipts, All Sources.	Operating Expenses.	Charges on Earnings.	DIVIDEND PAID		
						Amount.	P. C.	
Brooklyn Heights R. R. Co.	\$200,000	\$250,000	\$11,705,860	\$6,691,777	\$4,185,142	.....	..	\$828,941
Brooklyn Queens Co. & Suburban R. R. Co.	2,000,000	6,624,000	1,618,905	971,253	437,677	.....	..	209,975
Nassau Elec. R. R. Co. (Brooklyn)	15,000,000	15,000,000	3,300,126	2,112,462	969,354	260,000	4	Def. 41,690
* Brooklyn Union Elevated R. R. Co.	18,000,000	23,000,000	2,410,579	1,252,763	532,877	83,333	5	541,606
Coney Island & Gravesend Ry. Co.	350,000	.....	54,387	47,846	1,142	.....	..	5,399
* South Brooklyn Ry. Co.	500,000	.....	126,970	111,126	20,151	.....	..	Def. 17,641
Coney Island & Brooklyn R. R. Co.	2,000,000	3,500,000	1,621,615	1,228,848	311,722	.....	..	Def. 38,955
Van Brunt St. & Erie Basin R. R. Co.	200,000	65,000	61,447	34,191	3,629	10,000	4	13,627
Long Island Electric Railway Company	.....	.....	.....	.....	.....	.....	..	.....
New York and Queens County Railway Company	3,235,000	3,000,000	913,212	740,907	204,573	.....	..	Def. 32,268
New York & Long Island Traction Company	1,000,000	1,000,000	242,526	171,852	60,531	.....	..	10,143
Ocean Electric Railway Company	35,000	20,000	92,578	94,172	2,823	.....	..	Def. 4,417
New York City Railway Company	13,000,000	1,761,000	18,459,109	10,181,881	11,607,429	.....	..	Def. 3,330,201
Dry Dock, E. Broadway & Battery R. R. Co.	1,200,000	2,050,000	627,979	445,555	195,246	.....	..	Def. 12,822
Forty-Second St., Manhattanville Ave. & St. Nic. Railway Company	2,500,000	2,800,000	1,083,871	769,837	398,215	.....	..	Def. 84,181
Union Railway Company (New York)	2,000,000	2,000,000	1,583,656	1,124,595	392,141	.....	..	166,919
Southern Boulevard R. R. Co.	250,000	250,000	57,648	48,134	20,401	.....	..	Def. 10,887
Westchester Electric R. R. Co.	500,000	500,000	323,589	286,746	105,644	.....	..	Def. 68,801
Interborough Rapid Transit Co.	35,000,000	25,000,000	23,179,635	9,593,331	5,753,860	3,150,000	..	566,444
New York City Interborough Railway Company	5,000,000	.....	62,466	62,398	7,469	.....	..	Def. 7,401
Richmond Light & R. R. Company	2,871,750	2,200,000	335,008	284,909	114,094	.....	..	Def. 83,995
Staten Island Midland Railway Company	35,000	.....	223,033	193,110	55,979	.....	..	Def. 26,056
Southfield Beach R. R. Company	250,000	21,000	6,770	4,591	2,287	.....	..	108
City Island R. R. Company	50,000	27,873	8,917	8,460	3,327	.....	..	Def. 2,870
Pelham Park R. R. Company	50,000	27,750	11,175	11,358	1,768	.....	..	Def. 1,951
* Seabach Railway Company (4 months)	650,000	650,000	81,471	79,738	12,250	.....	..	Def. 10,517
Bush Terminal R. R. Company	200,000	.....	33,798	20,320	13,789	.....	..	Def. 311
The Marine Railway Company	50,000	.....	5,947	2,882	1,447	.....	..	1,618

* Four months ending June 30, 1907.