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Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905, to date, 229,350 copies, an average of 8191 copies per week.

The Subway Critics

It is with pleasure that we print in this issue the reply of Mr. Stillwell to the criticism on the electrical equipment of the New York Subway, offered by Mr. Tesla and printed in part in our issue of June 24. If Mr. Tesla's audience had been confined to electrical engineers only, no answer would have been necessary to his comments, as they carry their own refutation, but so long as Mr. Tesla chooses to ignore Mr. Stillwell's challenge to debate these subjects before the American Institute of Electrical Engineers, it is well to place the facts before the public. There is so much that is mysterious in the operation of electrical machinery in the popular mind that it might not be surprising if certain of the claims offered in the original Tesla letter should have left an impression with some that a radical mistake had been made in the system adopted in the subway. Mr. Stillwell, however, takes up the criticisms seriatim and disposes of them so completely as to leave no excuse for resurrecting the subject again.

Fireproofing Cars

The discussion at the Lake George convention of the New York State Association on the question, "What can the master mechanic of the average surface road do to prevent fires on cars, and to render his cars more nearly fireproof," develops the fact that the minds of many of the master mechanics of the State have been working to this same end, namely, the prevention of fires on cars due to electrical causes. The trend of opinion seems to be that all cables and wiring should be carried in iron-pipe conduits, or at least in good wood moldings, one or two of the speakers rather favoring the latter. Inasmuch as nearly all fires in cars arise from defective wiring, it is extremely interesting to note this common recognition of the axiomatic proposition that modern transportation conditions require more painstaking attention to the car wiring than the makeshift methods of not so many years ago. It is safe to say that the car-wiring specifications of the future, if they are to be considered complete, will call for heavily insulated and protected flexible stranded cables of ample capacity to be carried in conduits, either of iron pipe, wood or fire-resisting composition; all cables to be located inside the car, so far as possible, and to be protected by suitable bushings where the cables enter and leave the conduits. For especially heavy equipments, a fire-resisting lining under the bottom of the car floor framing, and particularly over the resistance boxes, offers an additional and commendable protection.

Electric Railway Service and Technical Graduates

At this time of the year, when so many technical graduates are seeking for the first time positions in the industrial field, it is interesting to consider the opportunities which electric railway service offers to the man who desires to specialize in rapid transit work. It is to be feared that in many quarters the impression prevails that electric railway work is a short cut to affluence, and that individual progress in it is faster than in any other branch of the engineering industry. Seldom does the enthusiastic graduate stop to realize that the great bulk of transportation work, both steam and electric, is compensated by wages instead of salaries. There is always a certain leveling tendency in established engineering enterprises which expresses itself in a demand for routine work and which results in the employment of a large number of men whose training and compensation cannot in the nature of things

equal the qualifications and rewards possessed and enjoyed by the executives and heads of departments. In electric railway work we find no exception to this tendency, and the heavy pressure brought to bear to keep operating expenses down often renders regular and substantial advances in salary exceedingly slow.

If the graduate of this year is unwilling to take up any line of work in which he cannot expect quick profits and rapid advance into responsible positions, electric transportation has little use for him. If the Saturday half-holiday and the nine to five hours of the rest of the week are unto him a necessity, the operation of a modern rapid transit system is something to be let severely alone. A bank or a Government office will supply the desired environment far better than the electric railway, with its frequent emergency calls, night or Sunday work on rush propositions, forgetfulness of office hours and a generally strenuous life. The handling of from half a million to a million passengers per day in the restricted and congested area of the modern large city is no kid glove affair, and the gigantic pressure of the public desire for rapid transit often leaves little time for the golf links.

Granted that a graduate of ability, force and persistence enters such work with his eyes open to the probability of a long period of apprenticeship at moderate pay, it still remains true that few if any branches of engineering offer greater possibilities in the long run than does electric transportation. Remarkable as have been the developments of the past quarter century in this field, the future unquestionably holds work in store which will dwarf the achievements of to-day, as modern successes overshadow those of the early 90's. The application of electricity to certain operating phases of steam railroad work is virgin soil in this country as yet, although the beginning of a mighty development is close at hand. Real rapid transit has as yet been but slowly developed in the larger cities, considering the ever broadening requirements of increasing population and traffic density. The harmonious unifying of through transportation facilities on interurban railways has still to be worked out in a satisfactory manner, and the standardizing of electric railway freight business is a long way from realization. In the department of motive power and machinery, the evolution of the steam turbine and the commercial adoption of the alternating-current motor open up possibilities in the design and operation of power plants and rolling stock radically different from previous work, while the more gradual development of the gas engine offers many interesting and revolutionary opportunities. The improvement of repair shop design and methods, adoption of motor-driven machine tools, and the study of new types of cars specially adapted to the quick loading and discharging of passengers, are all progressive steps leading to a still higher development of the efficiency of the transportation machine as a whole. Finally, the improvement in auditing methods, which marks the more recent progressive administrations of electric railway properties, points to the greater realization on the part of the officials of the importance of saving time and money through the prevention of unnecessary waste in every department of the industry. Perhaps there is no line of railway work in which keen analysis counts as much as it does in this. The electric railway needs the technical graduate, and to the man who realizes its developing possibilities and makes the most of opportunity, it offers an exceptionally interesting career, which in many cases will not be destitute of adequate ultimate reward.

The Value of Technical Training

Apropos of this subject, that of the recent graduate, a recent address by William Barclay Parsons before a convention of teachers lays beautiful emphasis upon the acute need for manual and technical training to meet the requirements of modern life. It is a subject upon which it would be hard to lay too much stress. The basic idea which Mr. Parsons used as his text, so to speak, was the change of manual to mechanical operations in modern civilization. A hundred years ago machinery, save of the simplest sort, was practically unknown. The operations of daily work were not complex, and the manifold elaborate trains of manufacture had not appeared. At the present time all that is changed, and there is hardly to-day a man, in city or country, who does not daily come into necessary contact with somewhat intricate mechanisms. Trades, for the most part, are no longer handicraft, but machine craft, and the best workman is not he who can use a plane or a chisel, a bit or a file with the truest hand, but he who can most skilfully set the tools and adjust the cut on a machine which will do ten men's work. The gain in efficiency brought about by such a change is enormous, but to make the most of it, it becomes necessary to train workmen how to use the new and complicated tools with which they have to deal. A carpenter, in the modern sense, must not only know the tools of a hundred years ago for the occasional necessities of their use, but must learn how to work with a dozen kinds of labor-saving machines, big and little, and the other trades are, with few exceptions, in the same case.

A first-class craftsman, therefore, must know machines and their uses, and, moreover, he must understand the principles of their use, else they will become his masters instead of his servants. A man who merely learns how to run a machine is in a sorry plight if anything goes wrong or if he has to change to another job. One of the greatest current labor problems is how, under modern conditions, to preserve the laborer's initiative and to make him something of more vital possibilities than the steel and brass structure of which he has become a component part. And the only way to free him is to so instruct him that he can at an hour's notice master a new machine and become an expert at operating it in a day or two. The man who is familiar with a dozen automatic machines has greater resources than he who merely knows the hand tools of a century gone. But this new facility implies a broader and more thorough training than of old, and the necessity of acquiring this is obvious. The old methods of training have gone with the old methods of work, and our main industrial difficulty is that new methods of training have not come in to take their place. To be sure, we have in this country many technical schools, but they do not turn out, nor are they intended to turn out, skilled craftsmen. With few exceptions, they are engaged in training men for the more responsible, but less needed, work of the engineer. One cannot decry the training of engineers, but the men from engineering schools are training themselves to escape the very kind of work that the world must have in large amounts. Their ambition is laudable, though it does nothing in supplying the demand for skilled labor as such.

The trade school, in one form or another, must come to help the world out of its difficulty. It is as legitimate a sequence of the age of machinery as the apprentice system was of the age of handicraft. There are those who grieve that the old methods of labor are gone, but the world must leave them with their lamentations and make the best of the changed conditions.

There may come a change of vision when the present order of things will have disappeared, but until it comes one must meet the problems of to-day. We need trade schools where skilled workmen can be trained to take their places in the world's industrial programme, and we need them very badly and at once. How much of the millions that have been given for education in the past decade has been devoted to the uplifting task of bettering the workman's condition? We do not grudge the beneficence that has fallen to the lot of existing institutions, for knowledge is desirable in and of itself, but the sum that provides chairs of Ashantee philosophy and Thibetan ethics for the benefit of half a dozen be-spectacled collegians per year would help in making a hundred young workmen steady and efficient, fitted for better places in the world. And just at the present moment the world needs first-class craftsmen much more than it needs students of the occult. Abroad, the current necessity has been felt as forcefully as here, and already something has been done, but with us there is apathy in this phase of education. We have manual training of a purposeless sort in the public schools, and some workmanship finds its way into the crannies left among theoretical studies in the universities. Between these two there is woefully little. From prejudice or false pride there are few schools instituted frankly for the purpose of training the workmen who shall become the motive power of the world's industry, and ten such are needed for every university to preserve a just balance of the necessities.

Train Despatching and Red Tape

Red tape usually comes under the head of a necessary evil, to be avoided as far as possible, but if there is any one place where it is justified, it is in train despatching on an interurban road. The principal argument that advocates of a telegraphic train-order system urge against train despatching by telephone is the informality of the telephone method and the fact that the recipient of a telephone message is not necessarily a person of as much training and responsibility as a telegraph operator. We are inclined to think that there is some ground for this objection, in that the greatest weakness in interurban despatching at the present day is a certain lack of formality and discipline. The familiarity which sometimes is painfully evident in the conversation between despatchers and conductors and motormen operating cars over the line is not conducive to care in giving or receiving orders. If there is one thing that a despatcher should studiously avoid, it is such familiarity shown, either by himself or by his assistants. It is at best difficult to educate motormen and conductors in the short time available to train them in their duties, and it is very unfortunate if the younger men acquire from their more experienced fellow trainmen habits of carelessness in receiving train orders. As stated at a recent Indiana convention, the interurban roads of the country have all sorts of systems of despatching. It can be said to the credit of the business, however, that practically all of the important interurban roads have despatching systems which approach those of steam railroads in efficiency if carried out according to rules. The principal points upon which different interurban roads differ is in the mode of receiving orders from the despatcher and in the frequency with which trainmen must report to the despatcher. Some roads insist on trainmen taking written orders at all times; others require written orders only under certain conditions, while others require none at all. Some insist that the orders should be taken by the motorman in writing and should then be read back by the conductor. Others require them to be simply repeated back by the motorman who receives them. In fact, all sorts of variations between these two extremes can be found. The requirement that crews should report for orders with unnecessary frequency can hardly be called a formality which adds anything to the efficiency or discipline of the service. It is better to have crews report for orders as infrequently as is consistent with the successful operation of the road, but when they do report, it is well to make the receipt of an order a matter of sufficient formality so that the motorman and conductor are sure to understand it and realize its importance.

The Right of the Road

We have, from time to time, half in sport and half in earnest, alluded to the automobile danger as bearing upon electric railways, their rights and immunities. Now, in fact, the thing to which we directed attention is coming to pass, and we are continually hearing of automobile routes about to be established across country. The ordinary private automobile is in no proper sense a competitor of the trolley car. It is in about the same category as the so-called "public" coach "tooled" by J. Algernon Chappie for the amusement of others of his kind. But the public automobile, carrying a dozen or twenty passengers and operated for profit, is quite another matter, since it is very likely to gather in a very considerable amount of profitable tourist traffic. How well it can be made to pay is dubious, and perhaps the wholesome effect of experience may be felt after a season or two, but the thing here material is that injustice by which the street car, which is a safe and peaceable tenant of the edge of the highway, is subjected to severe regulations as to speed, while the public automobile, which is, from its huge bulk, a menace to every other vehicle on the road, is given the long end of the bargain. The tourist automobile is of no use whatever to the public that owns the highways which it abuses; it is merely an apparatus for the conversion of public property to private gain without compensating benefits. A trolley line is of use locally, but this coming nuisance of an automobile line is quite otherwise. It is of value practically only as a money getter to its owners, and contributes nothing whatever to the up-keep of the roads which it destroys, save in its local habitation. It certainly should be made rigidly to adhere to local speed regulations and should be subject to a round license fee in every town whose roads it batters, open to revocation for abuse of its privileges. It should in no wise be allowed to escape the restrictions imposed upon public vehicles that run upon and keep in repair their own tracks.

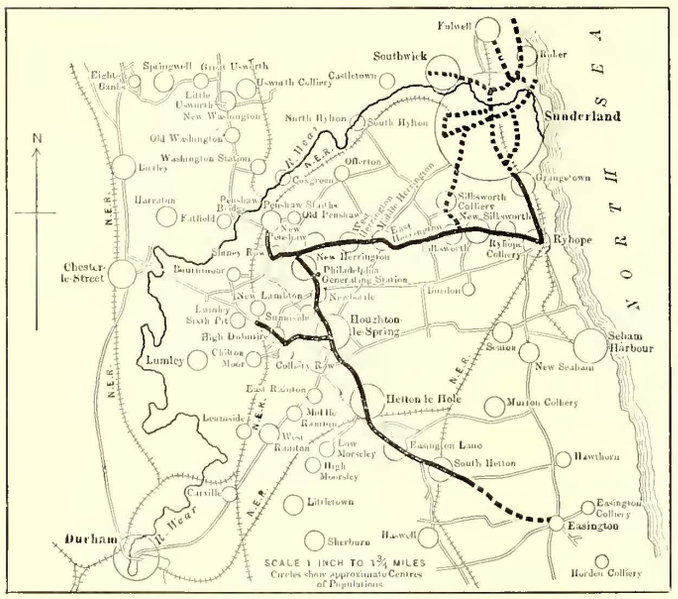
Grease vs. Oil Lubrication

Judging from the discussion at the Lake George convention, and also from the answers received for the Question Box, the grease question is a thing of the past. So nearly unanimous are the opinions, the conclusion is warranted that the use of oil is practically supplanting the use of grease for lubricating armature and axle bearings. The only question now open for discussion is as to a suitable form of oil cup that will provide for ample lubrication while the car is in motion, but will cut off the feed of oil when the car is at rest. In the various forms of cups described, the feeding is accomplished by modifications of wicks, felt, piston, ball and other forms of valves, rotating discs, etc., but none of the forms suggested seems to meet with unanimous approval. Here appears to be a good opportunity for the overworked inventor to turn his mind for a while from the study of car fenders and non-refillable bottles and devote his attention to designing a suitable oil cup for motor and axle bearings on electric cars.

THE SUNDERLAND DISTRICT TRAMWAYS

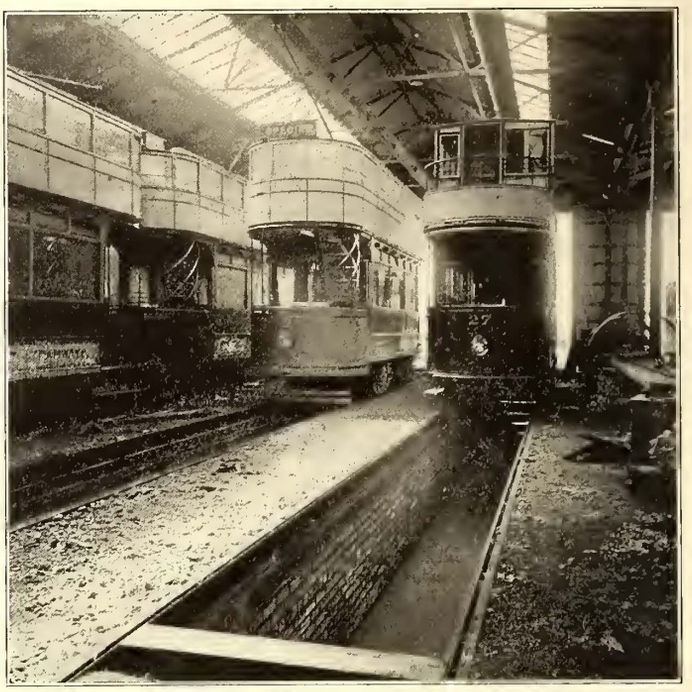
The majority of the large cities in England are now so well equipped with tramway systems that keener interest may be said to center on the exploitation of traction facilities in the less heavily populated districts. Naturally, the constructional and operative methods which must be adopted on such systems differ largely from those suited to cities in which the returns per mile of route are such as to warrant much larger capital expenditure.

The Sunderland District Tramways, which have lately been placed in operation, are an excellent example of a system constructed to meet efficiently the needs of a population of only moderate density. These tramways run from the outskirts of Sunderland, where they connect with the Corporation system, through a large number of small towns which have been practically neglected by the railroads, and among which the means of transit have consequently been of the worst. As will be gathered from a glance at the map, collieries form the main source of occupation in the neighborhood, and the crying need for conveyance between the miners' homes and the various pits was doubtless a factor in the movement which culminated in the formation of the Sunderland District Tramways Company, Ltd.

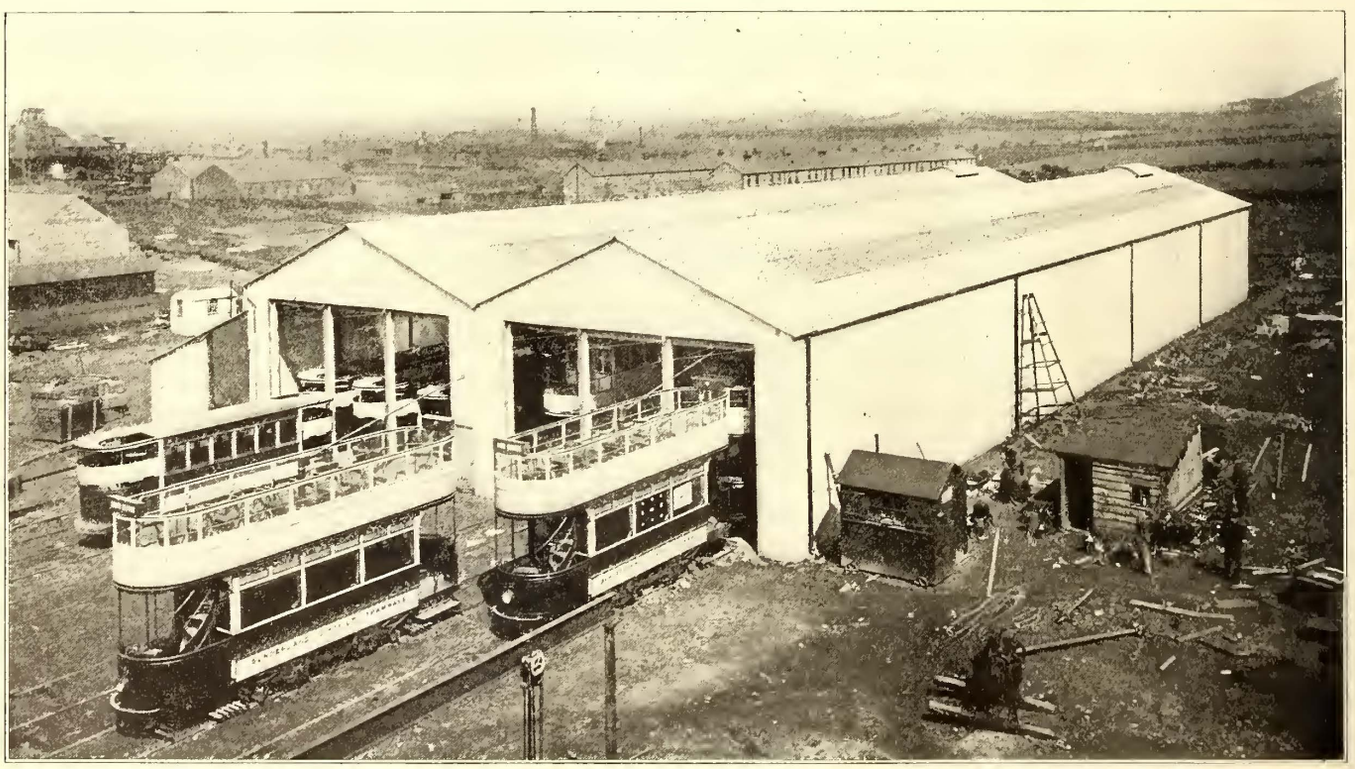


Map of the Sunderland District Electric Tramways.
Sunderland District Routes shown thus ——
Sunderland Corporation Tramway ----------

TERRITORY COVERED BY THE SUNDERLAND TRAMWAYS



A VIEW OF THE CAR HOUSE INTERIOR



GENERAL VIEW OF THE CAR SHEDS, POWER HOUSE, ETC., OF THE SUNDERLAND DISTRICT TRAMWAYS

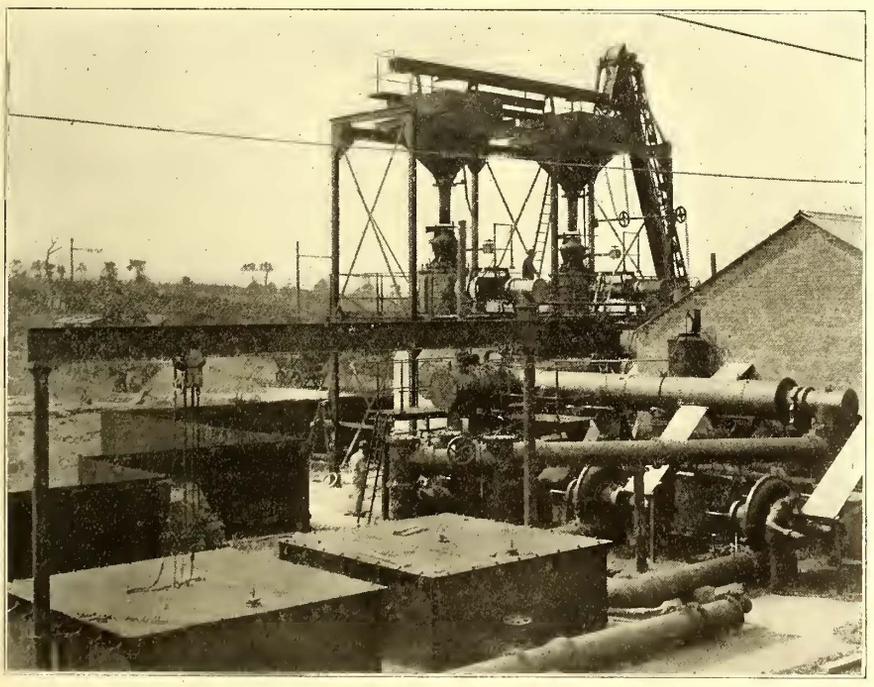
In 1904 the entire contract for the electrical and power equipment of the system was let to Bruce Peebles & Company, Ltd., of Edinburgh. Bruce Peebles electrical apparatus is accordingly employed throughout.

The total route mileage of the system comprises about 17 miles of single track. With the exception of turn-outs, there

is no double-track work on the route. The type of track construction varies in different parts. In the towns and places where the traffic is heavy, city railway construction is adopted, the whole space between the rails and 18 ins. outside being paved with Whinstone setts 5 ins. deep x 4 ins. broad x 9 ins. long. On the less busy portions of the route light railway construction has been adopted, the paving in this case being 9 ins. on each side of the rail. The rails are of the girder type, 6½ ins. in depth, weighing 90 lbs. per yard; they are butt-jointed and secured with steel fish-plates 24 ins. long, weighing 40 lbs. per pair. In tramway construction, mild steel tie-bars 5 ft. long over all x 2 ins. x ⅜ in., screwed ⅞ in. at one end and notched at the other end, are used, spaced 9 ft. apart, except at the curves and crossings, where they are spaced 6 ft. apart. In the light railway construction, on the other hand, the spacing is all 6 ins. At every joint, copper anchor joints 2 ft. long are fitted to the rails by 12¾-in. rivets and at the center of each rail 2¾ ins., holding down bolts 6 ins. long, are used to prevent hogbacking.

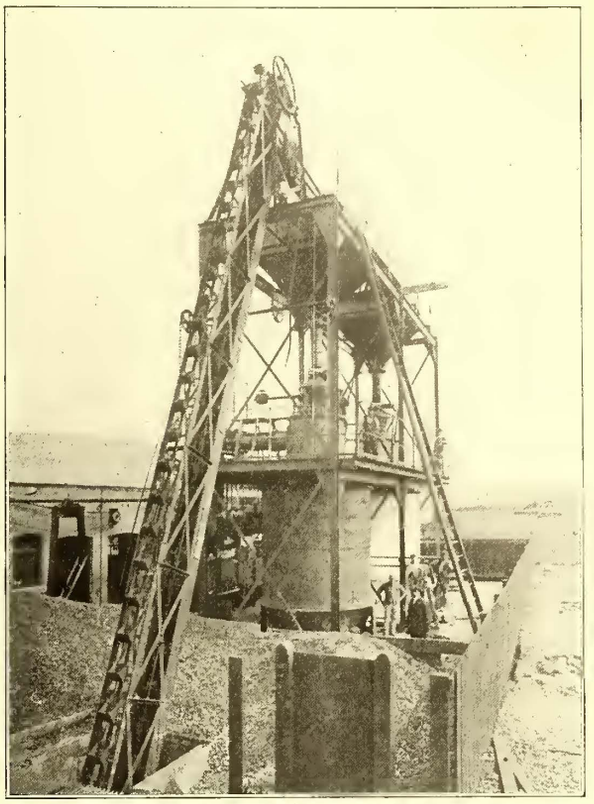
The rail-bonds are of sectional area No. 0000 S. W. G.; cross-bonds are provided at intervals of 120 ft., and all points and crossings are double-bonded. The resistance of track per mile is under .015 ohm. All points and crossings are of toughened cast steel, with manganese steel tongues of the spring type. The points are 6 ft. 6 ins. long, and have an angle of 1 in 7½.

A general view of the car sheds, power plant, etc., is shown on page 96. Nearby is a Mond gas generator, which supplies producer gas for the power station. This plant includes two producer units, together with the necessary subsidiary apparatus, such as gas cleaners, governor, coal-handling plant, etc. The producers are of cylindrical shape, and consist of internal and external wrought-iron shells; the blast, which is delivered by a Roots blower, enters the external shell near the top and passing downward becomes superheated before passing into the combustion chamber through the grate. The fuel bed is kept at a constant level by an internal bell which connects directly with the hopper; poking holes are provided, so that the whole of the fuel bed can be reached and if necessary stirred without any appreciable escape of gas. By means of a water seal the ashes can be withdrawn at any time while the producer is in operation.



THE POWER GAS GENERATING PLANT OF THE SUNDERLAND DISTRICT TRAMWAYS

The gas from the producers passes straight into the mechanical washer, where it comes into contact with water thrown up in a very fine spray. This removes the dust and at the same time causes a considerable lowering of temperature.



FUEL CONVEYOR USED IN CONNECTION WITH GAS PRODUCERS

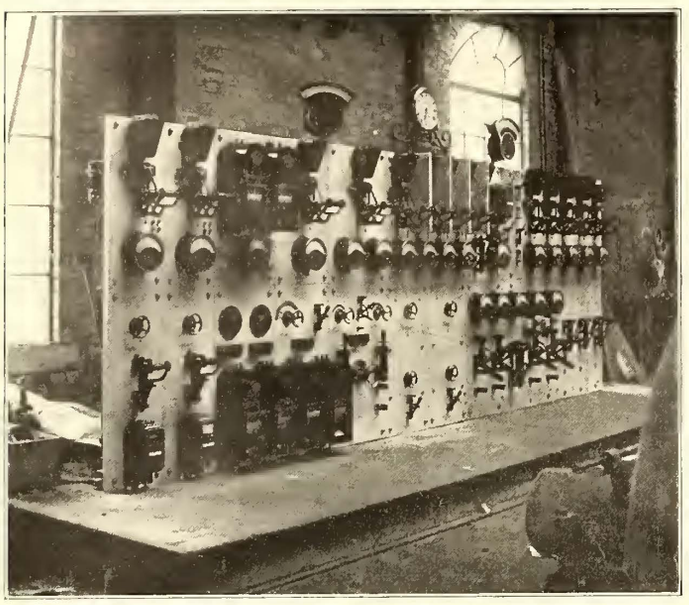
Any tar or other impurity that may still remain in the gas is removed by passing it through a specially constructed fan and finally through a sawdust scrubber. The plant is entirely automatic in operation, being fitted with a governor, which, in conjunction with the blower, accurately controls the production of the gas as it is required. The coal is fed into the bunkers by a bucket elevator and screw conveyor capable of dealing with 5 tons of coal per hour. The steam required for the operation of the producer is raised in multitubular boilers heated by the exhaust gases from the gas engines. Besides supplying the necessary moisture in the producers, the steam is used to drive two small single-cylinder engines belted to fans. A supplementary boiler, coal-fired, is provided as a standby and for initially starting the plant. By this plan it becomes unnecessary to use extra coal for steam raising, and a maximum economy is secured.

At the side of the yard opposite to the producer stands the power house and office building. The offices of the tramway are on the first floor above the battery room, while the generating plant occupies the other end of the building. The two gas-driven sets are of 210 bhp and 330 bhp capacity, respectively. The engines are of the Crossley Brothers two-cylinder vis-a-vis type, specially constructed for working on producer gas; the larger one has cylinders 25 ins. in diameter x 30-in. stroke, and runs at 150 r. p. m., while the smaller has cylinders 18½ ins. in diameter x 27-in. stroke, running at 190 r. p. m. Both machines are, of course, fitted with heavy fly-wheels to

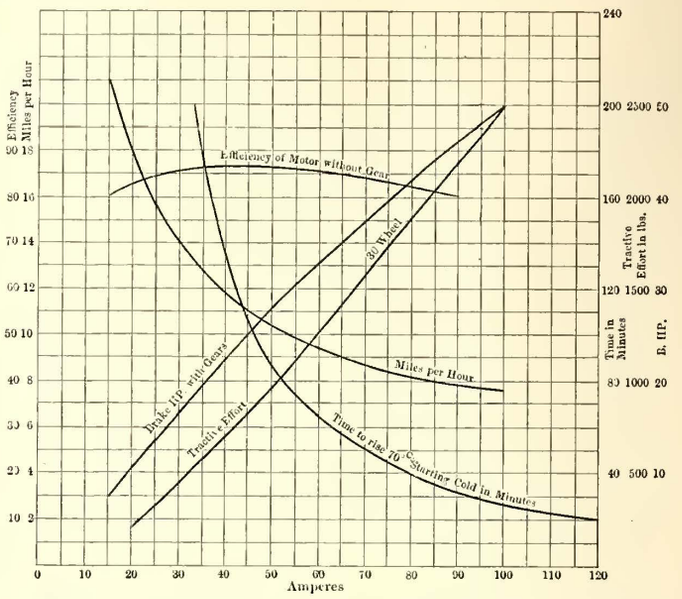
smooth out the cyclic irregularity common to gas engines, the fly-wheel of the larger engine being 11 ft. in diameter x 26 ins. wide, and of the smaller engine 9 ft. in diameter x 22 ins. wide. Electric ignition is used and duplicate igniters, which can be fed from the dynamos driven by the engine, are supplied as a standby. The larger engine has balanced and water-cooled exhaust valves, and also water-cooled pistons. Both engines have been specially designed to make the wearing parts as easily renewed as possible, with a view to reducing the cost of upkeep. The pistons are made with loose liners, which when worn can be easily withdrawn and renewed at small cost, and the pistons of the in-running cylinder are fitted with slipper guides to take up any wear that may occur. The side shafts of the engines which carry the cams for operating the different valves are driven by steel machine-cut scroll wheels, each engine having an independent side shaft and governor. The engines are started by compressed air, the compressor being driven by a small Crossley gas engine. Hand-barring gear is, of course, provided for each engine.

The generators are of the multipolar type, of output corresponding to that of the gas engines by which they are driven. Both machines have six poles, and are compound wound for 500-550 volts. The machines are of very generous proportions for the output required and the overload capacity is very large. The cables between the generator and the switchboard are of the St. Helen's Cable Company's manufacture, consisting of "Dialite" dipped in fireproof compound. The switchboard, which occupies one side of the power house, consists of fourteen panels, arranged as follows: Two generator panels; one standard Board of Trade panel; two automatic reversible battery booster panels; one line booster panel; one track (negative) booster panel; one car shed feeder and negative feeder panel; one station lighting and track return panel, and five positive feeder panels.

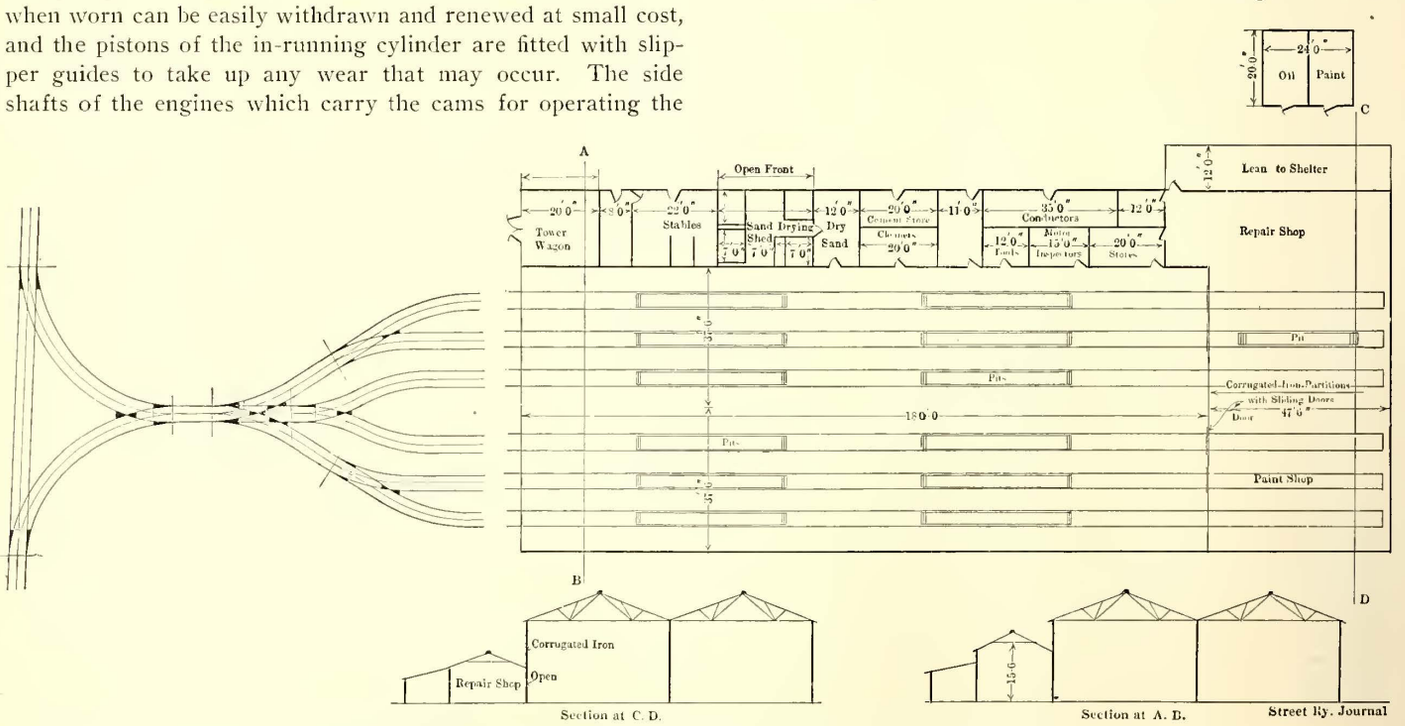
The panels are of Sicilian marble, mounted on an angle steel frame, neither woodwork nor other combustible material being used in the construction. Two of the positive feeder panels are fitted with throw-over switches, so that they can be connected to the line booster if desired. On the top of the switchboard, mounted on swivel brackets, are two illuminated dial



SWITCHBOARD IN POWER STATION OF SUNDERLAND DISTRICT TRAMWAYS



PERFORMANCE CURVES OF STANDARD DIRECT-CURRENT MOTOR USED ON THE SUNDERLAND DISTRICT TRAMWAYS



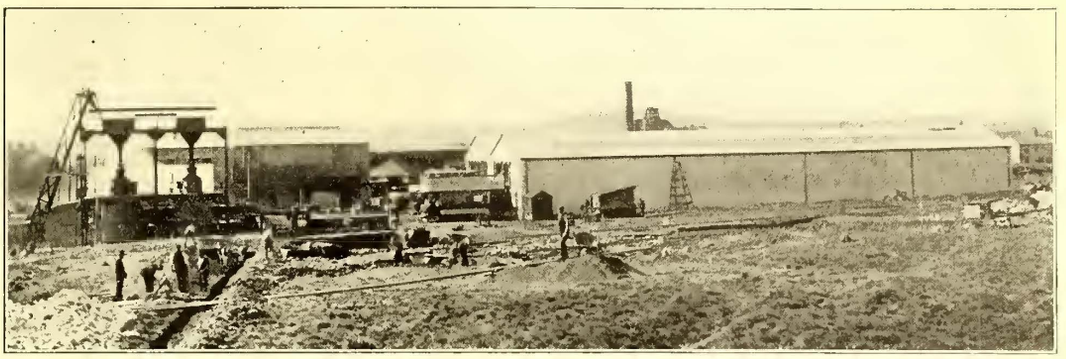
PLAN AND SECTIONS OF SUNDERLAND DISTRICT TRAMWAYS CAR SHED, SHOWING TRACK ARRANGEMENT AND LOCATION OF TOWER WAGON, STABLES AND DRYING SHED, REPAIR SHOP, ETC.

voltmeters for bus-bar and generator volts, respectively, and a non-magnetic clock in neat wrought-iron scroll is fitted in the center. The instruments are of Kelvin & James White's manufacture.

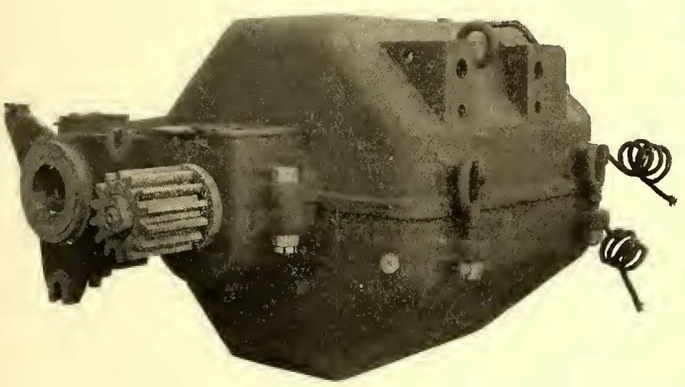
There are in all seven positive feeders, of which two are boosted. The positive booster will give any current from 0 amp. to 430 amps. at any voltage from 5 volts to 35 volts. The motor is shunt wound 500 volts to 550 volts, and direct coupled to the dynamo. There are two negatively boosted feeders, these being worked together by motor-driven set, which is a duplicate of the positive booster. In addition to the above, there is an automatic reversible battery booster working in connection with a battery of 264 Tudor cells, the capacity of the battery being 480 amp.-hours.

The cables were manufactured by the St. Helen's Cable Company, and are of its "Dialite" insulation, laid in wooden troughing and filled in with bitumen. On the whole system there are seven positive feeding points, the cables for these being .3 sq. in., and two negative feeding points, the cables being .5 sq. in. in section.

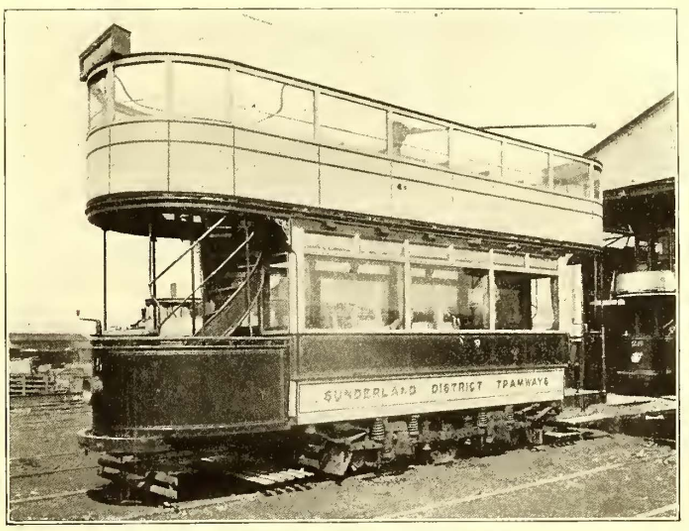
The car shed, of which a plan is reproduced, is constructed of corrugated iron on steel framing and combustible elements are entirely absent in its construction. As will be seen, it has six tracks, and the car shed proper has accommodation for five cars on each track, or thirty in all. In addition to this, the repairing and painting shops at the back of the car shed can accommodate another six cars. The rolling doors at the entrance to the car shed were supplied to the order of Bruce Peebles & Company, Ltd., by the Lift & Hoist Company, of Deptford. There are the usual pits on each track in the car shed for examination and repairs.



VIEW SHOWING LOCATION OF GAS PRODUCER PLANT IN FRONT OF THE CAR SHEDS



TYPE OF 35-HP RAILWAY MOTOR USED BY THE SUNDERLAND DISTRICT TRAMWAYS



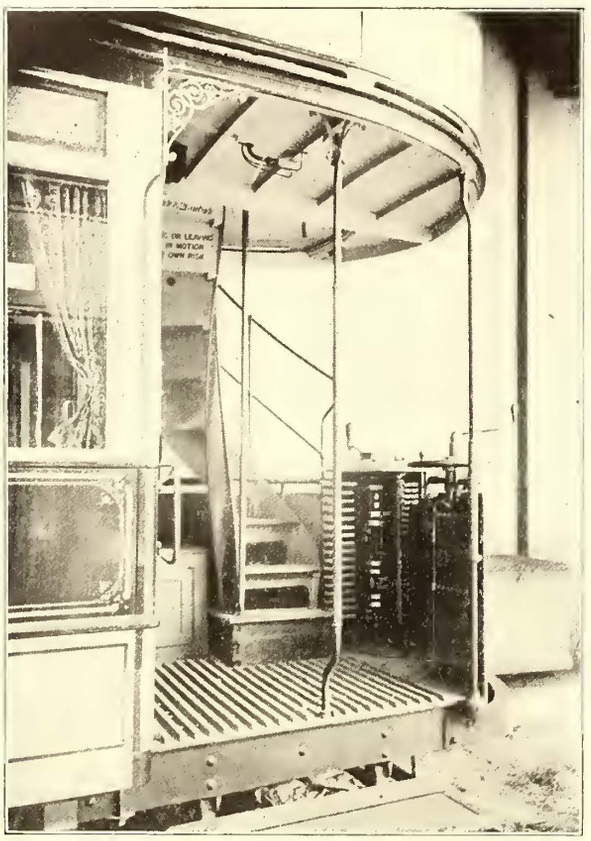
SUNDERLAND DISTRICT TRAMWAY DOUBLE-DECK CAR FITTED WITH WIND SHIELDS

A TRACK SWITCH IN SUNDERLAND, SHOWING ALSO THE TYPE OF OVERHEAD CONSTRUCTION

The cars, which were supplied by the main contractors, are thirty in number. The bodies and trucks were supplied by the Brush Company, the trucks being of its standard type with 6-ft. wheel base, and fitted with hand and slipper brakes. Each car is constructed to carry forty-six passengers, of which twenty-two are inside, and is 6 ft. 6 ins. wide. As will be seen, this car is fitted with wind shields on the upper deck, 4 ft. 6 ins. in height, and of a type which the Brush Company has lately supplied to several other tramway systems.

The electrical equipment of each car consists of two 35-hp Peebles type-S tramway motors and type-B controllers. These motors weigh approximately 1 ton, complete with gears, and are suspended by means of spring-supported suspension bars bolted to the frame of the motor. As will be seen from the performance curves, the motor is of ample power for driving the cars, even considering that there are several very long and heavy grades on the system. Its construction is of the type which has been practically standardized, comprising an exter-

nal steel case horizontally divided and forming a water-tight casing for the entire motor, having four poles projecting inwardly, carrying the series-field coils. The armature has been designed with small fly-wheel action in order to reduce the waste of power which occurs in destroying the momentum of the armature each time the car is pulled up by the brakes. All



ARRANGEMENT OF STAIRWAY TO UPPER DECK OF SUNDERLAND CAR

the usual details of equipment are fitted, including lightning arresters of the Garton type, circuit breakers, fuse blocks and E. P. D. earth indicators. The trolley standards are of Brecknell, Munro & Rogers type. The controllers have five series and four parallel notches for power, and seven notches for the rheostat braking. Special attention has been paid to the rheostatic braking, owing to the liability of a motor to flash over to the case when acting as a generator, and any trouble from this source has been avoided entirely. Hudson-Bowring lifeguards are fitted on all the cars.

The overhead equipment consists of 30-ft. poles of light type used on straight runs, with medium type on all curves and heavy type for anchor poles, the poles being all tested to conform with the requirements of the British standard specification for tubular tramway poles, issued by the Engineering Standard Committee in August, 1904. The trolley wire is of hard-drawn copper No. 0000 S. W. G., the span and pull-off wires being No. 7-14 S. W. G. The insulation throughout is "Dirigo." The telephone and pilot wires are for the greater part of the route carried overhead on insulators.

The section boxes are fitted with porcelain switch fuses, quick-break switches, lightning arresters, etc. The accompanying illustrations show the back and front of a standard section box, from which will be seen the arrangement of the incoming feeders and the leads to the overhead wire and lightning arresters, fuses, etc.

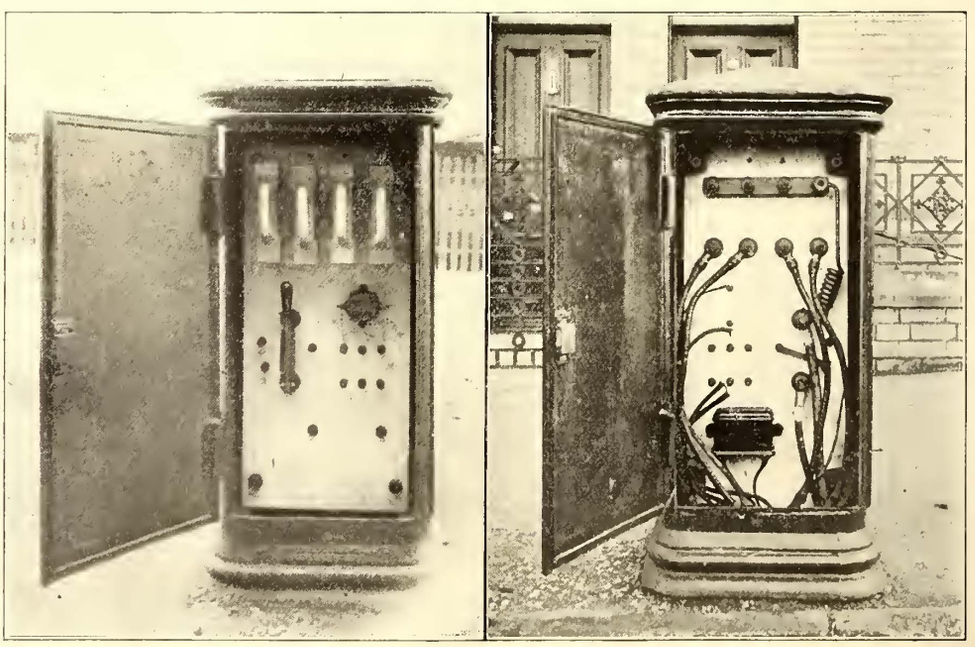
R. D. McCarter, who is well known as manager of the Bath Tramway system, is acting as general manager of the Sunderland District Tramways. For the electrical part of the work the consulting engineers were Harper Brothers and Handcock & Dykes, both of London. David Balfour & Son, of Cathedral Buildings, Newcastle-on-Tyne, acted in a similar capacity as regards the civil engineering work.

A CASE OF MISTAKEN IDENTITY

A curious incident, in which one of the starters of the Boston Elevated Railway Company figured prominently, occurred during President Roosevelt's recent visit to Cambridge, Mass. As the presidential party was passing the transfer point where the starter is stationed it naturally occurred to the latter to salute the Chief Executive, and he did so, raising his hand to his cap. Unfortunately, the starter's hand carried a transfer punch, which gleamed in the evening light like a revolver, and the moment the salute was given the mounted sleuths of the Secret Service gave chase and attempted to ride down the astonished street railway man. A moment's explanation cleared the atmosphere, and the procession wended its way rejoicing. Question: On whom was the joke?

THE ELECTRIC RAILWAY IN ROME, ITALY

The ancient city of Rome is enjoying a considerable growth in its rapid transit facilities, the present lines aggregating about 30 miles. The city is circular in shape and has an extreme diameter of 3 miles. Two suburban lines are now nearing completion, one of which will run through the city to the Alban Hills and the other to Civita Castellana, each about 20 miles long. The power for operating both the city and suburban railways is obtained from a hydro-electric plant located at the Tivoli waterfall, near Rome. The overhead trolley system is standard throughout. The number of passengers carried on any one year on the city lines exceeds 25,000,000; the number of cars is about 150, and over 1000 men are employed.



FRONT AND REAR VIEWS OF PANEL IN JUNCTION BOX

PROCEEDINGS OF THE LAKE GEORGE CONVENTION

In the last issue were published the proceedings for the first day of the twenty-third annual convention of the Street Railway Association of the State of New York, held at Fort William Henry Hotel, Lake George, N. Y., June 27 and 28. The proceedings for the second day are published herewith:

WEDNESDAY'S SESSION

President Allen called the meeting to order at 10:10 o'clock a. m.

The President—I will appoint as the committee on nominations H. M. Robinson, of New York; H. J. Clark, of Syracuse, and J. E. Stephenson, of Buffalo, who will report nominations for officers for the ensuing year.

UNIFORM STANDARDS FOR EMPLOYEES

Dr. F. H. Peck then read a paper on "Uniform Standards of Examination of Railway Employees." This paper was published in the issue of the STREET RAILWAY JOURNAL for July 1.

Dr J. J. Higgins, of the New York City Railway Company—In outlining the examination made of applicants for employment by the New York City Railway Company I should describe them substantially the same as Dr. Peck has described them. The only thing I have to say in regard to the paper is that in New York where we need so many men, we do not get enough men to permit us to inforce the regulation of perfect eyesight. We find hard work in securing men with perfect vision, and so we pass a man with a fraction of vision of 15-20 for new men, and for the old men who have been driving horse cars we pass them at about 12-20. We have a special advantage in New York in our facilities for watching our men, because, after they have been passed as motormen, in two or three months they are re-examined when they become applicants for admission to the benefit society of which I have charge. In this way we are able to keep track of our men all the time; and during the last eight years I have been medical examiner for the road and have also taken care of the men when they are ill.

A feature in the examination of men which Dr. Peck has not spoken of in his paper is the range of vision and also the field of vision. The roads in New York City find side vision of great importance, because most of our accidents come from persons running into the cars, not coming from a distance, but the people who run off the sidewalk and run into the cars, and it is important that a motorman should have good side vision in order to avoid such accidents. If a man is blind in his right or left eye, he cannot see people coming from that side of the street toward the car, so that it is important that a man be able to see on both sides. It is also important that he should not be far-sighted. A man may be able to read correctly at 20-20, but will not be able to read small print at 10 ins. or 12 ins. from him.

In regard to the tests for color blindness, our tests are the same as those described by Dr. Peck. The great difficulty in examinations for color blindness is the stupidity of the men under examination. Men will actually tell you that they do not know what the color green is, although they will match it up all right. Many of the men are very sluggish. Many of the men who apply to us for positions come from the country, and many of them are foreigners, but I cannot say which are the more stupid, the fellows from the country or the foreigners. I sometimes think the country-born natives are greener than the foreigners. You have to use a good deal of discretion in color examination.

In regard to hearing, that is also a very important thing. I think hearing is very necessary, especially ability to hear conversation. The acuteness of hearing in detecting sounds from a watch or tuning fork, is not so important as the ability to hear conversation. It is really remarkable, however, how some of these men become educated to the ring of the bell. We had several years ago a driver on one of the roads in New York who could not hear a word of ordinary conversation. The superintendent told me the man never had an accident; the superintendent did not know that the man was deaf. That fellow became accustomed to the vibration of the ringing of the bell, whether because of the jar of the car through his feet, or how, I cannot say, but he always heard one bell or two bells, yet he could not hear ordinary conversation at 12 ft. or 5 ft. He was practically deaf.

In regard to physical examinations, as to rupture and things of that kind, there are very few men who are perfect—very few indeed. I believe there has been one perfect man discovered, named Ross, in the University of Chicago. There are very few men but have some deformity. In regard to ruptures, no man should run a car without a truss. If he has a good fitting truss he can run a car all right. As for the heart and lungs any man with a bad heart is dangerous. The thing we have difficulty with are the fellows who drink and get up with acute indigestion in the morning. They will collapse in the car, and they are the fellows who are most dangerous of all. The fellows who have ruptures and things of that sort always look after themselves. A lot of men pay me to act as their medical adviser. Of course, it is an advantage to the company to have the company doctor look after the men, but the men are also benefited, because if they are not able to run their cars and their strength gives out I am able to give them tonics and advice through which they can build up their strength. I am, of course, expected to keep the company protected as well as the men themselves. It is for the good of all concerned that the health of the men should be maintained.

One thing I want to say, and that is, that no man under 150 lbs. in weight should be appointed to the front end of a car. Nearly all men weighing from 135 lbs. to 150 lbs. have petered out and want to be changed to the rear end, or something else. As to the age limit, I think that most of these men should be at least 23 or 24 years old. They have reached their maturity at that time, and very few men over 35 years old should be broken in as new motormen. How long they are able to work on the front end of a car depends entirely on their mode of living.

As to re-examination, I think these men should be re-examined every five years, and after all acute diseases and infectious diseases, such as scarlet fever and typhoid fever and things of that kind, there should be a re-examination before they are put on a car. In the way we have it arranged for in New York, it is only a matter of a few seconds to examine them before they are returned to work. One of the troubles we have in New York from eyesight difficulties are the men who have opacity of the corona, which frequently comes from cinders blowing into their eyes, of which there were many cases when the elevated railroads were operated by locomotives. They would get a little cinder from the elevated road and that would practically blind them. It practically puts them out of business, and that is what causes us considerable trouble. The eyesight of the men, after they have worked five years, most of them, remains very good indeed, and there are very few of them thrown down unless they have had some serious illness.

Dr Albert B. Van Vranken, of the Schenectady Railway Company—There are one or two points that I might mention, and one of them is in connection with hearing. You will often find a man whom you believe has poor hearing, but he will simply have some wax in his ears. That is one point we should look after.

In the matter of re-examination I believe every man should be examined at periods of less than five years after he goes on the road. I remember a case we had about two years ago where a man was in our employ and left to go in the employ of a road in the West. He returned to Schenectady and sought a

position again upon our road. He was subject to re-examination, of course. I examined him and found that one eye was practically blind. After telling him there was no possibility of his having employment upon the road, I asked him frankly to tell me what the trouble was. He said he had received a flash two or three months previously, and had had a great deal of trouble with his eye. We are not troubled so much with cinders as we are by eye-flash ills. Many of our men have this flash, and that seems to cause a contraction of the corona of the eye so that they are unable to see objects distinctly—the object will become distorted. If a man is on the front end of a car with an eye that way, and gets a cinder in the other eye, we have a man running the car who is practically blind, and all your safety devices amount to nothing. In reference to the physical health examination, as Dr. Higgins has said, a great many men can run cars who are not perfect men by any means. It is very hard to find perfect men. We should know, however, when a man goes on a car what the trouble with him is, and know all about him. If a man should meet with an accident before entering the service of the company and afterwards he was thrown out of employment, he might seek damages from the road for some trouble that he had received long before he entered the service of the company, and if we knew how his condition was when he entered upon the road then we would be in a position to fight and have some ground to stand on.

In the test for hearing, I believe we should eliminate entirely the sense of sight. The sense of sight and hearing are very closely connected. I generally stand behind a man, and either have a tuning fork or my watch in my hand, and I bring both hands up, with my arms extended full length from either side, and sometimes my watch is in one hand, and sometimes in the other, and sometimes in my pocket. The man being examined will say it is on the right or on the left side, and you can tell very easily if he is trying to cheat you. Another thing is, if you ask a man to put his finger in his ear he may only put it in half way. He may make the motion, but may not actually put his finger in his ear to close off the hearing. I always put my finger in his ear and then bring up the watch or tuning fork on either side, and sometimes it is in my hand and sometimes it is not.

I think the kidneys should be pretty well examined. I find that men who have had scarlet fever in their youth and have a small amount of albumen in their urine, the urine being of low specific gravity, suffer a great deal from backache and headache after they have been on the road for a little while. That is especially true of the men who run the small cars. The large cars do not seem to give them so much jolting. The heart, of course, should be examined. I think a man with an enlarged heart, or a heart in any way defective, should not be allowed to go on either the front or the rear end of a car. The lungs should be in fair condition, but if they are not absolutely normal a man can run a car all right.

In regard to the color test, I think many men are color ignorant. They can match the colors all right, but are unable to name them, or sometimes are very slow in doing so.

I believe if we had a uniform examination for all the street railway men in the State that it would be a great help to all of the roads. If a man for any reason, for family reasons, or what not, wished to change from one part of the State to another, and was examined, say, in Utica, and wanted to go to New York or Schenectady, or some other place, and had passed a proper examination one or two years previously at his former place, he could go to the next place and stand in the same relation as an old employee would upon that road in regard to physical examination; and if we had a uniform examination with numbers to indicate the rating, not using the words good, bad or indifferent, but actual numbers, these numbers being an indication of the rating of the employee, the numbers being standard throughout the State, then we could tell exactly his condition at the time of examination.

Albert Eastman, of the Public Service Corporation of New Jersey—Owing to the fact that we are generally short of platform men we have never been able to enforce as strict a physical examination as we would like to do. The hearing and eyesight test are conducted in my own office. I require the men to be at least 150 lbs. in weight. The only physical examination we apply is that based on appearance. We look the men over and if their physical appearance satisfies us they are passed. We have no medical examination and have not been able to adopt one. The age limit is between 21 and 40 years. Even with our apparently lax method of examining applicants, we are usually somewhat short of men. The proposition we have is entirely different from the smaller and suburban properties which most of the gentlemen present represent.

Dr. F. J. Ryan, of the Syracuse Rapid Transit Railway Company—Before discussing the subject of physical examinations, I would deem it advisable that a differentiation be made between the low and high-speed roads. In the case of the high-speed road, the question of velocity with which the car is passing along the highway—40 m.p.h. or 50 m.p.h.—the sameness of space and the uninterruption of the rays of the sun, have some effect on the visionary sense. The eye strain is greater than it is for a motorman who is running a car in the urban service, with the direct rays of the sun interrupted by the buildings, trees, etc., together with the fact that he is stopping here and there to let passengers off and let them on, and that he is busy escaping by an inch or two the unmindful pedestrian or the head-bent truck driver. The eye-strain is not so great in this case, but it requires more judgment than it does absolutely perfect vision.

Then, again, the color test should be more stringent in the high-speed roads than the low-speed roads, because of the necessity of observing color signals at night. In the urban service we do not use many lights, possibly one or two, whereas, in the high-speed roads several are used. As regards the hearing, I agree with the mode of examination outlined in the paper.

The examination of the lungs is quite important. It has been my experience within the last year or two to have been called suddenly to take care of one of our conductors who had fallen to the platform of our car stricken with pulmonary hemorrhage. Fortunately, the signal was given by a passenger to stop the car, the motorman stopped the car, and the conductor was removed to a place of safety and taken care of by a physician, and thus an accident was averted in that case. Had that occurred to a motorman when he was descending a hill, or at any moment of emergency, while the car was going at high speed, you can see the danger attending such an incident, possibly the loss of lives, or, at any rate, a serious accident.

With regard to the examination for hernia, it has been my experience within the last year or two to have been called to take care of two conductors whose ruptures suddenly came down, felled them to the floor and incapacitated them absolutely. Now, if such a thing should occur to a motorman in the moment of emergency, you can see the hazardous position the passengers would be placed in. The question of deformity must be left absolutely to the examining surgeon. It does not make much difference as regards service whether a motorman or conductor is minus a toe or a finger, but if any important member of the body is incapacitated then that precludes his admission as either a motorman or conductor.

The question of the use of alcohol is very important and should be investigated. I do not mean by that that I require every motorman or conductor to be a teetotaler; but I do, during the course of my examination, look very thoroughly for

any evidence of inebriety. Its presence, without any hesitation, precludes the examination. The question of cigarette smoking is also of some importance. In the single man more especially it leads into other practices, which in the end do not fit him for good service. I do not say that I can stop absolutely the smoking of cigarettes on the part of motormen or conductors, but I spend a minute or two during the examination in making inquiries and trying to bring out points which will best fit him for good service. To my mind the most important part of the whole examination has been omitted—that of intelligence. You might say, how are you going to estimate the intelligence of the applicant? In answer to that I say find out who answered the questions on the application blank handed to the applicant. Was it his wife, brother, sister, father or mother? Having signed his own name in the presence of the examiner, you can soon find out who answered the questions. It has been my experience oftentimes to see a very poor handwriting in the signature, with superior penmanship on the application blank. In such cases it immediately must occur to the examiner that some one else besides the applicant answered the questions. I do not mean that we need college graduates for motormen and conductors, but I do mean that if the damages and injuries account of your railroads is to be made smaller instead of greater, you must pay some attention to the intelligence of your motormen and conductors. If you do not believe me, refer this matter to the claim department. They will tell you that if there is anything that facilitates their work it is a complete report of each accident that occurs—a complete detailed statement of the occurrence, together with a proper recording of the names and addresses of the injured persons and witnesses. If you insist on your motormen and conductors being able to give a good history of an accident, being able to write a legible hand, and being able to read an ordinary newspaper, the ambulance chasers of this great Empire State will not be able to build mansions out of the moneys which they so often unjustly secure from our street railroad companies.

The President—There is no subject that has been considered more seriously by the members of the American Railway Association than the question of the standard examination of employees. In the published proceedings of the meeting of the American Railway Association, held at Philadelphia last October, out of a total of 150 pages, there are not less than ten or twelve pages which are devoted to the report of the committee on standard requirements for medical examination and re-examination of employees. I feel that this association could take no wiser step than at this convention to appoint a committee from its members to design blanks and to outline some form of examination which shall become the standard on all the roads throughout the State. You all know how much we appreciated the work which was done by the committee on rules, and I believe we could have the same results from a committee on standard examination of employees.

We have had this able paper by Dr. Peck and discussion of it by various physicians and surgeons, and I would like some discussion of the paper by the operating men.

R. E. Danforth, of Rochester—The papers and discussion describe in a general way the method followed in Rochester in examining applicants for employment. We have taken up the physical examination largely because of the fact that our employees are organized in a benefit association. The applicant for membership in this association must pass a physical examination, and we use the same examination for the purposes of the employees of the company.

T. W. Wilson, of Buffalo—I would say that in Buffalo we follow very closely the very excellent lines of examination laid down by Dr. Peck in his paper. We also have a benefit association, and nearly every train man who enters our service is a member of that association, so that our physical examination has to be very strict. The death benefit is $100, and we pay special attention to the examination of the eyes and the kidneys.

E. S. Fassett, of Albany—The methods pursued by the United Traction Company practically follow the suggestions of the talk that has gone before. The principal things we look to is the eye and the grasp, especially in the case of motormen. The standard for the eye must be not less than 10-15 and the grasp not less than 75 lbs. with each hand. The division superintendent is always present when the applicant fills out the application blank, so that there is no chance for anyone else to fill out the application, and the blank itself is gotten up with an idea of getting some knowledge of the man's intelligence, judging by his answers to the questions and his handwriting, spelling, etc. That is all taken into consideration. We have followed this method for many years and have not found any reason for changing it.

W. H. Pouch, of Newburgh—We have a method very similar to that which has been described here. We have had one or two cases of re-examination, in which it was discovered that the eyesight of the men had failed them to a certain extent.

It was then moved and seconded that a committee of five be appointed to recommend a standard system of blanks for the examination and re-examination of employees on street railways in this State, as well as the standard requirements of examination and re-examination of such employees. The motion was carried.

H. J. Clark, of Auburn—We follow practically the same method as has been described here. There is just one point I will refer to, and that is the re-examination every five years. An employee may have a serious illness in the meantime. We compel an employee who is off duty, as he says, owing to sickness, to give to the division superintendent a certificate from the attending physician, stating the nature of the illness and the extent of it. This is turned over to the medical department, and if the examining physician deems it necessary a re-examination takes place at that time.

W. E. Harrington—We have been practicing the Snellen test card and skein test for years. Insofar as the medical examination is concerned, the physical condition of the applicant, we depend entirely upon the physical appearance of the applicant. Ordinarily, we were so situated that we found it necessary to take some applicants we possibly would not have taken if we were not so much in need of men. The atmosphere of Southern New Jersey seems to affect the men to such an extent that they are continually changing. In one year we changed our entire force, insofar as numbers were concerned, 100 per cent and 10 per cent over in one year, so that we could not be very exacting as regards the physical examination. Insofar as the age is concerned we limit the age on one side to 21 years, and would seldom exceed 40 years. The applicant filled out his application sheet in the presence of the superintendent. That would overcome the point raised by Dr. Ryan. We found that method quite necessary, as many applicants would have other persons fill out their application blanks. I believe, however, that the practice of having a physician to supervise the examination of applicants is quite necessary and should be more generally practiced.

Mr. Fairchild—The question has been asked if any of the roads take on men as motormen and conductors who wear glasses. Do they accept a man who has a slight visual defect, which can be remedied by the use of glasses?

Dr. Peck—It is our practice in regard to the use of glasses not to accept at all motormen who are required to correct vision by the use of glasses. As I stated in the paper, we accept conductors with a vision of 20-30, which is practically two-thirds the normal vision, whose vision is susceptible of being practically corrected by the use of glasses. It seems to me that with conductors it is not so important that they have absolutely perfect vision. In closing this discussion I would

say that living in "Pent-up Utica," a provincial town, we are perhaps rather fortunate in the class of men who apply to us for employment. Most of them are young, healthy farmers, and a great majority of these are between the ages of 20 and 30 years, ages at which they have arrived at sufficient maturity to be placed in responsible positions, and ages at which no decadence of their normal powers has begun. I should think it would be very wise in formulating rules for examination to limit candidates between the ages of 20 and 30 years. We do not claim to have sculptures' models apply for our positions, but we do require an examination as rigid practically in its details as we physicians make in examining candidates for life insurance. We require that they shall be strong, healthy men, that all of their faculties shall be practically normal, that they shall be in the possession of good physical development in every way, muscular and otherwise, and it seems to me that it is extremely important that these men shall show, as Dr. Ryan has suggested, evidences of good general intelligence. Our applications are made out in the presence of the superintendent of the road, and then the examinations are conducted by me at my office, and the signature of the applicant is affixed to the blank in my presence. Of course, that is the only sample which I have of his handwriting, but during the examination I am particular to see whether he is bright and prompt in his answers. A man who is alert and quick in answering questions, and who does not get particularly rattled by the examination, is the man who is especially adapted to the work required at the front end of a motor car.

In regard to some physical defects, we accept men with slight defects other than those of vision and hearing. I think a man with a small hernia, which is supported by a well-fitting truss, is perfectly capable of going on the road, either the front or back end of the car. The man with a slight varicocele, or slight varicose veins, is not incapacitated for his work. The man with a slight hypertrophy of the heart, that is, overgrowth of the heart, is not incapacitated for his work. The majority of men who have worked very hard, who have done great physical effort of any kind, have a slight enlargement of the heart. The heart is a muscular organ, and by extraordinary physical effort the heart builds up to a somewhat extra size to compensate for the over-exertion of its possessor, and a slight hyperthrophy of the heart, overgrowth of the heart, is not material. If I find any organic lesion of the heart, by that I mean valvular lesion of the heart, leakage or obstruction, the man is not accepted. If I find a slight overgrowth of the muscular part of the heart without any change of the arteries or an iritable condition of the pulse, I accept him for either end of the car, and I think his life expectancy is practically as good as the man who has not a slight overgrowth of the heart so long as he lives a comparatively even out-of-door life.

We make it a point to look for evidences of inebriety. A man who comes with bleared eyes, a flushed countenance and red nose, we do not accept. We do not require that our applicants shall be total abstainers, but we do require that they shall be sober men, bearing evidences of intelligence and a fairly perfect physical development, and that they shall be physically equipped for the work.

In regard to obstructing the hearing during examination, I think that an examiner who is accustomed to testing the hearing can practically always tell whether a man is honestly excluding the sound from his ear. Most of the candidates whom I examine do not appreciate that I am testing their hearing when I ask them to put one finger in one of their ears. I continue this examination of the hearing as if it were a part of the test of the eyesight, and most of them will readily insert the forefinger well into the ear. If they do not do it I can readily see if they are obstructing the ear or not and instruct them to hold the finger forcibly in the ear. As a usual thing they think it is merely a continuation of the visual test, and do not understand I am testing the hearing until it is all over.

There is one other thing. I do not know whether it is practiced by many of the roads, but I think the schematic diagrams of the skeleton and outline of the figure on the back of our blanks are a good deal of value. We use this diagram to make a record of any existing defects in the applicant. We mark down the presence of slight varicose veins or of scars from any prior injury, so that we have a record of these injuries in our office, and if any man is in an accident he cannot subsequently bring claim that these scars are due to this accident.

Dr. Ryan—I think there has been an omission in this discussion as no special reference has been made to the height and weight of the motormen and conductors. Personally, I would prefer the motorman to be between 150 and 200 lbs. in weight, and his height to be between 5 ft. 7 ins. and 6 ft. For a conductor, I prefer a weight of between 135 lbs. and 175 lbs., with a height between 5 ft. 7 ins. and 5 ft. 11 ins. I raise the point of the difference between the heights of conductor and motorman, because it is easier for a motorman who is, say, 5 ft. 11 ins. or 6 ft. in height, to bend over and put more strength on the brake than it is for the low-sized motorman of 5 ft. 6 ins. The shorter man cannot get the strength out of himself. As far as the conductor is concerned, I dislike very much to see a conductor of 5 ft. 6 ins. passing through the car jumping for the bell rope, or a conductor of 6 ft. 1 in. trying to reach around in an ungainly way in the car.

J. C. Rothery, of Buffalo—In connection with this subject it appears to me there has been no consideration given to the various types of electric apparatus and the diversified conditions under which they are operated. Take a high-speed interurban road, if a motorman is bright and intelligent, and he only weighed 115 lbs., with the mechanical and electrical applances with which he operates his car, he would be satisfactory; and he would probably be more capable of operating the car than if he were 175 lbs. or 190 lbs. in weight and not as intelligent. Physical strength is not what is required in that case. In a densely populated city, where the motorman is required to use a hand-brake, strength is one of the first requisites. In a small town the qualifications might be between the two. Now, one standard type of examination to suit all of these diversified interests, it appears to me, would hardly be sufficient. I think there should be separate qualifications for urban roads, for interurban roads, and for high-speed roads. Would it not be well for the committee to bear that particular point in mind while they are considering the subject and draw up standard qualifications for each of these roads.

Mr. Clark—I will take issue with the gentleman on the lightweight man as a motorman for an interurban car. We operate a 34-ton car and sometimes, not often, the air brakes are out of order, and it is necessary to control the car with the hand-brake. No man of 135 lbs. could stop the car with any safety.

Mr. Rothery—I do not think there are 5 per cent of the cars operated in the State of New York to-day with air that can be stopped with a hand-brake within any reasonable distance. I think the operating men here will vouch for that. I find it is almost impossible to keep the hand-brake equipment in first-class working order at all times in a car on which air brakes are used.

Dr. Van Vranken—We never put new men on interurban cars. They always have to go through a preliminary service, a probationary service, on city cars. On our road it takes a man about two years before he is able to reach the dignity of running an interurban car. As far as the hand-brakes are concerned, I notice that our cars are always operated to stop by the hand-brake in going down hill, so that the hand-brakes in Schenectady are always kept in good order.

Mr. Fassett—We have exactly the same rule. On all cars

operated with the air brake the rule is that the last stop of the car must be made with the hand-brake—the last stop at each end of the line. We do not turn the cars. This shows that the brakes on both ends of the cars are in operating condition. The same rule applies to the large interurban cars that come onto our system from other roads, the Schenectady roads, for instance, where 40-ton cars are operated on a 9 per cent grade. For half a mile from the end of the line the motorman is obliged to use the hand-brake entirely. We have that rule so as to be absolutely certain that the hand-brake is all right, and the air brake can be used as an emergency brake, of course, if anything happens to the hand-brake. It seems to me all roads which operate with air-brake cars should have the hand-brake used regularly at certain times, so as to be sure it is all right and ready to be used when occasion requires.

The President—I think Mr. Rothery's suggestion is a good one, that the committee should take into consideration in outlining the requirements for the blank and the examinations the fact that the roads on which these blanks are to be used are not all interurban roads, but that there is a variety of roads to be considered and that a blank should be designed that would be suitable for each road, with certain modifications, as the conditions surrounding the road might require.

We will now return to the discussion of the most suitable car for city and interurban service.

CARS FOR CITY AND INTERURBAN SERVICE

E. S. Fassett, of Albany—I presume that I will be very much in the minority in my views and ideas of cars for city service, but I believe thoroughly the car for city service should not be over 20 ft. long and should be a single-truck car. Take, for instance, the road which I have the honor to represent in part. We can handle more people with that type of car than we can with any other. Our runs are short, comparatively, and we find in using the big car that every time a big car stops, in times of heavy travel, such as on ball game days and circus days, and it begins to unload its passengers, or stops to take on passengers, five or six of the short cars come up and lay behind the big car. With a short car the passengers are loaded and unloaded rapidly and easily, and I think when you get the number of people on a car that can be taken on a short car you come pretty near to taxing the intelligence of a conductor to handle the car properly, to collect his fares and to look after his passengers.

So far as interurban service is concerned, of course, that is an entirely different proposition, but for purely city service I thoroughly believe in a short car, single-truck, 20-ft. body.

The President—You evidently believe, Mr. Fassett, there is a limit to the number of passengers a conductor can handle. Will you give us your judgment on that point, as to the number of passengers a conductor can handle and handle safely?

Mr. Fassett—As to the number of people carried on a 20-ft. car, I think about sixty-five is the limit—anything beyond that is an overload for it, and I do not think that a conductor can take care of more than sixty-five passengers on such a car, get their fares and see that they properly get on and get off the car.

R. E. Danforth, of Rochester—I do not think that Mr. Fassett is entirely wrong. There are many places where, I think you will all agree, the single-truck, 20-ft. or 21-ft. body car is the most economical car for short hauls, short-distance riders, short lines and on lines where the traffic is fairly uniform during the day. I do not know about the conditions in Albany, but I do know that in Rochester, as well as in Buffalo, the majority of the cars in use must be over 20 ft. long, and those best suited to the service in those cities are cars having bodies of 28 ft. or 30 ft. But in both cities I have named some single-truck cars can be run to advantage. In our own city we operate forty or fifty single-truck cars on regular service, but find that on heavy lines, during the tripper service, we can make more money with the long cars. We have adopted as a standard length of car one having a body 28 ft. over all and with long platforms and with wide doors, and we permit passengers to leave the car by way of the front door. I believe in so doing we overcome the objection Mr. Fassett has to the use of the long car. At junction points we find that by the time the last passenger to leave is off the front platform, the last passenger to board the car is in the car by way of the rear platform. We try to enforce the rule of out the front door and in the rear door at all junction points. Without this rule we would lose considerable time in service, as Mr. Fassett indicated.

In the equipment of the car, local conditions govern very largely. We have found it impossible to operate with economy a double-truck car with two motors, because of the heavy snowfalls during winter, and we, therefore, adopted four motors, having ample capacity to operate the car without overload during the winter. We find that the double-truck cars now equipped with two motors per car run behind time during the winter, and, in fact, are usually pulled out of service and used only for trippers during the winter. The double-truck car has an added advantage in our climate in the fact that the service is maintained during snowstorms when it would be impossible to maintain the service with the average single-truck car. The added traction obtained from eight driving wheels keeps the car on time.

Concerning the seating arrangement, we are limited in the width of the car by local conditions to a body not over 8 ft. wide over all. This makes it well-nigh impossible to operate a strictly cross-seat car on lines having short riders and heavy traffic. We, therefore, adopted for such lines a compromise between the longitudinal-seat car and the cross-seat car, by having the cross-seats half-way down one side of the car with a longitudinal seat opposite, and then reversing the plan for the remaining half of the car. This gives a wide aisle, almost as wide as we obtain with the average longitudinal-seat car, with the advantage of seating half the passengers the popular way, with cross-seats. We find in summer that these cars are almost as popular as our semi-convertible cars with all cross-seats.

I note in Mr. Wilson's paper that he has referred to the practical inability to use the standard open car in summer. Our conditions are similar to those in Buffalo, and we find the most profitable car for summer service is one of the semi-convertible type.

QUESTION BOX

Mr. Fairchild, the editor of the Question Box, then took up the mechanical department of the Question Box.

Mr. Fairchild—The first question under the mechanical head is Question No. 20, relating to fireproofing cars. One of the most interesting suggestions made under this heading is the proposition advanced by George Gibbs, of New York City, as to the possibility of the all-steel car for ordinary surface electric railway service.

W. H. Collins, of the Fonda, Johnstown & Gloversville Railroad—Our usual practice on our large cars with steel underframing is that we carry all of our cables through iron pipes, and we use pretty much the same method as described in the Question Box by Mr. Baukat, of the Schenectady road. All of our cables are covered with rubber pipe insulation, and in putting up our rheostats we pay particular attention to using fireproof material, such as asbestos board, and in that manner we eliminate, practically, all trouble from fires. In fact, I cannot recall that we have ever had a burn-out or fire since I have been connected with the system.

H. A. Johnson, of Camden—I have given some attention to the subject of fire-proofing of cars. A meeting was held in New York by the Fire Underwriters to determine means for preventing fires on cars. The discussion of the metal car was

very thorough, but with the present method of wiring it was deemed at that time that fires would rather be enhanced than prevented by putting in metal floors and the present type of wiring. The general practice in street railways to-day in the smaller towns, apparently, is to use the old-fashion hose and cable. I believe, however, that it is now a proper time in the ordering of new equipment to follow the method which has just been described by the preceding speaker.

D. F. Carver, of Rochester—Personally, my observation has been that the cause of fires in the car house at night, when we put the equipment in the car house, has been from resistance. The car switchers put the brake on without shoving the controller entirely off. I know of a half dozen cases where fires started from resistance, because the car shifter at the car house had left the controller on all night. I have seen a good many cases where the leads caught fire from the motor, but I have never seen any worse fire. As to the use of the all-metal car, I think the success they are having with it in the subway has demonstrated that it is perfectly feasible, and more than feasible, for that heavy type of car. I understand the New York City Railway Company has almost completed a car of the all-steel type. My personal experience with the all-steel type amounts to practically nothing.

T. W. Wilson, of Buffalo—I think the principal thing is first to eliminate the cause of fires, because nearly all fires in cars arise from defective wiring. This being so, had we not better follow the standard rules of the Underwriters' Association.

In an interurban car I think it would be possible to have all cables in pipe conduits, and that will prevent entirely any fire starting from that cause. I saw a new car being designed for a Chicago road in a manufacturer's shop a week ago, in which that method was used, and all the cables and wires were run in pipe conduits.

J. G. Baukat, of Schenectady—We have adopted the same method Mr. Wilson has outlined. In the first place, I might say that we have taken another step which may be out of the ordinary. We use all flexible cable instead of solid wire, as has been the custom; that is used throughout. This flexible cable has extra heavy insulation. We found a great deal of trouble has come from the chafing of the cables. Then we lead all our cables through iron pipes, but before the cable enters the pipe we have a special mouth piece attached, which we designed ourselves, on the same lines as the mouth piece which the Manhattan Elevated Railway uses for its cars. Before the cable enters the pipe it goes through this rubber mouth piece, which makes the pipe waterproof, besides preventing chafing. When the cable comes out of the pipe the same precaution is taken again. By using iron pipe and rubber bushing throughout we have not experienced any trouble. We wired up the heaviest type of cars we have on our Ballston line in this manner, and we have not had any trouble from fire.

J. C. Calisch, of the General Electric Company—The Chicago car which Mr. Wilson referred to will be equipped with four 40-hp motors, and the question of wiring has been given very considerable attention. Where the wire leaves the trolley base on the roof of the car it is carried in a conduit to the corner post and from that point it will also be carried in a conduit to the point where it goes below the car. The main circuit will have in series a fuse with the circuit breaker, and the control and resistance cables below the car will be carried in separate conduits, that is, two for the control tables and one for the resistance. Where the taps are brought out for the resistance, and the motors' bell-mouths will be provided, and each motor will have a junction box, the idea being that the four leads from the motor can be readily disconnected, whereas, the controller cable, and resistance likewise, will never have to be touched except when general repairs are to be made. In this way, it is thought, absolute fire-proofiing will be secured.

George G. Blakeslee, of the Albany & Hudson Railroad—We operate the Albany & Hudson Railroad on the third-rail system. We recently lost a car from fire which occurred through a short circuit on the third-rail cable. We were never quite sure whether the cable picked up a piece of wire and connected things up, or what did happen. It is a subject which is very interesting to me. I would like to get what information I can from people who are running with the third-rail system. I have not anything to offer except to say that I shall follow out the suggestions and practice which have been mentioned in regard to fire-proofing. I think that is very important, and in reconstructing cars it is what we will follow. Our trouble is with our third-rail shoe, which has to be connected with a flexible cable long enough to allow us to make short curves. In other words, when the car moves around, the shoe has got to move away out in order to let us get around curves. The cable is bound to be dangling around and chafing and making trouble.

R. P. Leavitt, of the Albany & Hudson Railroad Company—I will say that this cable which connects to the third-rail shoe has to be long enough to permit the shoe to be tipped up in city streets, and that adds another feature to the shoe which makes it hard to take care of. I note that one feature mentioned by one of the gentlemen was a fuse in series with a circuit breaker. If that is used each fuse should be as near as possible either to the third rail or the trolley tap, so that there will be as little wire as possible to be protected by the same device.

W. J. Harvie, of the Utica & Mohawk Valley Railway—In regard to fire-proofing cars, I do not doubt that on new and heavy equipment there should be some extraordinary precautions taken. In a heavy express car we have just built we have the cables encased in iron pipe and also in oak mouldings. It is a question in my mind whether the iron pipe is preferable to a good wood moulding.

In regard to the cars which we already have in service on city and suburban work, it does not appeal to me that the extra expenditure for special fire-proofing is necessary, but that ordinary care and proper taping and hosing up of leads ought to take care of the trouble in these cars.

With regard to our new express car, we have a Westinghouse unit-switch control on that car. It is equipped with four No. 85 motors, 75-hp each. The control system, as is well known, is operated by air, the air valves being operated by a storage-battery circuit. The car itself is 57 ft. over all, and has a carrying capacity of 20 tons. Our trucks are special trucks made by the J. G. Brill Company for high-speed heavy service. We have run this car a mile in fifty-eight seconds, and thus far the equipment has proven entirely satisfactory. We have had but one case of trouble, which was due to an oversight, probably in the insulation. Our leads, motor wiring, etc., are laid in an oak molding, all four conduits, with a capping to correspond, and the turns are all square turns, and all of our low-voltage leads from the storage battery are in pipes, as I said before. We have no part of the 500-volt circuit in iron pipes.

W. E. Harrington, of Camden—The plan as outlined by Mr. Baukat seems to meet my views on the subject, and it is very clearly set forth on page 73 of the Question Box. As to the all-steel cars for ordinary street railway service being a possible development in the near future, I think that is a matter which can only be determined by practice. It certainly is a very remarkable departure from existing methods. We have our equipments in their present form and we have to take care of them in their present form, and that is the reason for my commenting favorably on the suggestions made by Mr. Baukat.

Mr. Baukat—In connection with wiring of cars and carrying wires in iron pipes, I will mention one thing. We experience quite a little trouble, especially with our heavy cables, in pulling them through the iron pipe, particularly where there are

bends in the pipe, without puncturing the insulation. We did away with that and now use nothing but straight pipes, and instead of having a special fitting for each different size—¾-in., 1-in., 1¼-in. and 1½-in. pipe—we have regular L's only of a larger radius, and they are cast in half and bolted together, so that we simply pull our cables through the straight pipes and clamp on the fittings afterward. I believe the Manhattan Elevated Company adopted that form, and I understand, in a roundabout way, that they have had some trouble with it. We have made it much wider, so as to get more packing between, and in that way we are wiring up our cars much quicker and are absolutely sure of not puncturing our insulation.

H. J. Clark, of the Auburn & Syracuse Railway—Speaking of fires, we take every precaution to prevent fires on our cars. We are now about to adopt extinguishers to prevent the fire disease—that is, to carry one hand extinguisher on each car, which, merely by turning it upside down, is ready for action. Within a week we nearly lost a full car of express matter, owing to the fact that a shipper had sent some explosive substance on our car. It was a package of small percussion caps. The conductor did not know the contents of the package; he dropped it on the floor and the car was set on fire. We happened to be in the city where there was an extinguisher at hand and our men were able to put out the fire instantly.

Mr. Blakeslee—What effect would the fluid in the fire extinguisher have on the electrical equipment?

Mr. Clark—I do not think it would have any more effect than water would have. The contents of the extinguisher are largely made up of water and soda.

Mr. Blakeslee—We found the liquid extinguisher made us a good deal of trouble when we allowed the men to use it on any of the apparatus, and we have adopted the powder extinguisher for the extinguishing of fires on our cars, and use a liquid extinguisher in case of other fires.

Mr. Fairchild—All the subway cars in New York are equipped with a fire extinguisher. I believe these extinguishers contain powder instead of liquid.

We will now take up the subject of bearing lubrication, covered in questions No. 21 and 22. This is a subject in which the mechanical men are all interested as well as the managers.

Before entering upon the discussion, I would ask Mr. Baukat if he will give a little longer description of the oil cup he is using and which is referred to on page 80 of the Question Box.

Mr. Baukat—In regard to oil cups, I am sorry to say I do not think we have the ideal cup, although it does our business. I am still in search of the ideal cup. Up to two years ago we used grease entirely for lubrication, and had all kinds of trouble. In the first place it is next to impossible to get the men who are doing the greasing to be clean, and as a rule considerable dirt is carried into the bearings with the grease. We had to make a quick change, and we got up a cup of our own, a cast-iron box with a pipe in the center, as you will see in the sketch, and then we have strands of the very best wool we can find to filter the oil and at the same time carry it down to the bearings. We have to change our oil three times a year. By experimenting quite a while we found by changing the oil twice or three times a year that we accomplish good results. The oil is affected by the temperature. Sometimes the oil would not feed; it got choked so that it would not flow, until the motor got heated up, and then it would feed down to the bearings. Suppose the oil is heavy enough to-day, and to-morrow should be a much warmer day, it will feed just the same.

The city authorities are complaining to us about the dirty streets. The other night I stepped into quite a large puddle of oil. The question is, Is there any ideal cup that would take care of thin oil? That is the thing I would like to hear discussed.

J. C. Rothery, of Buffalo—We have gone into oil lubrication and have tried it both in armature and axle bearings during the past year. Our experience, particularly in our high-speed interurban cars, has been very strongly in favor of oil. In the city cars, those operated on my division, where the speed is low, the improvement has not been so noticeable. The grease gave very good service, but the oil is an improvement upon the grease, and on the high-speed cars particularly we find the oil is a decided improvement over the grease, both economically and from every other viewpoint, hot bearings, etc. We frequently were troubled with hot bearings on account of the Buffalo & Niagara Falls line operating along the highway a long distance and the apparatus on the car being susceptible to the dust. Since we have used the oil we have had but very little trouble and are well satisfied with the result of our experience.

W. W. Cole, of Elmira—I think we are doing as nearly all the other roads are, accepting the journal boxes as the manufacturers send them out on the various classes of apparatus.

W. H. Collins, of the Fonda, Johnstown & Gloversville Railway—We have abandoned the use of grease entirely for both motor and axle bearings. We find by doing so that we have accomplished a remarkable saving in the matter of lubrication, as well as lengthening the life of our bearings to a great extent. We have been using a patent oil cup, with a special compound manufactured for use with that cup, very successfully. The only criticism we have to make on the cup is the price of the compound. I think if we could adopt the same cup and use a cheaper grade of oil, it would practically solve the lubrication question. We use oil entirely on all of our cars, both city, suburban and interurban cars, and I would not like to go back to the use of grease. On our large type of cars we use the GE 73 motor, which, as you gentlemen perhaps all know, has a sufficient oil space to permit of packing the journals with oil and waste similar to the way it it packed in the journal box of the car. We now have bearings running on these equipments with approximately 100,000 miles to their credit without changing the bearings, and we have had occasion to remove the armatures twice during that time, and the armature bearings are so little worn that we can hardly caliper the wear. I would like to ask a question of the gentleman who just preceded me, as to what kind of an oil cup he is using with his oil in the different types of motors.

Mr. Rothery—It is a simple oil cup with gravitation feed, which is adjusted by a screw in the motor bearings.

Mr. Fairchild—Is this the one you got from the manufacturers, with the car equipment?

Mr. Rothery—The cup we got from the manufacturers had the wick feed.

Mr. Fairchild—What is the objection to the wick feed?

Mr. Rothery—You have no way of stopping the flow of oil when the car is stopped. The feed is not automatic.

Mr. Fairchild—Are you working on anything in the way of an improvement on your present cup?

Mr. Rothery—No, it has been very satisfactory; but if anything which is better is presented to us we will be glad to give it a trial, but up to the present time the cup which we have now in use has been perfectly satisfactory to us.

Mr. Fairchild—Has anyone any comparative data on the lubricating item?

Mr. Baukat—Before we began to use oil it used to cost us for lubrication about $4,800 a year. We have got it down now to where it costs us about $1,800 a year. I guess these are about the best figures one can get as the total saving per year. I have not seen any figures which are better by comparison.

Mr. Johnson—We are doing about the same as the rest of the roads, trying oil and grease, and all the different cups made to produce the result. I would like to ask whether anyone has tried roller or ball bearings?

Mr. Baukat—I had the pleasure of trying that, and deliver me from ball bearings at the present time!

Mr. Clark—I think Mr. Du Boise, of Syracuse, has had some experience with roller bearings.

F. M. Du Boise, of Syracuse—We have a roller bearing that was made by a manufacturer in Syracuse. It is on experimental trial now. We have had it in use about two years, I believe. Up to the present time we do not find any wear whatever in the rollers themselves. We have had some trouble with the journal boxes they roll in, not being properly hardened when put on, and we renewed those, but the roller bearings and the action are as perfect as when they were put in. I think the car runs with a great deal less power. I have no figures to show how much less, but I feel safe in saying that the car is operated with considerably less power.

As to the oil cup question, I will state we are using a cup, but I guess I have the same trouble the others have, there is no way of stopping the feed of the oil when the car stops. Some of the members say that their streets are spattered up by the use of grease, and I see that our streets in Syracuse are also spattered, but we have not had any complaint yet from the city authorities on this account.

Mr. Fairchild—There have been suggested several forms of oil cups using a small ball at the bottom, the idea being the ball will vibrate when the car is in motion, allowing the oil to feed, and when the car stops, the ball will fall back into the opening and prevent the feed of the oil. Has anyone experimented with this, or is there any member who has any knowledge of a cup of that kind which is in general use?

H. V. Schreiber, of the Augusta Railway & Electric Company, Augusta, Ga.—We have tried the type of cup just mentioned and found after using it for some time that we could not adjust it. It is arranged with notches, and the idea is to turn the notches to regulate the supply of oil, but we found if we turn the nut one notch the oil would all flow out, or if we turned the nut back one notch the oil would stop flowing entirely. We have made experiments with a number of different kinds of oilers; but at the first, when we dispensed with grease, we simply took the grease cup already on the motor, and put waste in it, packed it good and hard with wool waste and poured oil on top of the waste, and that passed through the waste and made a good, cheap oiler, but it had the same trouble which has been mentioned here to-day, the oil would go down through the bearings and make the streets greasy. We tried some oil cups. We had a screw which pinched a wick similar to some of those described here. I looked up the matter of lubrication on steam railroads and found they are oiling cars for about one-tenth of what it costs us. We also tried successfully the oiler shown on page 77 of the Question Box. That has a great advantage in that it uses the same oil over and over again and keeps everything tight so that no dirt comes in. That is an oiler I think we will adopt; though a little expensive at first sight, it is really cheaper than some others and, although it looks complicated at first, it serves the purpose very well.

Mr. Danforth—I am sorry to say I am not supplied with any figures, and can only say generally that the cost of lubrication has been about the same as it was when we used grease, although our bearings are running two and three times longer than they did. We have been experimenting with a large number of trucks, using high-priced oils, and we consider the first thing necessary to stop hot boxes is to find the right kind of oil, and the next thing is to find the cup that will feed the oil economically. We finally got down to a cup that is somewhat of a compromise. It contains a loose-fitting piston, held down by a spring pressure resting on a thin piece of felt which acts as a filter. The vibration of the cup during the motion of the car moves the piston sufficiently to allow the oil to flow down onto the piece of felt, when it is filtered through onto the bearing. We are now working to obtain a cup which will practically stop the flow of oil when the car is at rest. I am of the opinion that, generally speaking, this will have to be accomplished by using a rod with dense oil which will flow slowly, if at all, at low temperatures. This means you can change the oil, which up to the present day we have not felt warranted in doing. I will say, however, we use two grades, summer and winter, and have tried some cheaper oils, with very good results.

Mr. Du Boise—I will say that in our oil cups which we are using we have four different feeds in the cup, which we can regulate to a certain extent. We cannot stop the flow entirely when the car stops. By changing the feed of these oilers according to the weather, hot and cold, and also by changing the grade of oil, we get along very economically with it, but cannot stop it entirely. Our experience has been that we effect a saving of about 25 per cent in the cost of lubrication by oil over the cost of lubrication by grease, and I should say we have effected nearly double that saving in the wear of bearings.

Mr. Collins—In regard to the matter of roller bearings, which Mr. Du Boise spoke of, I am not quite clear as to whether that refers to armature or axle bearings or journal-box bearings.

Mr. Johnson—I referred to all the bearings. Mr. Du Boise spoke of the ball bearings he was trying in an experimental state, and I gathered it referred only to the journal bearings of the car. I would like to know if it refers to the axle bearings and motor bearings as well?

Mr. Du Boise—I referred to the journal bearings only when I spoke of the roller bearing. In regard to the oil question, we have stopped the hot-box problem by the use of oil.

Mr. Harrington—I believe that the grease question is a thing of the past. We have been working on the oil question for some time, and there is no doubt that the use of oil has supplanted the use of grease. The great trouble is that the oil lies in pools around the car house and on the street. In so far as the cost is concerned, we made a contract about four months ago with a company on the basis of furnishing the lubrication for the entire system, so much per thousand car-miles. The oil company was to allow us credit for the oil and grease we had in stock. Since that time up to the last report I had, the oil company still owed us money.

Mr. Collins—There is another point which enters largely into this question, and that is the matter of armature repairs, due to armatures getting down on the pole pieces and stripping. Since we began using oil for lubricating we have practically eliminated that trouble, while prior to the use of oil as a lubricant we often had the bearings go down and we lost a good many armatures. At the present time we have overcome that difficulty almost entirely.

Mr. Du Boise—Since we have used oil for lubricating we practically have no armatures on the pole pieces whatever, and we get at least three times more life out of our bearings with the use of oil than we did when we used grease.

Mr. Harvie—I would like to ask how often these gentlemen find it necessary to thoroughly clean the oil cups, emptying out the old oil and cleaning them out thoroughly, to prevent clogging with the wick-feed cup?

Mr. Collins—We go over our machines, such as blowing out the motors and doing work like that, and in addition to that we make it a point once a month to clean out all the oil cups. I think the secret of success of lubricating with oil lies largely in the attention given to the matter of cleaning the oil cups.

Mr. Leavitt—In connection with the question of the use of oil, I think that grease and oil should both be used, especially on long lines. In such cases, where there is any bearing trouble, the grease will tide the bearing over and enable you to get the car into the depot. It would be necessary to clean out the bearing as soon as you found the grease had started, but having a motor of ample capacity, the grease does not start to any extent unless the bearing warms up—that is, it does not run to any extent in the natural heat of the motor.

We have used very little grease, but have used it as an extra precaution. Of course, if the grease starts, the felt and wicking is clogged up and is useless for oil, and has to be changed and cleaned out.

Mr Baukat—I do not agree with Mr. Leavitt. I say throw the grease out and keep it out. After you once get the grease in the bearing, you will have a hard job to get the bearing clean, and it means quite a little money to clean the bearing. After you have it once cleaned, keep it clean. The main thing we should aim at is to get a cup that will not feed when the car is not running. The whole question does not lie in the cost of oil by any means. If you have a cup that will lubricate your bearings at a fair price and you have no armature trouble, etc., I think you should be all satisfied. I would not advise using grease. I would not do it.

Mr. Fairchild—If there are no more questions or answers on this subject, we will pass to the wheel question, which is an old one, and yet it is always new. The matter relating to wheels is found on page 81 of the Question Box, and following pages. The subject is divided as follows: Give your ideas and experience with respect to the following: (a) Life and cost (per 1000 wheel-miles) of cast-iron wheels? (b) Life and cost (per 1000 wheel-miles) of steel-tired wheels? (c) Life and cost (per 1000 wheel-miles) of rolled-steel wheels? Is there anyone here who can give us late data on this subject? Have any of you been carrying out comparative records lately? There is a great demand for comparative wheel records. Everyone realizes that wheel records are only valuable up to a certain extent, because the conditions governing the information and also the method of keeping mileage records have not yet been standardized, and wheel records, even when they are given out, have to be taken with considerable explanation, but it might be well to give a few moments to this wheel question and see if we cannot add to the information on the subject.

Mr. Collins—I have expressed my opinion somewhat in the answers in the printed Question Box. We find in our experience, which is taken from a careful record of mileage—and it is an average record taken from 300 or 400 wheels—that the average life of our cast-iron wheels is about 30,000 miles and the cost per 1000 wheel-miles is 20 cents. That includes the cost of wheels used in city and suburban, and some interurban service. The average life of our steel-tired wheels is 150,000 miles and the cost per 1000 wheel-miles is about 13.5 cents. That price is based on the cost of tires only. I consider, in the matter of making comparisons between steel-tired wheels and cast-iron wheels, we should not take into account the wheel center, because that is a common feature of the truck. If the wheel center is designed correctly we can use that indefinitely. I find that the cost of turning the tires on one steel-tired wheel during its lifetime is practically the same as for boring and fitting five cast-iron wheels, which we would have to use to make the same mileage. The value of scrap returned is slightly in favor of the cast-iron wheel, which would reduce the cost of the cast-iron wheel per 1000 wheel-miles to 17.4 cents, as compared with 13.5 cents for the steel-tired wheel. That is merely looking at the question from the economical standpoint.

I believe we should look at the question in another light. I think the factor of safety should be the determining factor in the question of the use of wheels. I am very strongly of the opinion, and I have been convinced for some time, that in all interurban cars we should use steel-tired wheels. The question in my mind is, What is the best type of steel wheel? We have been using the built-up wheels, with cast-iron and cast-steel centers, with a Mansell retaining ring, which is practically nothing else than steam railroad practice. We have used that wheel with excellent results. There has been brought out lately a rolled wheel which seems to me to be admirably adapted for interurban service. We now have two of the largest cars equipped with that type of wheel, but they have not attained sufficient mileage to enable us to make a comparison. We have run something like 20,000 miles with that type of wheel, and from present indications they will be highly successful. The cost as compared with the built-up wheel will be slightly in favor of the built-up wheel in the long run. The first cost will be in favor of the rolled wheel, but in using the same wheel center over and over again indefinitely, the eventual cost will be slightly in favor of the built-up wheel. There is one element which should be considered. If you have an integral wheel, you eliminate largely the question of loose tires, or the wheel coming apart, or anything of that sort. It seems to me that the rolled wheel is the coming wheel for interurban service.

Mr. Johnson—Our experience is practically the same as that of the gentleman who has just spoken. I believe the rolled-steel wheel is the coming wheel for high-speed roads. I think it is going to be a little more expensive in maintenance, but the factor of safety is going to outweigh that. As far as the city service is concerned, I think the chilled wheel will hold sway and give us plenty of safety.

Mr. Carver—I do not know that I have much to say on the wheel question at this time. I am trying to watch developments in the wheel matter, trying to do that very closely. I think the steel-tired wheel will compete with the cast-iron wheel, for city service, on a cost basis. I do not believe that a cast-iron wheel is suitable for high-speed service. I have known of some cast-iron wheels which have burst in city service, but that was due to high speed, the motor running away on a down grade. The wheel burst as the result of the speed; that was the only solution we could discover for it. I do not want to advertise anyone's goods, but I am watching this pressed wheel very closely, and think it is going to win out.

J. H. Pardee, of Canandaigua—Last year our chief engineer applied some cast-iron wheels. They were specially designed, but have proven unsatisfactory, and we went back to steel wheels. We are experimenting with the built-up wheel and using that wheel, and also a solid wheel.

T. W. Wilson, of Buffalo—I believe for interurban practice regarding the question of wheels, we can, as in other things, follow the example which the steam roads have set us. I do not believe a cast wheel is fit to be run under an interurban car. As to the type of steel wheel, I rather agree with the gentlemen who have preceded me, in thinking that the rolled wheel is the best type. For city service, I think the only reason which would lead us to adopt a steel wheel is the one which Mr. Carver suggested, the initial cost. I think the cast wheel is satisfactory for city service. If the cost can be brought down to the same, or possibly a little more, as the cost of the cast wheel, I think we should adopt the steel wheel for city service. We get about 40,000 miles out of our steel-tired wheels on the Lockport line, and a little less on the Buffalo & Niagara Falls line, on account of the numerous curves. I think the life of a steel-tired wheel can be set at about 150,000 miles. Our cast wheel make about 40,000 miles and costs us about 22 cents per 1000 car-miles.

W. J. Harvie, of Utica—We have no rolled-steel wheels on our road. We are using two types of steel-tired wheels which are giving us very good results. I was rather interested in what Mr. Pardee said in regard to the special cast wheel which he had made for his road. We are using some of the same kind, although not for high-speed service. It has a reinforced flange, which seems to be a good feature.

Mr. Baukat—I would like to say something in regard to wheels. The life of the wheel can be increased to a considerable extent if your special work is taken care of so as to favor the wheel. The life of the flange determines the life of the wheel. I think, in order to favor the wheels, the track department should co-operate closely with the mechanical department

in regard to wheels. If that is taken into consideration, the cost of wheels can be decreased considerably.

Mr. Wilson—There is one addition I would like to make. In turning down steel-tired wheels we reduce the diameter, and last winter on our Buffalo & Niagara Falls line we found the mechanism under the car was closer to the roadbed than ever before, giving us considerable trouble from the motors driving on the snow and ice. Would it not be well to make a wheel with a little larger diameter than 33 ins. to take care of that trouble? I would like to ask some of the master mechanics if they have had any trouble on that account?

Mr. Collins—We ran into about the same trouble as Mr. Wilson describes. We have been using a 28½-in. wheel center, with a 2½-in. tire, and in order to overcome the trouble Mr. Wilson speaks of, we are increasing our tire to 3½ ins., and I think that will compensate for the reduction in the diameter of the wheel, owing to the turning down.

Mr. Baukat—In reference to what Mr. Wilson said, we ran up against the same trouble last winter, and on our new cars we are adopting a 36-in. wheel. We went further. We found our old special work was pounded out, was made wider than it was originally, and we are ordering our new special work wide enough to permit us to use a 1⅛-in. flange. I would like to hear an expression from the members in regard to a 36-in. wheel.

Mr. Leavitt—We are using a 34-in. wheel which, after it is turned down twice and runs three times, gets down below 33 ins. We have kept records of several sets of wheels on two cars. One car ran 218,000 miles with two turns, with one pair of steel-tired wheels with spoke hubs, that ran on the first wear 116,000 miles. We had a good deal of trouble with these turned wheels last winter, letting the motors down into the snow and ice in the streets, due to their smaller diameter.

Mr. Baukat—I would ask what kind of a wheel this gentleman used, because the mileage is certainly excessive.

Mr. Leavitt—The one that ran 218,000 miles was a steel-tired fused wheel. The one that ran 116,000 miles on the first run was a Midvale steel-tired wheel, with a Gibson ring fastened on the hubs. That wheel perhaps ran too long; 100,000 miles would perhaps have been a better figure at which to have changed it over.

Mr. Harrington—In the use of cast wheels, the ordinary road of the ordinary size sends its wheels to the wheel manufacturer to have the wheels renewed, thus avoiding the necessity of supplying the equipment necessary to change the wheels. I think this one feature alone has been one of the chief reasons why steel wheels have not been more generally adopted throughout the United States on the smaller roads, as they have not had the equipment to change and turn down the steel wheels. The advantages, I think, are quite strongly in favor of steel wheels if they can be properly handled—promptly handled, in that you avoid flats to a very great extent, so much so that you may consider you entirely avoid flats.

As to the matter of the relative safety between steel wheels and cast wheels, we hear continually that the steel wheels are almost an absolute necessity on high-speed roads. I would like to know how many railroad managers have had experience in which their cast wheels have caused derailments, such as have been referred to. I personally have yet to find out any experience that would indicate this. It seems more, from my point of view, to be a bugaboo—that we are looking for a certain thing that we think may happen. I should like information on that point. There is one other feature, however, in connection with the use of the steel wheel which gives it an advantage over the cast wheel, in that the wheels are not in the house for renewal so often, and therefore you can get more life out of your equipment, with the minimum amount of housing.

Mr. Johnson—I wish to say for the information of Mr. Harrington that less than two weeks ago we had a serious accident due to the breaking of a wheel. It was a case where a car ran at probably a little higher speed than it should have done, struck the curve and ripped off the flange; the car left the track and some people were injured.

Mr. Baukat—You mean a cast-iron wheel?

Mr. Johnson—This was a cast-steel wheel.

The President—I will say, in the winter of 1902-03, we had a 24-ton interurban car running at the rate of 45 m.p.h., equipped with 690-lb. chilled-iron wheels, and we had a portion of one wheel, consisting of the spoke and about one-third of the rim, weighing about 150 lbs., come up through the floor of the car and crush the foot of a passenger, so that he will be a cripple for life. The bursting of the wheel cleared the cable and a portion of the air equipment and the brake chain and everything that was on the car in the way of the wheel. That was the thing that drove us from the use of cast-iron wheels and compelled us to adopt the steel wheels.

Our experience with the steel wheel has been that there is no economy in the steel wheel; but we do not keep wondering when the wheel is going to break.

Mr. Pardee—The type of cast-iron wheel which we used is that with the reinforced flange, which Mr. Harvie spoke of. Since we have used this wheel we have not had a case where the flange has broken off sufficiently to allow the derailment of the car, but in running the wheels over side tracks and special work, the flanges became chipped and it was necessary to replace the wheels. We do not worry so much about derailments as we do about cost. We do not get enough mileage out of the wheels.

Mr. Collins—I would like to corroborate the experience of President Allen somewhat. We recently, within the past three months, had two 28-ton cars equipped with cast-iron wheels, and the flanges of these wheels were broken; in each case the wheels were comparatively new. In one case the car had run something like 6000 miles, and in the other case about 10,000 miles. In one case we lost about 11 ins. of the flange, and in the other case about 6 ins. In both cases, fortunately, this happened while the car was in the city streets. You can imagine what would have happened if it had occurred on some of our interurban lines on which we have some very heavy grades and bad curves.

In reference to the cost of the steel wheel as compared with the cast-iron wheel, I ask the president if his lack of facilities for taking care of the steel-tired wheels does not bring about, in a large measure, the increased cost?

The President—It does. A road equipped with steel-tired wheels should have the facilities in its own shops for taking care of these wheels. We are handicapped in this matter, in that we not only have to truck our wheels, but ship them to the Rome Locomotive Works, where they have facilities for turning down the tires. It costs $3 per pair of wheels for the turning down alone, plus the cost of transporting the wheels from our shops to Rome and returning the wheels to Utica.

Mr. Baukat—The steel-tired wheel certainly costs more; but in case of an accident what show would we stand, if anyone was injured, due to using cast-iron wheels, with the jury? I would like to hear Mr. Carr speak in reference to that point.

James O. Carr, Counsel for the Schenectady Railway Company—I do not think the question of the kind of wheel would have much effect on the jury, from what I have seen in most of these cases. The one point which would appeal to me particularly in this question is this: If it has been demonstrated that the steel-tired wheel is the only safe and proper wheel to use on interurban service, where the cars are operated at high speed, and a railway company was using at the time of an accident a chilled wheel or cast-iron wheel, in that event I believe the railway would be considered negligent for not having used a steel-tired wheel. However, there are usually other

things than wheels that have a bearing on the question, and I think all men here familiar with the operation of street railways understand that better than I do. It is usually the man who operates the car who causes the accident, rather than the equipment on the car; but from what I have seen in the use of wheels, I know, so far as the Schenectady Railway is concerned, we have found that the only feasible wheel for the interurban service, such as we operate, is a steel-tired wheel—that is, what is known to you as a steel-tired wheel, as distinct from the open east-iron wheel.

Mr. Fairchild—Reference has been made to the matter of taking care of steel wheels in shops. I call attention to the wheel-turning lathe in the shops of the International Railway Company, of Buffalo, described on page 82 and following pages of the Question Box. This is said to have cost but $350 to get into shape. It was made out of an old lathe and is rather an interesting suggestion. Has anyone else anything of the same nature in his shop for taking care of steel wheels? It may be interesting to know at what stage it will become economical to put in something for taking care of these wheels. I ask President Allen when he thinks it would pay him to put in a lathe to do his own work in the shop?

The President—Mr. Harvie, have you any idea when it would become economic to put in a lathe for turning our wheels?

Mr. Harvie—We have fifteen equipments of steel-tired wheels, and I thoroughly believe we should by no means be without a tire-turning lathe. How much below that a person can go in the equipment of steel-tired wheels, and still find it economical to have a tire-turning lathe, I cannot say; but I know we are seriously handicapped at the present in the matter of the cost of the wheels by the absence of a tire-turning lathe.

Mr. Fairchild—Is there anything more to be said on this wheel question? If not, we will pass on to the subject of brake-shoes, Questions 25 to 30. The brake-shoe question is intimately related to the wheel question, and is a subject which has not received perhaps full attention at past conventions. Mr. Baukat, you said you found your men were taking off the brake-shoes before they had worn down to a dangerously low limit—that is, they were wasting them. Have you stopped that and found it advantageous to let the shoes stay on a little while longer?

Mr. Baukat—That was entirely due to the fact that the brake rigging was not right. It was up too high. It was no fault of the shoe. In regard to the brake-shoe, local conditions govern that entirely.

Mr. Johnson—I believe local conditions govern the use of brake-shoes entirely. When cars are run on interurban lines, with high mileage, and are not frequently returned to the car house for attention, you cannot be too careful in avoiding too close a limit for the wearing of the shoe; but where cars are running on city service and go into the shop frequently, you can get a pretty wide limit on shoes. The question of the hardness of the shoe is one of the things which may also vary according to local conditions. We are using two different makes of shoes—a softer shoe on the heavier equipment for better braking qualities and a harder shoe on smaller equipment for better mileage. I think that practice, however, is general.

Mr. Du Boise—I am looking for information on this question. I have used a soft east-iron shoe, with a wrought-iron insert, which gives me as good service as anything I have found. It makes a tough wearing shoe, of good braking quality.

Mr. Collins—I do not think I have anything to add to this discussion, any more than to say I believe on the heavy cars we should not use too hard a brake-shoe, because, in my opinion, it impairs the braking quality, and in order to get the greatest amount of braking efficiency we should use a shoe adapted to service. We can use a harder shoe in the city service, where the conditions vary. We have experimented with different makes of brake-shoes and finally adopted a standard of our own, which we make in our own foundry, and get as good results as we have ever had from any we have ever tried.

Mr. Fairchild—Before closing the Question Box this morning I want to refer to some of the shop devices described in the Question Box, and make request if there is anyone here who can suggest other devices for use along the line of labor-saving devices for the shop, we will appreciate having them for the published discussions. Under this heading are described arrangements for washing cars; stands for varnishing sash; racks for holding freshly varnished sash and doors; an ingenious method for testing motors; methods of handling armatures, etc. This covers quite a range of subjects, and there is a good deal of interest in schemes of this kind. If anyone can suggest to the editor of the Question Box anything additional to be put under the heading of shop devices, we will appreciate the information.

The President—We have concluded the papers which were prepared for discussion and we have devoted upward of two hours' time this morning to the Question Box. I desire at this time, while there are many street railway men present, to conclude with the miscellaneous business of this convention, and we will take up the report of the committee on rules, Edgar S. Fassett, chairman.

Mr. Fassett presented the following report:

The standard rules committee would respectfully report that at a meeting, held in Albany on June 16, it was resolved that a circular letter be mailed to the members of the association, asking if they had adopted the code of rules which the State association adopted in September, 1904, and if so, whether they had followed the rules exactly, or if they had modified same, whether these modifications were in the nature of general rules or specific to the locality.

This circular letter was mailed to forty-three roads in the State, and answers were received from eighteen. Of these ten had adopted the rules, using only such modifications as were necessary for the special locality. Two roads have adopted the city rules, but have not adopted the rules for interurban service. Four of the roads have not yet adopted the standard rules, but two of them wrote that they intended to do so within the next year. Three of the interurban roads have adopted the standard steam rules.

These replies seem to indicate that the rules adopted for the city service are being generally accepted. The rules for interurban service, however, seem to need further modification, and we would respectfully suggest to the new rules committee for the ensuing year that changes should be made in the interurban rules to bring them nearer to the standard steam code of rules.

The President—Gentlemen, you have heard the report of the committee on rules. What will you do with it?

H. A. Robinson, of New York—I move that the report be received and placed on file, and that the rules committee be continued for another year, with the same powers.

The motion was seconded and carried.

The President—I desire to say that Mr. Fassett, as chairman of the committee on rules, has only had the opportunity of calling his committee together once. You will all appreciate that in the annals of the New York State Street Railway Association the year just about to close is a short year, our annual meeting usually having been held in September, and this has deprived the committee of the opportunity of doing the work they would have done if the year had been longer. We will now have the report of the committee on nominations.

Mr. Robinson then presented the list of officers for the ensuing year, and the report was unanimously adopted. (For list of these officers see the last issue of the STREET RAILWAY JOURNAL.)

The President—What is the pleasure of the association as to the place and date of the next meeting? As you are all aware, the executive committee last year was empowered to change the time and to name the place of meeting. As to whether this convention has been a success, each one must be the judge.

I feel there never has been such interesting discussion of interest to the mechanical and operating men at any convention that I have attended heretofore. If there is no discussion as to the next place of meeting, it will be in order to empower the executive committee to name the next place of meeting.

H. J. Clark—I move that the executive committee be empowered to select the next place of meeting. Motion seconded and carried.

Mr. Robinson—Mr. Chairman, permit me to offer the following resolution: "Resolved, That the thanks of the association be tendered to the Hudson Valley Railway Company, and its eminent president, A. B. Colvin, for his kindness and attention in making the entertainment of the ladies at this convention as delightful as it has been." Motion seconded and carried.

The President—The next thing I wish to bring before the convention at this time is in reference to changes to the by-laws. Section 2 of the by-laws provides at present that the executive committee shall consist of the president and four others. The practice of the association has been to elect two vice-presidents, and your executive committee, at its first meeting after the twenty-second annual convention, discussed this matter and recommended that the two vice-presidents should be made members of the executive committee. We have prepared and have ready to submit to this convention the following change in by-law II.:

"The officers shall consist of a president, two vice-presidents, a secretary and treasurer. The officers and members of the executive committee shall be elected by ballot, at each regular meeting of the association, and shall hold office until their successors shall be elected. The executive committee shall consist of the president, vice-presidents and four others, and shall have the entire charge and management of the affairs of the association."

Mr. Robinson—I think the suggestion is a very excellent one. We always have men of ability as our vice-presidents, and I do not see why the association should be deprived of their services on the executive committee. It seems to me most desirable that they should be made members of the executive committee. I move the adoption of the amendment to the by-laws. Motion seconded and carried.

Mr. Wilson—Before we adjourn I think the members of this convention should express, by means of a vote of thanks, their appreciation of the services of C. Loomis Allen as president during the past year.

Secretary Cole put the question, which was duly carried.

President Allen—Gentlemen, I wish to thank you for your kind resolution. I do not know that it is necessary for me to say very much. I know that I could not have accomplished anything alone. I have had the benefit of the advice and the hard work of the members of the executive committee and officers of the association, and if there be any glory or credit to be given to anyone for the work of the association during the past year, its officers and its executive committee are properly entitled to be given that glory.

We have another amendment to the by-laws, which is in reference to the time of meetings. The by-laws at present in force provide that the meetings of the association shall be held on the second Tuesday in September. At the convention of 1896, held in Binghamton, which was the last single-day meeting held by the association, it was voted at that time that the next year we should try holding our conventions for two days, Tuesday and Wednesday, and since 1897 the meetings have been held two days, but the by-laws of the association have never been amended, and your executive committee recommend the adoption of the following amendment:

BY-LAWS—MEETINGS—ARTICLE VII.

"The regular meetings of the association shall be held on the fourth Tuesday and Wednesday in June, and at such hour and place as shall be designated by the executive committee. Special meetings shall be held upon the order of the executive committee, and notice of every meeting shall be given by the secretary to each member. Ten members shall constitute a quorum of any meeting."

The President—The change involved is that from the second Tuesday in September to the fourth Tuesday and Wednesday in June, and also the hour and place to be approved by the executive committee. There is much that can be said upon this question. It is difficult for me to tell whether this convention has been a success or not. Each one of you must know whether it has been successful or not. To bring this matter before you, to decide whether we desire to hold a spring or fall meeting, I think this amendment should be moved and discussion follow.

J. N. Shannahan—I move that the resolution be adopted. Motion seconded.

H. A. Robinson—I desire to make a suggestion in reference to this resolution. It may be difficult, in moving around the State, to find a hotel in which to hold a convention meeting on the particular days stated in the amendment to the constitution. I offer the suggestion that some power to change the days be given to the executive committee when in their judgment it is proper to make a change. I do not know that it will always be possible for the executive committee to get the quarters we want in the particular week in June which has been specified. This is not intended, however, to differentiate between a spring and fall meeting.

The President—As stated in the address of the president, in order that the delegates, guests and supply men shall be accommodated in one hotel, it is necessary that this association shall hold its meetings at the time when some of the large summer resorts are open. We were at sea for a long while as to the best place to hold this present meeting. We desired at first to hold the meeting in the first week in June, and it was not possible for us to find a hotel which would be open at that time which could accommodate us. The new Fort William Henry Hotel, in which we are holding this convention, was opened one week earlier to care for this meeting. It seems as if it is not practicable to hold the annual meeting of this association in the fall of the year. There are many who attend our meetings who are desirous of attending the meetings of the American Street Railway Association, and it is not an easy matter to have street railway men leaving their properties twice in one month to attend conventions. That is the principal reason for changing the time of our meeting from the fall to the spring of the year. Is there anyone else who has anything to say on this question?

H. J. Clark—It has been suggested, owing to the fact that the master mechanics have their meetings in the second and third week in June, it might be inconvenient for them. I refer to the American Railway Master Mechanics' Association.

The President—Mr. Danforth, you have the burden of the affairs of the association during the coming year. What have you to say on this question?

R. E. Danforth—I ask for a freer expression of opinion from the delegates present upon the advisability of holding the annual meeting in June. If we hold the meeting in the fourth week of June, that is very close to the Fourth of July. Many of our operating men are very busy at this time preparing for the business on the Fourth of July, and to my mind it is a question whether the advantage gained in having the meeting in June is not offset by the disadvantage of losing the attendance of some of our transportation men.

T. W. Wilson—It seems to me that inasmuch as the national association has its convention in September, that it is most advisable for us to select another month. The big summer rush does not start until July, and it continues through July and

August; those are the two biggest months, so that unless we have the meeting in the same month as the meeting of the national association, I do not see any other month to put it in except June. It might be possible to make the date a little earlier in the month, in order to meet the objection of Mr. Danforth. Mr. Ely, will you give us the benefit of your judgment on this question?

W. Caryl Ely—The objection to having the conventions coming within a few days of each other is very well taken. The convention of the American Street Railway Association is held in the last week in September, or the first or second week in October each year, and there are many who desire to attend each, both the New York State and the national conventions. It is a serious thing to consider absences recurring so close to each other, and while this is somewhat of a departure from the established practice in this association, it strikes me very favorably indeed. I should say that a better attendance at our meetings and a better representation at the meetings of the American Street Railway Association could be secured by separating them in this way. Certainly it is very desirable, it seems to me, that there should be a large representation from the different companies at these meetings, and the great value of the meetings of the New York State Street Railway Association has been enforced upon my attention during the past few years. When one comes in contact with the laws of this State governing the construction and operation of street railways and compares them with the laws of other States, one is at once struck by the very great advance we have made in our statutes governing these things. In some States the electric railways, notwithstanding their importance, do not possess at this time the right of condemnation or the power of eminent domain. In other States twenty-five-year franchises are in vogue and many other things of like character. I do not believe, personally, that any such advance could have been made as has been made in this State had it not been for this association and its work. Its benefits and advantages are enforced upon my mind more and more, and I hear from all parts of the country most experienced and prominent men refer to this association as a leading example of organizations of this character.

It has fallen to my lot to undertake, with the assistance of others, the reformation and reorganization of the American Street Railway Association in an attempt to conduct it along higher and better lines, and in that work I have come in contact with the best men in our business throughout the country, and the appreciation expressed of the work done in New York State is very general.

I am very much pleased with this convention and the very serious and dignified way in which the work is being conducted, and I think the value of the association is bound to increase from year to year, and that anything which you may be able to do, with reference to the time and manner of holding conventions that will insure the greatest possible attendance ought to be done, and it seems to me this is a step in that direction.

J. N. Shannahan—I desire to offer an amendment to the original resolution which I moved for adoption, in that the date be fixed in the month of June, but the exact days be left to the discretion of the executive committee.

The President—The motion made by Mr. Shannahan is in substance that Article VII. be amended as follows:

"The regular meetings of the association shall be held in the month of June, in each year, and at such hour and place as shall be designated by the executive committee, etc."

The amendment, as proposed by Mr. Shannahan, was adopted.

The President—Before taking up the next order of business I will call upon Albert L. Judson, accountant of the New York State Board of Railroad Commissioners, to give us a little talk on some changes in the standard system of accounting which it has occurred to me would be wise and proper to make.

Mr. Judson—I am very glad of this opportunity, first, to thank you for your kind invitation to be your guest at this convention. I do so heartily.

So far as the accounting matter is concerned, at the last meeting of the Street Railway Accountants' Association of America, held at St. Louis last fall, the question of standardizing, so far as is possible, the accounts of electric and steam railroads, so that they might be compared with each other, particularly interurban roads, was taken up and discussed very thoroughly. The result of that discussion was the appointment of a committee by the National Association of Railway Commissioners, consisting of two Railroad Commissioners, one from Connecticut and one from Pennsylvania, a member of the Interstate Commerce Commission, a representative of the American Street Railway Accountants' Association and myself. We met with the committee of the Street Railway Accountants' Association in New York a short time ago and the matter was thoroughly discussed. The fact was admitted that in many respects the system of operation of interurban electric railroads was almost the same as that in use by the steam railroads. How to bring about a classification of operating accounts which might be based on the same idea, to be used by both steam and electric railroads, was a question. This matter has finally been left to a committee consisting of H. M. Kochersperger, third vice-president of the New York, New Haven & Hartford Railroad; G. N. Wilson, general auditor of the Lehigh Valley Railroad; C. N. Duffy, secretary and auditor of the Chicago City Railway Company, and W. F. Ham, treasurer and comptroller of the Washington Railway & Electric Company. It is expected that this sub-committee will be able to get out something which will meet the situation in two or three years.

As a matter of fact, a comparison between the accounts of electric railroads doing the same style of business as steam railroads is absolutely impossible at present, with the present classification. Street railway accountants think they have devised a system which is superior. The steam railroads have had their system in use so long that they do not like to change, so that it is probable that both sides will have to give way a little in order to arrive at a system of accounting which will be applicable to both systems. For instance, to illustrate one of the differences, where you have "Damages" under "General Expenses," the steam railroads have it as a "Conducting Transportation" item. The question of wages of station agents, the help in the various stations along the interurban roads, is not provided for directly in the street railway classification, but the committee which devised that system think that it covers in a general way all the accounts that are necessary for the purpose of making reports to official bodies, such as Railroad Commissioners, etc. For your own personal uses, of course, the system may be amplified to cover any local conditions. The classification of the construction accounts has not changed in any particular, neither have the operating expense accounts, so far as that is concerned. The principal change made by the Street Railway Accountants was in treatment of the income account.

Hereafter, beginning with this year, the State of New York will probably require as a part of the gross earnings the direct earnings of the property, including its electric light and power portion, and anything else which is the direct result of the operation of the property itself. Heretofore, as you will recall, advertising, sale of power and similar items have been given as "Income from other sources." This year, with the beginning of July, they are to be a part of the gross earnings. This system of classification and accounting has grown in use in the United States to such an extent that I believe all of the

Central and Middle States, and the New England States, with the exception of Massachusetts, have adopted it. It is expected that Massachusetts will fall in line some day, but of all the States in the East, I believe Massachusetts is the only one which has not finally adopted this system.

I would be very glad indeed to answer any questions I can or receive any suggestions which will aid the New York State Railroad Commission in publishing each year comprehensive information that will be of value to the public as well as the street railway companies; to the stockholders, bondholders and others.

James O. Carr, Counsel Schenectady Railway Company—I will ask Mr. Judson one question. You state that where a railway is operating an electric light plant, or possibly a gas plant, it is to report as part of the gross earnings the earnings of the electric light and gas plant. Is it also the intention of the Railroad Commissioners that these earnings shall be reported for the purposes of taxation as well? That is to say, the railways pay a tax of 1 per cent on the gross earnings. Are they also to pay that 1 per cent on the electric light and gas earnings?

Mr. Judson—I believe they do that now.

Mr. Carr—I think not.

Mr. Judson—From the standpoint of the State, I cannot strike off any taxation. (Laughter.) I will say that when the income account was originally arranged, it was arranged by some railroad men to put in the different items under "Income from other sources." Advertising is undoubtedly a part of the gross earnings of a company, and it would appear as if it might have been put in as a separate item for the purpose of escaping taxation—taken out of gross earnings and added somewhere else, but the man who makes the tax rolls at the Comptroller's office gets it in the right place.

Mr. Carr—If an electric railway company owns an electric light plant, and the electric light property is a separate corporation, if you include the lighting earnings, it pays twice, because as an electric light company it pays taxes on its earnings.

Mr. Judson—If it is separate corporation it pays taxes only once.

Mr. Carr—If you require these earnings to be stated as part of the gross earnings of the railroad company, would it not operate as a tax of 1 per cent in addition to the present tax of one-half of 1 per cent?

Mr. Judson—We are not looking at the proposition from the standpoint of taxation, but as an accounting proposition. Some of the companies, however, have found it almost impossible to divide the operating expenses of a corporation which distributes electricity and does other business with its own plant. It is almost impossible to take out of the operating expenses what applies strictly to the railroad proposition, and nothing else. In some instances the gross earnings from operation are required—the gross earnings of the railroad—and in the operating expenses the electric light plant is included, which produces a deficit from operation. Then when in the income from other sources sale of electric power is taken in, that makes the gross income show a nice profit. Where the stock and bonds of a corporation cover all these different things, it is almost impossible to arrive at correct statistics of percentage of earnings, unless the gross earnings include the gross earnings of all of the property.

Other miscellaneous business was transacted and the meeting adjourned.

The Boston & Worcester Street Railway Company, by arrangement with the Nahant Steamboat Line, is offering its patrons a round-trip ticket covering a trolley ride each way between Worcester and Boston and a steamboat ride to Nahant and back. The combination makes an excellent day's outing. It is the first time the experiment has been tried on this road.

FIRE PROTECTION IN GRAND RAPIDS

The Grand Rapids Street Railway Company has a comprehensive fire protection system, which has been built up within the last three years by special inspector, or fire warden, John Larmer. Inspector Larmer's duties consist in building up and maintaining safeguards against fire at the three car houses of the company and at Ramona, the company's amusement park.

It is at Ramona that the company's system for fire protection is most elaborate. About the grounds are located electric alarm boxes, each connected with a big gong in the pavilion. The alarm is given by pushing a button in the box a number of times, corresponding to the number on the box. On either side of the pavilion on the park lawns are located hose houses, in each of which are long lines of hose of the regulation 2½-in. and 1½-in. size. The hose is all racked up and ready to run out. One end is attached to the hydrant covered by the house, and to the other is attached a nozzle. The hydrant is never closed, and it is only necessary to open a valve to turn the water into the hose. In the basement underneath the pavilion is kept a hose cart with additional lengths of hose, which are hauled out as soon as an alarm is sounded. Other lines of hose are racked up on the roof of the pavilion veranda on either side. This hose is also attached to hydrants and with the nozzles on. Lengths of hose are kept stacked in the theater, attached to the hydrants. Each of the park concessions has its own hose equipment, also attached and ready for use.

Three electrically-driven pumps in a pump house near the pavilion grounds pump the water supply from the lake into a 1000-barrel tank located on a tower. When an alarm is sounded, the water is turned off from the tank and forced directly into the mains. With but two lines of hose a pressure of 72 lbs. is secured, and with seven lines of hose a pressure of 65 lbs. to the square inch is obtained from the pumps. A sprinkler system is used to protect the stage.

Two nights each week a fire drill is carried out. The firemen are fourteen in number, seven of them motormen and conductors, who, during the evenings and Sundays, act as special police at the park; the others are seven picked employees of the concessionaires.

When the alarm is given by the big gong in the pavilion, two of the firemen rush into the basement of the theater after the hose cart. Others drag the hose from the hose houses and turn on the water. Still others climb to the roof of the pavilion, each having his own particular post of duty. One man runs directly to the pump house and another to the tank. A private telephone system connects these places with the pavilion and other points about the grounds. When word is received by the telephone, the water is shut off from the tank and the pumps started. At each drill the exterior sprinkler of the stage is turned on. The sides and roof of the pavilion are deluged. When the drill is over, the hose is returned to its place and the men resume their duties. The department has run out the hose, started the pumps and thrown water within a minute and a half after the alarm is sounded. Besides the water protection, chemical extinguishers are placed about the park, fifty dry powder extinguishers and thirty liquid extinguishers being used. Ramona Athletic Park also has a line of hose and will soon have a hose house.

The car houses of the company are equipped with hose lines and fire extinguishers, and in one of the car houses an automatic sprinkler is installed. Fireproof paint is used at Ramona, and will be used at all of the car houses. Mr. Larmer makes his rounds of the car houses between 1 and 6 o'clock in the morning. He inspects the stoves in the cars, sees that no rubbish is allowed to accumulate, looks after the car houses and buildings and conducts the semi-weekly drill at Ramona. He also inspects the park concessions to see that they are kept free from inflammable material.

TABLE OF INCOME AND OPERATING EXPENSES PER CAR MILE

The accompanying table was compiled by H. M. Beardsley, secretary and treasurer of the Elmira Water, Light & Railroad Company, and was presented at the Lake George Convention of the Street Railway Association of the State of New York. It gives the various income and operating expenses for the year ending June 30, 1904, worked out on a car-mile basis, for all the member companies of the New York State Association. The comparative data offer much food for thought.

Income and Operating Expenses Per Car Mile of Roads Which Are Members of the New York State Association.

Year Ending June 30, 1904.

Compiled by H. M. BEARDSLEY, Elmira.

City	ALBANY		AUBURN		BINGHAMTON		BROOKLYN *	
Company	United Traction Co.		Auburn & Syracuse Elec. R. R. Co.		Binghamton Railway Co		Brooklyn Heights Railroad Co.	
	Amount	Per Car Mile	Amount	Per Car Mile	Amount	Per Car Mile	Amount	Per Car Mile
Car miles	8,297,632		904,822		1,210,622		53,891,975	
Income from operation	$1,690,204 64	20.37	$238,829 57	26.39	$239,223 32	19 76	$13,603,409 11	25.24
1. Maintenance track and roadway	64,147 77	.77	14,258 30	1.58	1,899 98	.15	296,369 25	.55
2. " electric line	19,820 39	.24	9,308 67	1.03	2,132 27	.18	151,375 14	.28
3. " buildings	8,422 09	.10	660 08	.07	462 17	.04	133,044 92	.24
4. " steam plant	3,878 26	.05	1,637 93	.28	1,529 97	.13	124,694 14	.23
5. " electric plant	945 58	.01	347 89	.03	210 73	.02	32,670 28	.10
6. " cars	29,006 38	.35	5,621 84	.62	8,727 44	.72	361,810 54	.71
7. " electrical equipment of cars	29,326 90	.35	5,561 16	.62	7,851 69	.65	373,040 22	.70
8. " miscellaneous equipment	2,092 93	.03	423 18	.05	345 78	.03	81,066 92	.15
9. Miscellaneous shop expenses	5,914 52	.07	429 23	.05	2,153 69	.09	147,986 97	.27
Total Maintenance	165,355 36	1.97	38,248 28	4.23	24,271 72	2.01	1,742,058 38	3.23
10. Power plant wages	18,287 36	.22	15,477 42	1.71	5,827 77	48	337,520 08	.63
11. Fuel	18,037 34	.22	17,032 12	1.88	15,613 77	1.29	863,175 36	1 60
12. Water	8,291 42	.10	193 35	.02			100,712 26	.19
13. Oil and waste	2,226 78	.03	926 21	.10	843 45	.07	17,137 04	.03
14. Miscellaneous expenses of power plant	2,061 60	.02	75 38	.01	306 36	.02	49,520 59	.09
15. Hired power	99,620 25	1.20					51,785 28	.10
16. Supt. of transportation	47,029 19	.59	835 00	.09	1,311 00	.11	195,114 29	.36
17. Wages of conductors	209,704 67	2.53	15,293 98	1.69	27,286 01	2.25	1,253,193 15	2.32
18. Wages of Motormen	209,204 02	2.53	15,293 93	1.69	27,675 65	2.29	1,229,156 00	2.28
19. Wages other car service employees	27,777 34	.34	784 96	.09	2,270 56	19	497,298 72	.92
20. Wages car house employees	23,947 03	.29	7,248 87	.80	4,151 24	.34	131,353 32	24
21. Car service supplies	7,715 11	.09	1,315 63	.15	1,002 70	.08	33,599 24	.06
22. Miscellaneous car service expenses	24,565 85	.18	2,207 75	.24	93 80	.01	116,651 16	.22
22a. Hired equipment	28,235 58	.34						
23. Cleaning and sanding track	18,302 38	.20	92 40	.01	547 35	.05	20,419 77	.04
24. Removal of snow and ice	11,871 75	.14	4,745 66	.52	1,236 87	.10	84,859 56	.16
Total Operating	747,676 28	9 00	81,522 66	9 00	88,166 73	7.28	4,981,495 82	9.24
25. Salaries of general officers	18,687 23	.22	5,303 63	59	4,500 00	.37	44,531 07	.08
26. " " clerks	18,374 81	.22	2,840 98	31	2,071 48	.17	117,293 14	.22
27. Printing and stationery	3,663 13	.05	389 67	.04	330 81	.00	12,517 70	.02
28. Miscellaneous expenses	6,357 57	.08	2,859 83	.31	357 93	.03	23,955 35	.04
29. Store room expenses	2,527 27	.03					18,272 35	.03
30. Stable expenses	6,851 88	.08	636 02	.07	659 89	.05		
31. Advertising and attractions	273 50	.01	2,608 10	.29	4,339 54	.30	3,730 76	.01
32. Miscellaneous general expenses	7,920 04	.10	3,820 94	.42	1,539 75	.13	34,907 96	.06
33. Damages	45,840 11	.55	7,130 40	.79	2,049 95	.18	667,384 65	1.24
34. Legal expenses in connection with damages	11,504 95	.13					228,105 76	.43
35. Other legal expenses	4,253 73	.05			350 00	.03	37,689 41	.07
36. Rent of land and building	684 32	.01	2,347 25	.26			8,828 38	.01
37. " " track and terminals	44,599 01	.54	21,505 42	1.27			20,946 72	.04
38. Insurance	19,087 63	.23	1,662 00	.18	2,230 00	.18	143,587 48	27
39. Express							20,693 43	.04
Total General	190,630 18	2.30	40,104 24	4.43	118,447 75	1.52	1,382,441 06	2.56
Total Operating Expenses	2,161,861 82	13.27	159,875 18	17.66	130,887 20	10.82	8,105,995 26	15.03

City	BROOKLYN		BUFFALO		CANANDAIGUA		CORTLAND	
Company	Coney Is. & Brooklyn R. R. Co.		International Railway Co.		Rochester & Eastern Rapid Ry. Co		Cortland County Traction Co.	
	Amount	Per Car Mile	Amount	Per Car Mile	Amount	Per Car Mile	Amount	Per Car Mile
Car miles	6,391,140		15,153,937		270,548		218,871	
Income from operation	$1,643,767 69	25.72	$3,470,450 09	22.90	$72,978 26	26.97	$47,393 02	21.65
1. Maintenance track and roadway	42,869 83	.67	137,302 25	.91	4,800 13	1.78	4,408 11	2.02
2. " electric line	14,727 43	.23	27,158 96	.18	821 38	30	398 55	.18
3. " buildings	5,012 68	.08	9,459 97	06	163 01	.06	158 58	.07
4. " steam plant	25,269 07	.59	5,916 99	.04	447 59	.17	474 98	.22
5. " electric plant	1,944 90	.03	5,416 63	.03	67 67	.02	12 16	.01
6. " cars	27,770 19	.43	89,006 16	.58	3,332 66	1 23	1,645 64	.75
7. " electrical equipment of cars	57,939 30	.91	70,704 01	.47	1,285 92	.48	1,410 60	.64
8. " miscellaneous equipment	2,380 19	.04	5,614 08	.04	161 45	.06	25 20	.01
9. Miscellaneous shop expenses	364 16	.01	10,196 56	.07	820 30	30	210 59	.10
Total Maintenance	178,477 75	2.79	360,775 63	2.38	11,900 20	4 40	8,754 41	4 00
10. Power plant wages	42,060 79	.66	32,834 98	.21	5,280 57	1 95	1,323 67	.60
11. Fuel	160,597 78	2.51	40,394 85	.26	13,371 73	4 94	4,058 34	1.85
12. Water	10,136 70	.16	663 23	.01	122 06	.05		
13. Oil and waste	4,966 46	.08	1,624 10	01	679 50	25	150 92	.07
14. Miscellaneous expenses of power plant	6,968 19	.11	1,089 75	.01	146 07	.05	195 83	.09
15. Hired power	26,695 68	.41	248,182 57	1.64				
16. Supt. of transportation	19,375 73	.30	38,423 26	.25	1,315 99	49	600 00	.28
17. Wages of conductors	168,265 75	2.63	357,179 03	2 35	3,809 22	1.40	4,430 44	2.02
18. Wages of Motormen	168,263 75	2 63	343,283 51	2 27	3,887 51	1.44	4,194 63	1.92
19. Wages other car service employees	18,436 34	.29	71,228 59	.47	58 22	.02	365 38	.17
20. Wages car house employees	26,899 98	27	70,598 43	.47	1,493 29	.55	694 34	.31
21. Car service supplies	2,638 29	.04	14,166 13	.09	662 22	.24	197 62	.09
22. Miscellaneous car service expenses	25,763 18	40	38,352 51	.25	4,801 91	1.78	523 91	24
22a. Hired equipment			744 37	.01				
23. Cleaning and sanding track	4,430 18	.07	15,094 86	.10	85 78	.03	130 40	.06
24. Removal of snow and ice	6,035 82	.10	40,661 67	.27	1,129 66	.42	918 73	.42
Total Operating	681,352 62	10 66	1,314,531 84	8.67	36,841 53	13.61	17,784 41	8.12
25. Salaries of general officers	16,800 00	.26	41,775 04	.27	2,096 04	.77	2,916 67	.87
26. " " clerks	8,696 93	.14	24,408 19	.16	2,003 80	.74	817 83	.37
27. Printing and stationery	2,455 17	02	6,239 31	.04	1,358 21	.49	131 31	.06
28. Miscellaneous expenses	1,104 19	.02	6,692 23	.04	325 88	12	237 43	.11
29. Store room expenses	883 17	.01	8,550 11	.06	268 03	.10	2 44	.01
30. Stable expenses	7,376 64	.12	6,901 90	.05			354 10	.16
31. Advertising and attractions			7,233 16	.05	2,482 69	.92	1,116 25	.05
32. Miscellaneous general expenses	7,551 68	.12	23,789 85	.16	715 39	.26	491 41	.22
33. Damages	108,470 01	1.70	235,785 76	1.55	165 98	.06	102 20	.05
34. Legal expenses in connection with damages	2,105 77	.03	9,932 84	.07	12 43	.01		
35. Other legal expenses	2,546 05	.04	10,568 99	.07				
36. Rent of land and building	2,000 00	.03	10,727 35	.07	419 15	.16		
37. " " track and terminals	21,901 86	.34			6,579 75	2.44		
38. Insurance	27,561 74	43	33,856 80	.22	140 00	.05	904 20	.41
39. Express								
Total General	208,253 41	3 26	426,461 73	2.81	16,545 35	6.12	5,073 84	2 31
Total Operating Expenses	1,068,283 78	16.71	2,101,769 20	13.86	65,289 08	24 13	31,612 66	14 44

City	ELMIRA		FISHKILL		FREDONIA	
Company	Elmira Water, Light & R. R. Co.		Citizens Ry., Light & Power Co.		Dunkirk & Fredonia Ry. Co.	
	Amount	Per Car Mile	Amount	Per Car Mile	Amount	Per Car Mile
Car miles	1,206,965		179,982		122,935	
Income from operation	$194,044 12	16.08	$44,888 40	24 94	$42,269 03	34 38
1. Maintenance track and roadway	27,267 37	2.26	2,831 99	1.57	818 32	66
2. " electric line	2,326 87	19	307 48	.17	399 95	35
3. " buildings	783 55	06	545 76	.50	86 34	.07
4. " steam plant					1,473 97	1.20
5. " electric plant					53 34	04
6. " cars	7,324 12	61	5,310 20	2 96	1,676 70	1 36
7. " electrical equipment of cars	6,150 32	.51	1,614 05	90	1,385 12	1.13
8. " miscellaneous equipment	26 63				225 19	18
9. Miscellaneous shop expenses	135 91	.01	191 22	.11		
Total Maintenance	44,014 77	3 64	10,801 07	6 01	6,118 93	4.97
10. Power plant wages					1,686 84	1.37
11. Fuel					11,011 54	8 96
12. Water					140 00	12
13. Oil and waste					241 25	20
14. Miscellaneous expenses of power plant					164 89	14
15. Hired power	25,325 48	2.10	5,758 00	3.20	1,120 00	.91
16. Supt. of transportation	1,426 65	12				
17. Wages of conductors	25,019 42	2.09	3,705 00	2.06	2,662 12	2.17
18. Wages of Motormen	24,292 61	2 01	4,524 82	2.51	2,400 00	1.95
19. Wages other car service employees	1,160 70	10				
20. Wages car house employees	5,578 86	.29	637 75	.35		
21. Car service supplies	1,489 13	.12	514 59	29	175 59	.14
22. Miscellaneous car service expenses	1,819 44	.15			175 59	14
22a. Hired equipment						
23. Cleaning and sanding track	1,488 84	.12	155 40	.08	20 90	.02
24. Removal of snow and ice	855 46	.07	192 76	.11	1,174 32	.95
Total Operating	86,456 57	7.17	15,488 32	8 60	20,975 04	17.06
25. Salaries of general officers	3,360 00	.28	1,960 89	1.09	200 00	.16
26. " " clerks	1,124 73	.09			431 79	35
27. Printing and stationery	295 05	.02	34 50	.02	22 50	02
28. Miscellaneous expenses	818 07	.07	325 06	.18	277 59	.23
29. Store room expenses	199 12	.02	24 16	01		
30. Stable expenses						
31. Advertising and attractions	1,253 36	.10	301 98	.17	1,734 31	1.41
32. Miscellaneous general expenses	755 30	.06	27 98	.01	98 82	.08
33. Damages	3,907 60	.32				
34. Legal expenses in connection with damages						
35. Other legal expenses	375 00	.03			20 50	.02
36. Rent of land and building	297 52	.02				
37. " " track and terminals	529 92	.05				
38. Insurance	1,438 94	.12	1,200 00	.67	275 64	.23
39. Express						
Total General	14,354 61	1.18	3,874 57	2.15	3,061 15	2.50
Total Operating Expenses	144,825 95	11.99	30,163 96	16 76	30,153 12	24.53

* Cable plant included with steam plant. Maintenance of locomotives included with maintenance of misc. equipment. Wages of trainmen (elevated) included with motormen.

City.	GARDENVILLE		GLENS FALLS		HORNELLSVILLE		ITHACA	
Company.	Buff., Gar. & Eb. Ry		Hudson Valley Ry. Co.		Hornellsville Elec. Ry.		Ithaca Street Ry. Co.	
	Amount.	Per C. M.	Amount	Per C. M.	Amount	Per C. M.	Amount.	Per C. M.
Car miles	97,614		2,265,130		181,440		376,492	
Income from Operation	$ 14,006 07	14.35	$ 465,218 75	20.54	$ 15,854 16	8 74	$87,653 86	23.34
1. Maintenance track and roadway	2,805 47	2 98	33,210 64	1.47	1,905 06	1.05	2,131 14	.57
2. " electric line	113 00	.11	11,496 46	.61	168 32	09	606 36	.16
3. " buildings			2,952 66	.13	360 02	.19	168 92	.04
4. " steam plant			6,611 11	.29				
5. " electric plant			3,856 19	.17			9 76	
6. " cars	416 07	.43	15,066 56	66	894 10	.49	2,936 86	.78
7. " electrical equipment of cars	221 38	.23	19,872 06	.88	999 26	.66	2,610 96	.67
8. " miscellaneous equipment			1,121 14	.06			31 17	.01
9. Miscellaneous shop expenses	70 98	.07	2,230 97	.10			340 73	.09
Total Maintenance	3,726 90	3.82	96,414 87	4.26	4,316 76	2.38	8,734 89	2.32
10. Power plant wages			17,338 63	.77			3,613 63	.93
11. Fuel			27,969 08	1.23			19,007 09	5.06
12. Water			426 97	.02				
13. Oil and waste	24 20	.02	1,269 58	.05				
14. Miscellaneous expenses of power plant			948 06	.04			108 98	.03
16. Hired power	3,600 00	3.69	31,513 16	1.39	3,223 83	1.77		
16. Supt. of transportation			10,164 25	46			834 50	.22
17. Wages of conductors	1,445 17	1 48	37,208 99	1.64	3,051 20	1 68	9,272 39	2.47
18. Wages of motormen	1,451 46	1 48	37,333 86	1.65	3,010 00	1.68	8,900 59	2.37
19. Wages other car service employees			4,767 76	21			6 15	
20. Wages car house employees	174 40	.18	7,101 37	.32	349 12	19	1,167 89	.31
21. Car service supplies	380 90	.39	3,407 22	.15			427 06	.11
22. Miscellaneous car service expenses			7,700 66	.34			11 76	
22a. Hired equipment								
23. Cleaning and sanding track			716 42	.03			744 69	.20
24. Removal of snow and ice	238 94	.25	7,485 03	.33	184 18	.10	258 39	.07
Total Operating	7,316 07	7 49	196,339 93	8 62	9,818 33	5.42	44 253 01	11.77
25. Salaries of general officers	225 00	.23	6,224 96	.28	797 07	.44	2,980 83	.79
26. Salaries of clerks	201 60	.20	8,328 16	.37				
27. Printing and stationery	34 76	.04	991 48	.04			60 27	.02
28. Miscellaneous expenses	41 88	.05	945 12	04	27 86	01	12 09	
29. Store room expenses			922 66	04				
30. Stable expenses			285 34	01			67 37	.02
31. Advertising and attractions	149 00	.15	1,598 49	07			3,078 88	82
32. Miscellaneous general expenses	28 90	.03	3,624 04	.16	379 72	.21	1,307 16	35
33. Damages			14,147 17	62	16 00	01		
34. Legal expenses in connection with damages	7 70	.01	2,627 39	.12			2,360 00	.63
36. Other legal expenses			2,343 74	.11	210 00	.12		
36. Rent of land and building			2,495 00	.11				
37. Rent of track and terminals			19,403 19	.85				
38. Insurance	15 00	01	7,200 00	.32	85 00	.04	788 52	.21
39. Express			12,185 63	.53				
Total General	703 74	72	83,221 69	3 67	1,514 64	.83	10 645 17	2 84
Total Operating Expenses	11 744 71	12.03	374,976 29	16 55	15,649 72	8.63	63 633 07	16 93

City.	KINGSTON		MONTOUR FALLS		NEWBURGH		NEW YORK	
Company.	King. Con. R. R. Co.		Elmira & Sen. L. Ry.		Orange Co Trac Co.		New York City Ry. Co.	
	Amount.	Per C. M.	Amount	Per C. M.	Amount	Per C. M.	Amount	Per C. M.
Car miles	493,599		201,721		528,392		45,383,254	
Income from Operation	$123,037 51	24.93	$ 39,237 33	19 45	$112,760 02	21.34	$15,133,600 70	33.35
1. Maintenance track and roadway	6,648 06	1.14	6,685 94	3 31	9,506 16	1 80	288,807 86	.62
2. " electric line	782 58	16	42 38	02	1,401 96	.27	207,251 57	.46
3. " buildings	154 37	.03	93 83	05	524 75	10	42,388 98	.09
4. " steam plant	259 84	.05	1,094 83	.54	185 02	.03	44,033 99	10
5. " electric plant	96 90	.02	16 80	.01	412 25	.08	50,709 03	.11
6. " cars	4,483 78	.91	616 77	.31	4,643 63	88	385,909 20	.85
7. " electrical equipment of cars	3,134 06	.64	917 67	.45	4,567 00	86	427,170 73	.94
8. " miscellaneous equipment	265 90	05	301 24	.15	477 29	.09	1,629 03	
9. Miscellaneous shop expenses	1,953 88	40	78 09	04	151 77	03		
Total Maintenance	16,779 37	3 40	9,846 56	4.88	21,869 83	4 14	1,439,900 39	3.17
10. Power plant wages	3,416 37	.69	2,468 73	1.22	3,221 71	61	125,749 43	.28
11. Fuel	7,722 90	1.56	7,028 78	3.49	9,692 13	1.84	385,369 14	.85
12. Water					200 04	.04	42,608 73	.10
13. Oil and waste	595 09	.12	111 22	.06	275 27	.05		
14. Miscellaneous expenses of power plant	181 88	04	323 30	.16	186 39	.03	26,760 91	.06
16. Hired power							76,547 05	.17
16. Supt. of transportation			1,200 00	59			337,737 75	.74
17. Wages of conductors	11,860 08	2 41	2,951 31	1.46	11,216 14	2.12	1,465,409 05	3 23
18. Wages of motormen	13 536 33	2.74	2,951 31	1 46	13,399 91	2 53	1,465,409 05	3.23
19. Wages other car service employees					1,663 34	.29		
20. Wages car house employees	1,714 11	35	1,404 64	.70	1,993 08	.38	247,439 67	.54
21. Car service supplies	290 93	.06	193 86	.09	778 16	.15	80,471 67	.18
22. Miscellaneous car service expenses	364 42	.07	266 10	.13	488 51	.09	28,718 40	.06
22a. Hired equipment							459,363 99	1.01
23. Cleaning and sanding track	1,100 45	.22	118 03	.06	519 04	.10	9,601 14	.02
24. Removal of snow and ice	495 18	.10	880 19	44	335 23	.07	93,067 12	.20
Total Operating	41,276 74	8.36	19,897 47	9 86	43,867 95	8 30	4 843,153 10	10.67
25. Salaries of general officers	5,100 00	1 03	1,778 46	88	3,845 04	.73	126,792 17	.28
26. Salaries of clerks	1,210 66	.24	716 16	.35	2,669 36	.50		
27. Printing and stationery	214 00	.04	63 83	.03	339 05	.06		
28. Miscellaneous expenses	85 15	.02	130 30	07	297 03	.05	65,663 94	15
29. Store room expenses					93 84	.02		
30. Stable expenses	315 29	.06						
31. Advertising and attractions	2,806 69	57	59 60	.03	3,591 16	68		
32. Miscellaneous general expenses	529 94	.11	161 61	.08	1,708 40	.32	11,362 21	.02
33. Damages	1,058 66	.22	30 00	.02	5,629 36	1.05	757,301 68	1.67
34. Legal expenses in connection with damages	1,433 93	29					461 850 81	1 01
36. Other legal expenses	349 33	.07			561 85	.11	41,234 65	.09
36. Rent of land and building	1 00		296 36	.15	648 00	.10	26,925 91	.06
37. Rent of track and terminals			3,233 40	1 60			103,603 62	.23
38. Insurance	1,523 74	31	410 99	.20	1,618 80	.31	86,869 65	19
39. Express								
Total General	14 626 29	2 96	6,880 61	3 41	20 781 86	3 93	1,681 504 64	3 70
Total Operating Expenses	72,684 40	14 72	36 624 3	18 15	86,519 64	16.37	7,964,558 13	17.54

City.	OGDENSBURG		ONEIDA		ONEONTA	
Company.	Ogdensburg St. Ry Co.		Oneida Ry. Co		O. C. & R. S. Ry Co	
	Amount	Per C. M.	Amount	Per C. M.	Amount	Per C. M.
Car miles	314,160		147,349		674,360	
Income from Operation	$ 27,862 15	8.87	$ 12,404 84	8.42	$ 77,703 83	13.53
1. Maintenance track and roadway	591 29	.19	9 79	01	6,064 10	1 06
2. " electric line	93 18	.03	5 87		2,637 24	46
3. " buildings	64		2 16		311 60	.05
4. " steam plant	137 09	.04			448 90	08
5. " electric plant	175 63	.06	106 75	.07	392 40	.07
6. " cars	3,652 15	1.16	855 14	.58	6,662 48	1.16
7. " electrical equipment of cars	64 80	02	482 96	.33	6,749 19	1.00
8. " miscellaneous equipment			65 48	.05	56 30	.01
9. Miscellaneous shop expenses			188 33	.13	347 50	.06
Total Maintenance	4,714 78	1.50	1,716 46	1.17	22,660 71	3.95
10. Power plant wages	1,274 00	41			6,580 29	1.15
11. Fuel	287 25	09			21,361 83	3.72
12. Water						
13. Oil and waste	40 78	.01	1 00		725 65	.13
14. Miscellaneous expenses of power plant	561 65	.18	12 49	.01	200 33	.03
16. Hired power			4,190 89	2.84		
16. Supt. of transportation					1,759 79	31
17. Wages of conductors	4,478 07	1 42	2,529 96	1.72	5,909 38	1.03
18. Wages of motormen	5,445 48	1.73	2,499 11	1.70	6,982 47	1.21
19. Wages other car service employees	1,130 98	.36	80 85	.05	1,794 02	.31
20. Wages car house employees	1,130 89	.36	523 47	.37	1,274 31	.22
21. Car service supplies	212 93	.07	67 31	.04	670 20	.10
22. Miscellaneous car service expenses			253 96	.17	606 88	10
22a. Hired equipment						
23. Cleaning and sanding track			97 66	.07	28 06	.01
24. Removal of snow and ice	513 92	.16	264 30	.19	1,652 85	.29
Total Operating	15,075 95	4.79	10,541 00	7.16	49,446 06	8.61
25. Salaries of general officers	1,166 66	.37			1,300 00	.22
26. Salaries of clerks	512 21	.16	266 40	.18	5,916 26	1.03
27. Printing and stationery	10 36		91 73	.06		
28. Miscellaneous expenses	200 00	.07	115 46	.08	1,485 95	.26
29. Store room expenses					215 93	.04
30. Stable expenses					413 19	.07
31. Advertising and attractions	325 00	11			16 96	
32. Miscellaneous general expenses	360 92	.12	145 39	10	40 45	.01
33. Damages			372 14	.25	1,487 68	.26
34. Legal expenses in connection with damages	255 99	08			97 85	.02
36. Other legal expenses	255 99	08				
36. Rent of land and building			65 00	.04	133 06	.02
37. Rent of track and terminals					645 00	.11
38. Insurance	234 75	.07	648 00	.45	2,420 94	42
39. Express						
Total General	3,321 88	1 06	1,704 14	1 16	14,172 29	2 46
Total Operating Expenses	23,112 61	7.36	13,961 60	9.49	86,279 08	15 02

City.	PEEKSKILL		PLATTSBURG		PORTCHESTER		POUGHKEEPSIE		ROCHESTER	
Company.	Peeks'll L. & R. R Co.		Plattsburg Trac. Co.		N. Y. & Stamford Ry.		P. C. & W. F. E. Ry. Co		Rochester Railway Co.	
	Amount	Per C. M.	Amount	Per C. M	Amount	Per C M	Amount	Per C. M.	Amount.	Per C. M.
Car miles	293,398		132,573		764,196		464,781		6,138,030	
Income from Operation	$ 50,015 77	17 05	$ 21,004 26	15 84	$121,614 70	16 92	$ 98,406 30	21.17	$1,487,181 81	24 23
1. Maintenance track and roadway	1,276 15	.44	773 62	.58	1,689 49	.22	3,073 27	.66	15,980 10	.26
2. " electric line	184 66	.06	260 24	.19	2,014 29	.26	4,694 04	1.01	21,134 39	.34
3. " buildings	122 00	.04	38 95	.03	509 65	.07	45 85	.01	4,161 62	07
4. " steam plant					193 68	.03	1,439 61	.31	10,735 34	.17
5. " electric plant	699 47	.24			2 66		156 50	03	5,589 87	.09
6. " cars	1,184 29	.40	622 41	.47	3,232 76	.42	3,913 77	.84	47,392 00	.77
7. " electrical equipment of cars	597 65	.20	199 01	.15	1,941 67	.25	5,157 06	1.11	47,584 92	78
8. " miscellaneous equipment	Red 16 92				157 32	.02			3,122 17	.06
9. Miscellaneous shop expenses			23 73	.03	89 10	.01	23 63	.01	7,148 00	.12
Total Maintenance	4,047 20	1.38	1,927 96	1.45	9,830 61	1.28	18,503 73	3.98	162,848 31	2.65
10. Power plant wages					3,804 23	.49			25,320 33	.41
11. Fuel					10,260 76	1.34	10,999 16	2.37	74,786 76	1 22
12. Water					1,082 76	14			2,103 93	.03
13. Oil and waste					163 45	.02	1,021 65	22	1,661 33	.03
14. Miscellaneous expenses of power plant					259 71	.03	42 52	01	1,585 02	.02
15. Hired power	7,856 07	2.68	1,988 59	1.50					68,158 17	1.11
16. Supt. of transportation	916 00	.31	574 86	43	1,217 08	16			12,863 46	.21
17. Wages of conductors	6,235 86	2.13	1,861 44	1 40	15,247 76	2 00	33,420 41	7 19	152,059 34	2.48
18. Wages of motormen	6,238 06	2 13	1,855 54	1 40	15,247 76	2.00			153,384 62	2.49
19. Wages other car service employees			270 75	20	312 41	.04			8,494 39	.14
20. Wages car house employees	1,026 21	.36	404 38	.30	2,589 65	33			13,001 16	21
21. Car service supplies	157 50	.05	206 46	16	449 90	.05	36 01	01	11,072 64	.20
22. Miscellaneous car service expenses	158 98	.05	170 81	13	1,344 66	.18	53 25	01	20,091 55	.31
22a. Hired equipment										
23. Cleaning and sanding track	82 39	.03	43 10	03	707 77	09			3,300 77	.05
24. Removal of snow and ice	165 97	.06	196 53	.15	402 65	.05	484 67	.10	20,305 09	.33
Total Operating	22,826 84	7 78	7,632 44	5.76	53,090 66	6 92	46,063 67	9.91	568,792 55	9 27
25. Salaries of general officers	1,375 00	47	1,500 00	1 13	2,623 84	.33	5,360 00	1.16	15,416 65	25
26. Salaries of clerks	904 00	.31			1,434 64	.19			14,388 98	.23
27. Printing and stationery	81 54	.03	112 56	.08	153 78	.02	71 18	.02	1,967 10	03
28. Miscellaneous expenses	61 65	.02	265 35	20	274 04	.04	220 77	.08	3,307 32	.06
29. Store room expenses									2,140 00	04
30. Stable expenses							1,768 24	.38	3,845 04	06
31. Advertising and attractions	606 06	.17	385 00	.29	5,446 39	.71			8,686 17	16
32. Miscellaneous general expenses	344 76	.12	379 56	.29	1,678 49	.21	1,549 20	33	10,428 47	.17
33. Damages	90 00	.03	742 76	.58	1,286 07	17	145 00	.03	43,588 61	.71
34. Legal expenses in connection with damages					7,412 64	97	108 00	.02	4,200 00	.07
35. Other legal expenses									1,977 88	.03
36. Rent of land and building			83 33	.06	236 01	.02			998 00	.01
37. Rent of track and terminals									820 31	.01
38. Insurance	4,032 76	1.37	169 68	12	2,415 39	.32	1,485 75	.31	7,247 08	12
39. Express										
Total General	7,405 76	2 52	3,638 21	2 74	23,011 17	3 01	10,686 14	2 30	119,107 20	1 94
Total Operating Expenses	34,278 80	11.68	13,108 61	9 94	88,032 34	11 21	75,263 54	16 19	850,748 06	13 86

City.	SCHENECTADY		SYRACUSE		SYRACUSE		SYRACUSE		UTICA	
Company.	Schenectady Ry. Co.		Syracuse, L. & Bald.		Syracuse Rapid Transit		Syracuse and Suburban		Utica & Mohawk Val.	
	Amount.	Per C. M.	Amount.	Per C. M.	Amount.	Per C. M.	Amount.	Per C. M.	Amount	Per C. M
Car miles	2,755,036		226,967		3,869,887		438,492		3,394 271	
Income from Operation	$660,202 58	23.96	$ 60,988 69	22.46	$834,561 74	21 56	$ 83,513 64	19.05	$724,938 09	21.36
1. Maintenance track and roadway	19,810 91	.72	1,742 89	.77	$ 16,229 82	41	5,256 94	1.20	24,841 83	.73
2. " electric line	7,358 09	.26	618 28	.27	9,431 60	.21	616 68	.14	9,273 71	.27
3. " buildings	4,362 77	.16	27 73	.01	1,452 69	04	560 08	.13	947 72	.03
4. " steam plant	740 15	.02	164 80	.07	13,205 60	.34	111 88	03	1,555 32	05
5. " electric plant	1,458 52	.05	636 67	.28	8,431 72	.21	207 76	05	751 32	.02
6. " cars	37,392 01	1 36	1,216 86	54	26,409 06	.68	1,902 43	.43	19,160 49	.56
7. " electrical equipment of cars	22,710 47	.82	2,513 21	1 11	19,546 00	.50	2,357 20	.54	20,379 48	.60
8. " miscellaneous equipment	1,639 88	.06	96 97	04	498 56	.01			4,217 30	.13
9. Miscellaneous shop expenses	4,571 09	.18	36 77	.01	2,400 00	.06	762 48	.17	5,944 70	18
Total Maintenance	99,943 89	3.63	7,053 10	3.10	97,604 84	2.52	11,775 44	2.69	87,061 87	2.57
10. Power plant wages	7,368 22	26	2,224 82	.98	10,784 23	.28	2,030 52	46	10,041 48	.30
11. Fuel			5,426 72	2.40	65,562 62	1 69	1,048 73	24	961 89	03
12. Water					316 71	.01			12 35	
13. Oil and waste	122 87	.01	244 14	.11	2,010 34	05	123 27	.03	210 37	.01
14. Miscellaneous expenses of power plant	1,067 97	.04	217 80	10	732 40	02	66 10	.01	781 10	.02
15. Hired power	69,946 53	2.54	562 90	.25	1,189 47	03			128 992 75	3.80
16. Supt. of transportation	12,591 56	.46	19 30	.01	3,555 88	10			3,616 06	.11
17. Wages of conductors	60,319 41	2.19	2,798 48	1.23	86,428 52	2.23	7,008 05	1.60	59,692 11	1.76
18. Wages of motormen	61,948 89	2 25	2,732 17	1.20	89,754 00	2.31	7,516 62	1 72	59,703 67	1.76
19. Wages other car service employees	7,129 57	.26	109 45	.05	5,154 69	.13			5,088 68	15
20. Wages car house employees	22,809 41	82	823 33	.36	8,540 94	22	4,294 67	98	15,621 41	48
21. Car service supplies	5,303 31	19	105 86	.05	2,832 74	.08	447 41	10	6,615 17	20
22. Miscellaneous car service expenses	22,102 50	80	382 77	.16	4,262 10	.11	307 43	07	8,786 39	.26
22a. Hired equipment										
23. Cleaning and sanding track	4,768 66	.18	57 25	.02	3,823 57	.10	281 06	.06	2,186 77	.06
24. Removal of snow and ice	6,308 37	.19	28 67	.01	8,189 60	.21	1,396 35	.32	15 803 02	47
Total Operating	280,817 29	10.19	15,733 66	6 93	293,136 71	7.57	24,521 11	5.59	318,134 74	9 37
25. Salaries of general officers	3,661 98	.13	2,277 92	1.00	13,768 36	.35	3,540 00	.81	10,253 29	.30
26. Salaries of clerks	10,717 47	39	1,143 32	.50	5,269 49	.14	1,480 50	.33	5,685 67	.17
27. Printing and stationery	1,807 10	.07	89 97	.04	732 69	.02	115 85	.03	1,274 21	.04
28. Miscellaneous expenses	2,138 96	.08	109 27	.05	116 77	.01	1,960 36	.45	1,149 18	.03
29. Store room expenses	2,727 03	.10			335 00	.01			784 83	.02
30. Stable expenses	5,504 78	.20			2,762 41	.07	193 80	.05	2,263 56	.07
31. Advertising and attractions	3,018 43	11	175 65	08	4,985 38	.13	976 62	.22	2,788 55	.08
32. Miscellaneous general expenses	7 411 19	.27	943 66	42	5,765 86	.15	4,881 00	1 11	6,820 38	.20
33. Damages	24,801 69	.90	225 00	.10	50,469 89	1.30	536 50	.12	21,748 12	.64
34. Legal expenses in connection with damages	84 22		228 23	.10	4,527 32	.11	213 86	.05	2,080 11	.06
35. Other legal expenses	586 83	.02	1,175 96	.52	4,033 53	.12	723 93	.16	1,798 79	.05
36. Rent of land and building	861 72	03			1,520 14	.04	970 08	.22	769 08	.02
37. Rent of track and terminals	46,000 66	1.67							70 37	
38. Insurance	5,734 68	21	300 00	13	4,800 00	13	16 00	.01	8,332 06	.25
39. Express									22,177 24	.65
Total General	115,666 62	4 20	6,668 87	2 94	99,666 84	2.58	16,602 56	3 56	87,666 73	2 58
Total Operating Expenses	496,117 70	18 02	20,455 63 (6 mos only)	12 97	490,408 30	12 67	81,899 10	18 84	492,863 33	14 52

MEETING OF THE OHIO INTERURBAN RAILWAY ASSOCIATION

The Ohio Interurban Railway Association held its last meeting of the season at Cedar Point, near Sandusky, last week. This is a most attractive summer resort, and is popularly called the Atlantic City of the Great Lakes. It is a point of land ¼ mile wide and extending 10 miles into Lake Erie, and accessible only by steamer from Sandusky, and it is of tremendous importance to the Lake Shore Electric Railway, whose interurban cars run directly to the boat landing. The meeting was largely of a social nature, nearly all of the members bringing their families, who greatly enjoyed the boat ride, bathing and other attractions of the place. About 150 sat down to a noonday luncheon of excellent quality, in which lake fish was the leading feature. A toast was offered to E. C. Spring, the absent president, who is still confined to his home near Dayton, as the result of a six weeks' illness.

The short morning session was devoted to the discussion of the subject, "Freight vs. Express." It was a very one-sided discussion, owing to the absence of some of the strongest advocates of the freight business.

Vice-President Warren Bicknell, who presided, invited F. D. Carpenter, of the Western Ohio, to open the discussion in the absence of Harrie P. Clegg, of the Dayton & Troy. He said Mr. Carpenter had had experience with both classes of business, his road having recently changed from express to freight, and he asked Mr. Carpenter to explain why.

Mr. Carpenter said it was an important question, and that he was willing to have it understood that the present freight business on his road was in direct opposition to his views. The connecting roads both north and south of him handled freight and wanted to try to develop through business, so he reluctantly consented to a trial, but as a matter of fact they had not dropped the company's local express business, and were handling it on the same cars with the freight. He thought that not one in ten interurban roads were built to handle freight. They usually have a single track going through the centers of towns. To operate any large number of freight cars would mean an interference with the operation of passenger cars, which is the companies' chief business. He said that while his company had one of the largest power stations on an interurban road and had plenty of excess power, he did not think either his road nor the majority of roads had sufficient excess power to handle the varying loads caused by the operation of freight trains at irregular intervals. If they interlined with steam roads as some of the electric lines professed a desire to do, they would have to take whatever was offered to them, and at times this would mean heavy trains that could not possibly be moved. He referred to one electric line which had started with the plan of hauling trains by an electric locomotive, and he understood this company had been obliged to abandon this locomotive and buy steam locomotives. The parallel steam roads had let go of the local passenger traffic with reluctance, and it would be waving a red flag at them to attempt to take the freight business, particularly the through freight. Altogether, he had no faith in the proposition of the present forms of electric roads handling freight. On the contrary, he said, they had worked up a nice little package express business at express rates, and he proposed to hang on to it and develop it.

I. L. Oppenheimer, of the Ohio River Electric Railway & Power Company, said his company handled both classes. They are situated differently from the majority of roads. They connect at Middleport with the Hocking Valley Railway (steam), and handle its cars for Pomeroy and Racine, the latter 12 miles from the junction. Cars are handled at night by electric locomotive, and they receive from $2 to $5 per car, switching charges; empties returned free. They haul four cars at once, the plan being to get between them on account of heavy grades. It is a profitable business, and they are a feeder to, rather than in competition with, steam roads. They expect to buy a heavier locomotive and 100 coal cars with which they will serve a coal mine on their line, and will interchange with the steam road on a per diem basis. Their power station runs all night for lighting, and as the interurban cars are then off, the freight about balances the load. In their express service they handle packages at 10 cents and 25 cents, selling tickets which are rung up as cash fares. They have a wholesale shipper's rate of 10 cents per cwt. to any point on the line, not less than 50 lbs. accepted. He said that during a recent month it cost 10.86 cents per car-mile to operate freight cars, and the earnings per car-mile were considerably more than for passenger cars.

F. W. Coen, of the Lake Shore Electric Railway, thought the advisability of handling freight or express hinged upon the geographical position of a road. Roads having no steam competition like the Eastern Ohio and Toledo & Western could probably work up considerable freight business and make money on it, but he did not think freight was profitable on a line closely paralleling a steam road. On the Toledo-Norwalk division of their road they formerly handled freight. For the year previous to the change to express, the earnings per car-mile were 12 cents to 14 cents. They ran three cars each way a day and had plenty of business; in fact, it was 33⅓ per cent of the entire Toledo Union Station business, where five of the other roads did similar business. In September, 1903, the Electric Package Company took over the business and rates were almost quadrupled. People complained and the quantity of business dropped off, but at present their earnings from the Electric Package Company are about 27 cents per car-mile, this being after deliveries and terminal station expenses were deducted, but including power maintenance and wages of train crew. Their cost of operating is about 10 cents per car-mile. He explained that the Electric Package Company was an association, and that it had no capital account, all expenses being charged to operation. New equipment is charged to the various roads; in 1903 they paid $4,000 for horses, wagons, etc., and there has been nothing since. Their net from freight in 1903 was $5,000, while the net from the Electric Package Company in 1904 was $17,000, which convinces them that express is a much better proposition for a road of their class.

J. R. Harrigan, of the Columbus, Newark & Zanesville, said their rates were between freight and express, and because the name sounds better they class it as express. Cars make two round trips a day between Columbus and Zanesville, the service having just been started on the Zanesville extension. They are handicapped by poor terminal facilities in both terminal cities. It was out of the question for them to handle carload freight, and he agreed with Mr. Carpenter as to the practicability of handling standard freight cars. They have discontinued wagon service as unprofitable. They get the business because their rates are lower than express, and they give practically express service.

Theodore Stebbins, of the Appleyard system, said his business was the same as that of Mr. Harrigan's, only they called it freight. He thought about 90 per cent of it was freight at rates between steam freight and express, and the balance was delivered express at rates slightly higher than steam express. Their freight cars earn 32 cents to 35 cents per car-mile, which is more than the passenger cars earn. He thought the success of the business was largely dependent upon keeping the cars full. Get as much high-priced matter as possible and then fill the cars with cheap stuff at standard freight rates if necessary to get it. He thought a good manager should be able to accomplish this and at the same time not have the cars loaded with a lot of bulky, cumbersome freight that was unprofitable.

In answer to a question, George S. Davis, of the Street Railway Journal, said that the Ohio roads were about evenly divided on the question of freight and express; if anything,

more roads handled freight at slightly higher than steam freight rates. As an example of a road handling carload freight at freight rates in close competition with steam roads, he spoke of the Toledo & Indiana. They are within a stone's throw of the Lake Shore & Michigan Southern (steam) over the entire route. They have a number of standard freight cars and handle trains of a number of cars by electric locomotive, being limited only by the amount of business they can get. They have laid sidings into a number of factories and get considerable business on account of prompt deliveries, and because they load and unload goods right in the towns. They claim to be earning 50 cents to 60 cents per car-mile on freight business. He agreed with Mr. Stebbins that much depended upon keeping the cars full. He spoke of two roads in Eastern New York that distinguish between freight and express only in the matter of immediate shipment and deliveries. They agree to handle bulky stuff any time within a specified period, and they keep their cars filled by having a considerable amount of this class of goods in their warehouses ready for shipment. He thought some of the roads doing purely an express business could increase their receipts without increasing their car mileage by moving farm produce at freight rates. At present some of them cannot touch this class because their rates are too high.

W. H. Abbott, of the Roberts & Abbott Company, said that on all new propositions they were considering carefully the freight prospects, and that nearly all new roads were being built with few curves and grades with this in view. He thought the majority of old roads were in no condition to handle carload freight, both from the standpoint of track and power stations. He thought that where only one or two cars were handled it was foolish to attempt to do business at steam freight rates. If you can get business enough for trains of cars, it was doubtless profitable, but this means extra equipment in the power station, at least 600 kw extra for each freight train to be handled, and more feeders and sub-stations closer together.

F. T. Pomeroy, of the Cleveland & Southwestern, thought there was money in securing switching charges for transferring carload freight, but could see no money in it in competition with steam roads. He thought the profits shown by some of the freight-carrying electric roads were largely a matter of bookkeeping; that they did not know what it cost to operate.

F. J. Stout, of the Lake Shore Electric Railway, said their main business was passenger business and that freight cars were a disturbing element to good service. They have a single-track line and give half-hourly headway much of the time, in addition to five limited trains each way, and their chief concern was to keep the cars on time and carry people safely. Freight cars necessarily run slower, and he thought that even if they had double track all the way that an increase of freight business would interfere with the passenger business.

W. H. Abbott, of the Roberts & Abbott Company, agreed that a road having business enough to warrant half-hourly headway had better let the carload freight business alone.

C. N. Wilcoxson, of the Cleveland & Southwestern, said he knew of some roads that had taken contracts for moving brick, stone and building material in competition with steam roads. He figured they lost more than they earned, besides straining their power-station equipment. He thought if a road advertised that it would haul freight, it would be obliged to take anything that was offered or run the risk of having its charter forfeited. He thought that even with business enough for two-car or three-car trains, it was not profitable to handle it at steam road rates.

J. H. Merrill, chairman of the transportation committee, stated that the agreement on the Ohio interchangeable coupon books would expire Aug. 19, and he asked the various parties to the agreement to sign up the new contracts that would be sent to them. He stated that the plan was proving very popular among the traveling public, and that about 2800 books were in use at that time. He announced that the Indiana Union Traction Company had signed the agreement and would accept the books on its lines, making them available on something over 1500 miles of roads at the present time, with additional contracts expected in the near future.

A NOVEL A. C. BLOCK SIGNALING SYSTEM

BY CHARLES E. BENNETT.

There is now in successful operation on the electric tramways at San Juan, Porto Rico, a block signal system that embodies features believed to be somewhat out of the ordinary. In brief, the source of energy for operating the signal lamps is a 220-volt alternating current main, the current from which is stepped down to 20 volts by means of two special 2-kw transformers placed near the center of each block. The signal lamps are connected in series with the primary side of these transformers. One of the track rails throughout the system is insulated from ground and is divided at the center of each block into insulated sections. One secondary lead of one transformer is connected to the insulated rail going in one direction, and one secondary lead of the other transformer is connected to the insulated rail going in the other direction. The remaining secondary leads of the two transformers for each block are connected together and are tapped to the second track rail, which is not insulated, and acts as a common return for the alternating current of the signal system and the direct current of the trolley circuit. The number and candle power of the signal lamps in the primary circuit of each set of transformers are so selected with respect to the voltage of the energizing current as to give a choking effect or reactance of sufficient density so that the current normally flowing in the primary circuit will not cause the lamps to light. It will now be understood, by reference to Fig. 1, that when a car enters the block the car axle will bridge the two track rails, causing a short circuit on the secondary side of the transformers, thereby breaking down the resistance and permitting sufficient current to

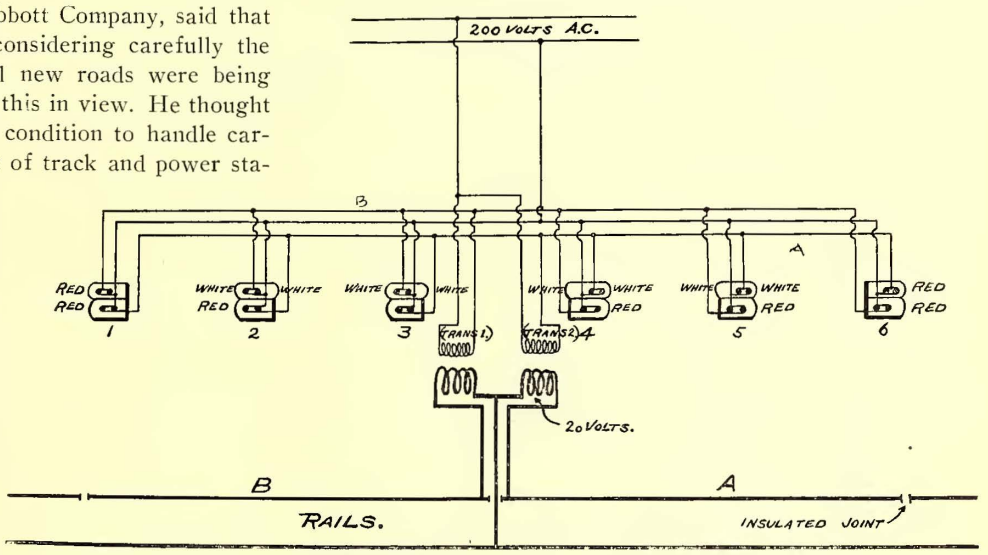


FIG. 1.—WIRING DIAGRAM FOR SIGNAL SYSTEM, SAN JUAN

flow in the primary circuits to cause all the lamps to burn brightly.

The number of signal lamps to be used is a matter for determination, depending upon the voltage of the lamps and the length of the block. The lamps will be required to work upon a rather variable voltage, varying approximately from 85 to 120 volts, inasmuch as the resistance in the secondary circuits will change as the car approaches the extreme ends of the section. It will be evident that under these conditions better regulation will be secured by having a greater number of lamps of low candle-power rather than fewer lamps of higher voltage. By experimenting, the writer found that lamps of about 120 volts were best adapted to the system, and in Fig. 1 is shown the layout of a block equipped with six signal boxes, each box including two sets of lenses. Two lamps are provided for each lens, one lamp placed directly back of the other, so that if one should burn out the other will still give the proper indication through the lens. The signal boxes may be located at different points along the section, and the signals will be given simultaneously at all the boxes. This introduces a very important additional element of safety, inasmuch as the lights at the various points serve as a constant check on the train crews, and in the event of a crew running past a red signal at the entrance to the block, they will still be confronted with warning lights at frequent intervals along the block. Moreover, the crew of an opposing car moving in the same block will be warned that the crew of the approaching car has disobeyed the signals, and they will be able to take suitable steps to prevent disaster.

The complete working of the system will be understood by reference to Fig. 1. It will be seen that a car entering at B will

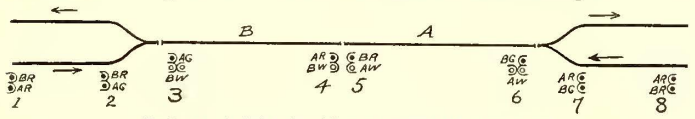


FIG. 2.—LOCATION OF SIGNAL BOXES

cause a red signal to light up in boxes 1, 4, 5 and 6, thereby protecting itself at extreme ends of the block as well as at the intermediate points in the block. White lights will appear in boxes 2 and 3, these white lights serving the one purpose of indicating whether or not the signal system is working normally. Failure to get a white light signifies that something is out of order. As the car moves beyond the middle of the block into section A, red lights appear in boxes 1, 2, 3 and 6. The red lights in boxes 1 and 6, however, are changed from the upper to the lower lens, thus showing the waiting car that the one in the block is approaching. Should two cars enter from opposite ends of the block at the same instant, all lamps will light up. This will cause red signals to be shown against the entering cars. Should one of the transformers feeding either section of the block become crippled, the car entering will fail to get a white light, showing at once that the signal is out of order.

It will be evident that the system requires five wires, two for the 220-volt alternating-current main and three for the lamp circuits. As installed at San Juan, the system required the giving up of one track rail for the signal system, but it will not be a difficult matter to devise some form of induction bond or reactance choke coil so that this rail may be used for the trolley return, while at the same time carrying the alternating current of the signal circuit.

It is a comparatively simple matter to arrange the signal system so that two or more cars may run through the block in the same direction. With the wiring, as shown in Fig. 1, it is possible to do this, providing there is an understanding that such arrangement of cars shall pass as a unit. Or it can be done as shown in Fig. 2. In this case A and B represent the two divisions of the block between the turnouts. It will be necessary to use three colors of lenses, W, G and R, as shown on the diagram, indicating respectively white, green and red lenses; that is, for example, A G represents a green signal, operated from the transformer connected to the section A, and is illuminated only when a car is on that section.

To illustrate, assume two cars entering from the right. The leading car enters upon section A, immediately throwing a red light in box No. 7 A R, holding the second car at that point. The first car continues on to section B, setting signals B R in boxes 5 and 8, and B G in boxes 6 and 7. The second car upon receiving green signals in boxes 6 and 7 will follow into section A, but can only go as far as box 5 until the first car leaves section B, for the reason that, as long as the car is in section B, danger signals are illuminated in all B R boxes. This feature of the system is advantageous, because cars are kept safely apart while running in the same direction. Should two cars enter the block from opposite ends simultaneously, green lights will be displayed in boxes 3 and 6 against both of them. Both the motormen, knowing in the first place that they are not following cars, will anticipate trouble, and one of the cars will have to back out, giving the other the right of way. This perhaps is not a perfect arrangement, but no accident could occur, for the reason that they would both face danger signals in the middle of the block. White signals are installed in boxes 3, 4, 5 and 6, and are used to indicate merely that the system is operating normally.

This method is also applicable to a double-track road using overlaps, it being necessary to install one transformer in each overlap and five wires for the lamp circuits and alternating-current mains.

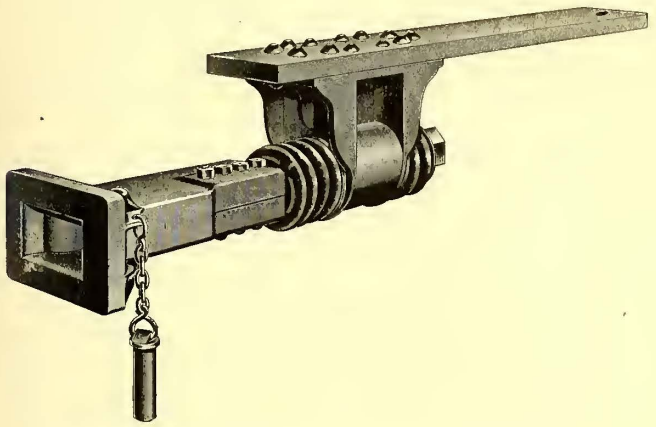
THE ELECTRIC RAILWAY AS AN AUTOMOBILE AMBULANCE

General Superintendent F. J. Stout, of the Lake Shore Electric Railway, has hit upon a scheme for bringing a little extra revenue to his road from an extraordinary source. The road closely parallels the main east and west highway all the way from Cleveland to Toledo, which is used a great deal by automobile tourists, and needless to say the cars frequently puncture or break down. Time and again Superintendent Stout had passed a smile at the sight of a farmer with his team dragging a disabled automobile to the nearest repair shop, when recently an idea struck him. He bought a couple of block and tackle outfits and some good, stout planks, and caused it to be known that his company would furnish automobile ambulances on short notice at any time of day or night. He uses an ordinary flat car, propelled by a work car, freight car or anything that is handy, and arriving at the scene, the damaged auto is pulled aboard in short order. The new service comes rather high, but it is a great convenience to automobile owners, and is much less embarrassing than having to resort to the horse to get back to town. For $15 an automobile will be hauled 15 miles, or for $25 it will be carried 50 miles, with greater distances at 50 cents a mile. It looks like a very good idea, four autos having been rescued within the last ten days.

The Sandusky, Norwalk & Mansfield Railway has been placed in operation between Norwalk and Plymouth. The work of installing the overhead was done last week by John Mann, chief electrician of the Lake Shore Electric Railway, who adopted the rather novel method of stringing live wire. A reel of wire was placed on the front end of the car and furnished with power from the Lake Shore Electric power station, and the car simply pushed its way to the end, unreeling and stringing the trolley as it went. The task was carried through without accident, and 26 miles of trolley wire strung in two days. Some little difficulty was experienced in getting a start out of Norwalk, owing to the number of telephone and electric light wires which, of course, had to be elevated, but once out of town it was smooth sailing.

NEW TYPE OF DRAW-BAR

W. T. Van Dorn, of the W. T. Van Dorn Company, of Chicago, has recently brought out an improved draw-bar for heavy service which presents several radical improvements over former draw-bars manufactured by him. The feature of the draw-bar, which is entitled No. 19, is the use of a round pin instead of one having an elliptical or elongated section. The coupling pin used on this type of bar is 1 11-16 ins. in



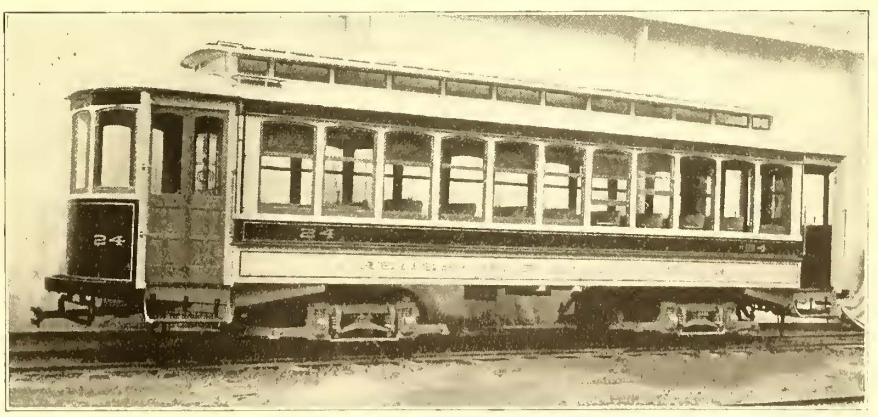
NEW DRAW-BAR WITH ROUND COUPLING PIN

diameter, and it is designed to drop in either at the center of the link or at one side of the mouth of the bar, as in the other forms of Van Dorn bars. The advantage of the round pin in distributing the wear is self-evident. Every time that it is used it presents a different surface to the wear of the link; at the same time the round pin is found to deflect the link at the time of coupling just as easily as the former type. The No. 19 draw-bar is made with a tail bolt, as shown in the illustration, and the No. 20 draw-bar, which also used the round pin, employs an 80-lb. rail instead of a tail-bolt.

SEMI-CONVERTIBLE CARS FOR FREDERICK & MIDDLETOWN RAILWAY, MD.

The semi-convertible type of car illustrated has recently been delivered to the Frederick (Md.) & Middletown Railway Company, by the J. G. Brill Company, to be operated on the lines connecting Frederick, Middletown and Myersville. The railway company is well acquainted with the semi-convertible window system, the Brill Company having previously furnished it with this type. The illustration shows some of the windows held at different heights and others raised entirely into the roof pockets, and also the neat arm rests provided on the low sills.

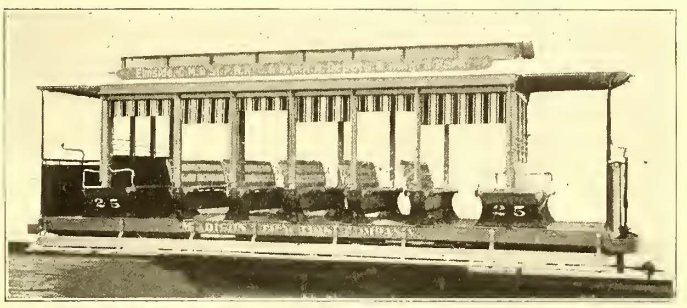
The cars measure 30 ft. 8 ins. over the end panels, and are 8 ft. 2 ins. wide over all. They are seated for forty-two passengers. An interesting arrangement is that of the longitudinal seats at one end, occupying the space of two windows. Baggage will be carried in this end of the car, and the seats are arranged to drop with the cane against the side of the car, thus providing extra space without any liability of injury to the seats. The transverse seats are of spring cane and are 36 ins. long, leaving a 22-in. aisle. Ash in natural color and birch ceilings neatly decorated constitute the interior finish. The trucks are of the No. 27-G type for fast and heavy city and suburban service. The length over the vestibules is 40 ft. 8 ins., and from the panel over the crown piece and the vestibule, 5 ft. The width over the sills is 7 ft. 10½ ins. The sweep of the posts is 1¾ ins.; the distance between the centers of the posts is 2 ft. 8 ins. The side sills are 4 ins. x 7¾ ins., and the end sills are 5¼ ins. x 6⅞ ins. The sill plates are 12 ins. x ⅜ in. The thickness of the corner posts is 3⅝ ins., and of the side posts, 3¼ ins. The furnishings include angle-iron bumpers, "Dedenda" gongs, "Dumpit" sand boxes, etc.



ONE OF THE FREDERICK & MIDDLETOWN RAILWAY COMPANY'S DOUBLE-VESTIBULE, SEMI-CONVERTIBLE CARS

SUMMER EQUIPMENT FOR MADISON, WIS.

The Madison (Wis.) Traction Company has recently added to its equipment the nine-bench type of open car illustrated, intended for service in the city and suburbs of Madison, where the company operates about thirty-five cars. The length over the bulkheads is 18 ft. 10 ins., and the width over the seat ends is 7 ft. ½ in. The seats are reversible, with the exception of the two seats at each end of car, and are of ash slats, with a double row of spindles in the backs. The seat arms are of bronze. The sashes in the bulkheads are arranged to drop



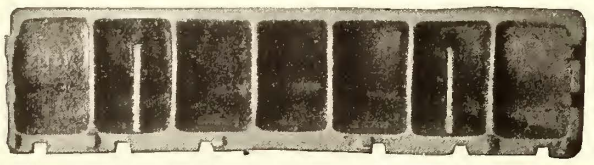
NINE-BENCH, SINGLE-TRUCK CAR FOR THE MADISON TRACTION COMPANY

into pockets between the seats. The curtains may be drawn to the floor, the Brill round-corner seat-end panels which are used being so arranged in connection with the grooves in the posts as to permit the curtains to come down over the post outside of the panels, a continuation of the grooves of the posts being formed in the exterior surface of the panel. The panel also provides for an easy entrance, as there are no sharp projecting corners, and increases the safety of passengers compelled to stand on the running board. The interior finish is of ash, with decorated quartered oak ceiling.

The length of this car over the crown pieces is 27 ft. 6 ins., and the width over the sills, including the facing, is 6 ft. 3 ins. The sweep of the posts is 5 ins. The distance between the centers of the posts is 2 ft. 9 ins. The side sill size is 4½ ins. x 7 ins.; the sill plates are 7 ins. x ½ in.; the thickness of corner posts is 3⅝ ins., and of the side posts, 2¾ ins. The height of the steps is 17 ins., and of the risers, 16 ins. Angle-iron bumpers, radial draw-bars, gongs, sand boxes, ratchet brake handles, etc., of Brill manufacture are also included.

A NEW CAR REPLACER

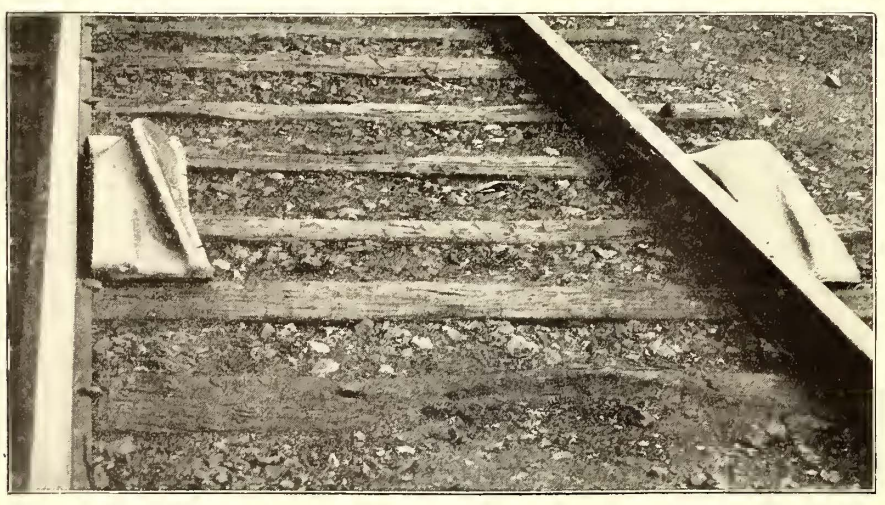
The Buda Foundry & Manufacturing Company, of Chicago, has recently put on the market a car replacer which is illustrated herewith. One of the important features of this device is the groove that protects the flange by allowing the tread of the wheel to first engage the replacer preparatory to mounting. This construction makes it possible for the tread, and not the flange of the wheel, to first grip the replacer. The increase in the friction thus secured, over what would be possible if the flange only were presented, is readily apparent, and the great



UNDER SIDE OF CAR REPLACER

force and shock to the equipment that is ordinarily made necessary is obviated, and thus the injury which so often occurs to the flange, equipment or to the replacer while rerailing a car is avoided. Again, there are overcome the tendency to shove the replacers out of position, and also the spinning of wheels in the attempt to secure, on the flange alone, sufficient friction to start the ascent, especially in the case of very heavy equipment. Another desirable point in the replacer, and one which will doubtless meet with considerable favor, is the reduction of the pronounced and abrupt arch at the ends. Reference again to the illustration will show how thin the approach has been made, at the same time this method of construction has been accomplished without decreasing the strength required at the points mentioned.

The inner replacer shows for itself more plainly than could be told by description how the wheel is forced toward the rail. Repeated experiments have shown that it is not possible for



CAR REPLACER IN POSITION

the wheel to travel over the top of the replacer and drop on the opposite side—the deflection has been proved positive and absolutely complete in each instance. During the entire rerailing operation there is no shock whatever, and the resultant saving to the equipment, as well as the economy in the time required, leads the manufacturers to feel that they have a replacer which will meet with great success.

The demand for strength has also been met, and tests made by the Hunt Bureau of Tests have demonstrated that the Buda replacer will sustain a load more than two and one-half times as heavy as any locomotive now in use. This is accomplished by the proper distribution of metal and not by any undue amount. A cut is shown of the under side of a replacer which illustrates its construction. Convenient carrying handles are provided, which are shown near the end. Another style has center handles. The replacers come in two sizes, the No. 1, for 60-lb. rail, weighing 150 lbs. a pair; the No. 2, for 100-lb. rail, weighing 200 lbs. a pair.

PREPARATIONS FOR THE PHILADELPHIA CONVENTION

A meeting of the executive committee of the American Street Railway Manufacturers' Association was held in New York, July 7, and a number of important preliminaries in connection with the Philadelphia convention next September were arranged. There were present at the meeting Chairman Brady and Messrs. Carlton, Heulings, McGraw, Martin, Pierce, Randall, Wharton and Baker and President Ely, of the American Street Railway Association.

The resignation of Committeeman W. H. Whiteside, of the Allis-Chalmers Company, was received, and Frank C. Randall, manager of the New York office of the company, was elected in his place. E. H. Baker, of the Galena Signal Oil Company, was appointed to fill the vacancy caused by the resignation of Mr. Randall, as representative of the National Electric Company.

It was decided to provide admission to the exhibition hall by means of tickets, which will be distributed under the direction of the executive committee.

Mr. Wharton, as chairman of the local committee, confirmed the agreement made with the executive committee of the American Street Railway Association, selecting the Philadelphia Museum as the place of meeting, and also the hall for holding the exhibits. He also announced that arrangements had been made with a well-known caterer in Philadelphia for supplying a lunch at the convention hall, at which moderate prices will be charged; also that arrangements had been made for coaches for conveying attendants between the convention hall and the Walnut Street cars.

THE WHEEL QUESTION

In the article on this subject by C. G. Bacon, Jr., in the last issue of this paper, a paragraph read: "And why is it not possible * * * as did the wheel shown in Fig. 3?" This reference should be to Fig. 4. The following paragraph should also be inserted after the reference to Fig. 3: "Wherein is the wheel itself, or its manufacturers, at fault in the showing as per Fig. 3? Yet this was the condition of two wheels on the same axle under a car in street railway service, in a recent test, after 13,416 miles of service."

SIGHT-SEEING IN SAN FRANCISCO

In connection with its "Seeing San Francisco" service, the United Railroads of San Francisco publishes an interesting folder containing illustrations and descriptions of the city's noted buildings, monuments, street and harbor scenes, etc., together with a list of statistical items about the Golden Gate metropolis. The sight-seers' car, which is accompanied by a lecturer, takes over two hours to make its rounds, and half a dollar is charged for the complete trip.

One advantage of this attractive sight-seeing service, both in San Francisco and other cities, is that even the city residents are led to indulge in similar trips, especially on holidays.

FINANCIAL INTELLIGENCE

Wall Street, July 12, 1905.

The Money Market

Some improvement was noted in the local money market this week. The demand for accommodation was larger than in the preceding week, and rates for fixed periods ruled slightly above those recently quoted. Money on call was in abundant supply at rates ranging at from 2¼ to 3 per cent, with most of the business transacted at 2½ to 2¾ per cent. In the time loan department, brokers reported a fair increase in the inquiry for funds, especially for the long maturities, as a result of the increased activity in the securities market. Early in the week the demand was supplied largely by out-of-town lenders, who placed moderate amounts of six months' funds at 3¾ per cent, but as soon as this supply was exhausted the rate rose to 4 per cent, with very little money obtainable under that figure. Local institutions were not disposed to offer with any degree of freedom, owing to the preparations making for payment of the remaining 25 per cent of Government deposits, due on July 15, and the expectations of heavy subscriptions to the new Japanese 4½ per cent loan to be offered to investors this week. Mercantile paper continued in good demand, but the supply was not materially larger. Rates were unchanged on the basis of 3¾ per cent for choice names. Sterling exchange was weak, prime demand sterling declining about 25 points to 4.8675, which is considerably below the gold export rate. The decline in sterling was attributed to the placing of sterling loans. The foreign markets ruled easy and practically unchanged. At London the discount rate was 1⅞ per cent; at Berlin, 2⅛ per cent, and at Paris, 1 13-16 per cent. The bank statement published last Saturday was rather disappointing. Loans decreased $4,410,500 and deposits decreased $7,733,800. Cash decreased $5,634,500 and the surplus reserve decreased $3,701,050 to $7,957,825, as against $36,017,725 in the corresponding week of last year and $8,008,475 in 1903. United States deposits amounted to $10,952,225, as against $14,755,725 in the preceding week.

The Stock Market

Increased activity developed in the stock market this week, but prices continued to show more or less irregularity as a result of profit-taking sales. During the first half of the week the upward movement was resumed, and in many instances new high records were established, but toward the close heavy realizing by the speculative element carried prices off rather sharply. London traded only moderately and at no time was an important factor in the market. Commission houses, however, were more active than in the preceding week, indicating a growing interest in the speculation on the part of the outside public. Reading and Union Pacific were the leaders of the market, both establishing new high records on heavy purchases. Other prominent features of strength were New York Central, Louisville & Nashville, Pennsylvania, St. Paul and Erie. In the specialties, Tennessee Coal & Iron scored a sensational advance. Amalgamated Copper showed early strength, but in the subsequent dealings practically all of the early gain was lost. At the beginning of the present week the upward movement was continued, there being no unfavorable developments over the holiday, but on Tuesday there was considerable selling by the professional element, which carried prices off sharply. Western houses were particularly heavy sellers of Union Pacific. Reading declined sharply, as did New York Central and Pennsylvania, while in other quarters of the market the recession ranged from 1 to 2 per cent. The Steel stocks were in urgent demand throughout and held relatively strong. Baltimore & Ohio was also conspicuously strong at the close. The bond department was moderately active and firm, the feature being the activity and strength in Japanese issues. The closing was soft.

The local traction issues were less active. In the early dealings prices held fairly firm, but at the close there were sharp recessions in sympathy with the decline in other quarters of the market.

Philadelphia

Increased dullness characterized the market for traction stocks this week. Dealings included a fairly large number of issues, but the individual totals were considerably smaller than in the preceding week. The general tone, however, was firm. United Gas & Improvement was especially strong. In the early dealings the price fluctuated between 93¾ and 94, but toward the close there was a sharp rise to 95⅞, from which it reacted only a small fraction. About 2500 shares were dealt in. Philadelphia Traction was practically unchanged, about 800 shares changing hands at 100¼ to 100. Philadelphia Rapid Transit was extremely dull, but firm, practically all transactions taking place at 28¾. Philadelphia Company common sold to the extent of about 1500 shares at from 44 to 43½, while the preferred sold at 47¾ to 48. Other transactions included Rochester Railway & Light preferred at 92¾, United Railways of San Francisco preferred at 87½, Union Traction at 60½ to 60, Fairmount Park Transportation at 17, Union Traction of Pittsburg preferred at 51, American Railways at 51, United Companies of New Jersey at 269½, and Union Passenger Railway at 235.

Chicago

Little interest was manifest in this market. Trading was confined to a few issues, and apart from a sharp rise in Chicago & Oak Park Elevated preferred from 16 to 17¾ on the exchange of less than 600 shares, the dealings were without feature. The common recovered a point to 5 on the purchase of about 400 shares. A small lot of Chicago Union Traction preferred sold at 28. Northwestern Elevated common brought 21⅞ for 125 shares.

It is said that Mayor Dunne has a new traction plan, but before anything is done another attempt will be made to have the traction interests fix a price upon their properties.

Other Traction Securities

The Boston market was fairly active and irregular. Boston & Suburban common sold at 22 and 22½, while the preferred rose from 68½ to 70. Boston & Worcester common declined from 30 to 29 on limited dealings, but subsequently there was an advance to 30¼. The preferred was dealt in to the extent of about 2000 shares at from 76½ to 77, and closed near the highest. West End common moved up a point to 98 on the exchange of a small lot. Boston Elevated sold at 157¾. Massachusetts Electric common sold at 19¾ to 19½, and the preferred at from 63¾ to 63.

At Baltimore, trading was upon an exceedingly small scale, but prices generally held firm. United Railway issues, which have been the market leaders for weeks past, were unusually dull. Odd lots of the stock brought 13. The 4 per cent bonds sold at 93¾ to 94 for about $25,000, while the incomes changed hands at 59½ to 59¾. City & Suburban 5s sold at 113¼. Virginia Railway & Development 5s advanced from 99 to 100. On the New York Curb market, Interborough Rapid Transit ruled quiet but firm, about 700 shares selling at prices ranging from 200½ to 202. New Orleans Railway common sold at 35¾ for 100 shares, while 200 of the preferred brought 79½.

There was little activity at Cincinnati last week. Toledo Railways & Light featured and made a gain of 1 point from 34¼ to 35¼. Cincinnati, Dayton & Toledo stock showed a fractional decline to 23. There were heavy sales in the 5 per cent bonds of this company, with a range of 94⅞ and 95. Southern Ohio 5s, an underlying issue, sold at 98¼. Cincinnati, Newport & Covington preferred and common both showed fractional declines, the former selling at 92¼ and the latter at 32¾. Detroit United sold at 93½, and Cincinnati Street Railway at 147.

Northern Texas again featured in Cleveland, and it made a jump of several points to 66. Aurora, Elgin & Chicago common was firm at 16½ on a number of sales, and the preferred sold at 65¾ for a small lot; the 5 per cent bonds sold at 93 and 93½. Northern Ohio Traction reached a high mark in several years trading of 24. Western Ohio receipts advanced to 14½, on reports that the property would be taken into the Widener-Elkins trans-State project, and there was considerable trading in the bonds of this company at 80 to 80⅜. Cleveland Electric sold at 77½ and 78.

Security Quotations

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

	July 5	July 12
American Railways	50½	50
Boston Elevated	a157	157
Brooklyn Rapid Transit	72½	69½
Chicago City	a190	a190
Chicago Union Traction (common)	7	7½
Chicago Union Traction (preferred)	32	32
Cleveland Electric	79½	78
Consolidated Traction of New Jersey	82	82

	July 5	July 12
Consolidated Traction of New Jersey 5s	108½	108½
Detroit United	93¾	93
Interborough Rapid Transit	200⅞	200⅜
International Traction (common)	—	a28
International Traction (preferred) 4s	—	a65
Manhattan Railway	165	164
Massachusetts Electric Cos. (common)	18	a19
Massachusetts Electric Cos. (preferred)	a62	63
Metropolitan Elevated, Chicago (common)	24	23⅞
Metropolitan Elevated, Chicago (preferred)	65	65
Metropolitan Street	129¾	125¾
Metropolitan Securities	84½	81¾
New Orleans Railways (common), W. I.	38	38
New Orleans Railways (preferred), W. I.	80¾	80¾
New Orleans Railways 4½s	90	90
North American	99¾	98⅝
North Jersey Street Railway	25	25
Philadelphia Company (common)	*43¼	43
Philadelphia Rapid Transit	28⅝	28
Philadelphia Traction	100	100
Public Service Corporation 5 per cent notes	97	97
Public Service Corporation certificates	69	69
South Side Elevated (Chicago)	94½	95
Third Avenue	130	127
Twin City, Minneapolis (common)	113	113⅛
Union Traction (Philadelphia)	60	59½
West End (common)	97	97
West End (preferred)	*114	114

a Asked. W. I., when issued. * Ex-dividend.

Iron and Steel

The monthly statistics collected by the "Iron Age" show that the production of coke and anthracite pig iron fell off from the record of 1,964,000 tons in May, a month of thirty-one days, to 1,793,000 tons in June, a short month. The greater part was due to the restriction of the operations of the steel companies, whose product declined 136,000 tons, while the output of the merchant furnaces fell off only 35,000 tons. The active capacity has undergone a sharp decline, having receded from 443,092 tons on June 1, to 408,617 tons on July 1. The demand for structural material is very active, the pressure being so heavy that orders are reported to have been sent abroad. Premiums are being paid for prompt delivery, and there is a disposition in some quarters to agitate for an advance in the base prices. Additional business is in sight for the steel rail mills, and in the wire trade the first indications of a revival of buying have been noted.

JUNE OUTING OF NEW ENGLAND STREET RAILWAY CLUB

The June outing of the New England Street Railway Club took place Thursday, June 29, at Lake Quinsigamond, Worcester, Mass., with about 200 members in attendance. Through the courtesy of the Boston Elevated Railway Company, the Boston & Worcester Street Railway Company, the Worcester Consolidated Street Railway Company and F. H. Bigelow, manager of the "White City" at Lake Quinsigamond, the party was taken from Boston to Lake Quinsigamond and admitted to the "White City."

One of the features of the occasion was the ride from Boston to Lake Quinsigamond and return, via the Boston & Worcester Street Railway, the party having the pleasure of riding in a special three-car train of electric cars. An excellent dinner was served at the Tatassit Club House on an island in Lake Quinsigamond, and the outing was one of the best in the history of the club.

WIDENER-ELKINS SYNDICATE BUYS INDIANA LINES AND LEASES LIMA TRACTION COMPANY

It is announced that the Indianapolis & Eastern Railway and the Richmond Street & Interurban Railway have been acquired by the Widener-Elkins syndicate and merged, and that Charles Murdock, of Lafayette, has been appointed general manager of the entire property, succeeding J. W. Chipman, of the Indianapolis & Eastern. A new schedule will soon be effective whereby cars will run direct from Indianapolis to Richmond. For some reason not stated the proposed merger of these properties with the Dayton & Western Traction Company has not been effected, although it is asserted negotiations for the property are still pending.

The lease of the Lima (Ohio) Electric Railway & Light Company's property to this syndicate became effective July 1. The syndicate controls the Fort Wayne, Van Wert & Lima Traction Company and the Lima & Toledo Traction Company, which is building a line north from Lima towards Toledo. The securing of the city property is in line with its policy of controlling terminal lines.

NEW ORLEANS RAILWAYS COMPANY SOLD AT PUBLIC AUCTION

The last step preparatory to the transfer of the properties of the New Orleans Railways Company to the New Orleans Railway & Lighting Company was taken July 8, when the properties were sold at public auction and bought in for the New York Security & Trust Company for $3,500,000. The final step will be for the newly-organized company to take over the properties from the trust company. M. C. Buckner, of the reorganization committee, representing the New York Security & Trust Company, bought in the property for the sum mentioned, it being sold by Elwyn C. Foster, one of the receivers, and master of the sale.

The property was sold in four lots. The first consisted of all the realty, which brought $250,000. The second was the right, title and certain indentures in the lease of the New Orleans City Railroad Company. This brought $2,000,000. The third lot was rolling stock, office fixtures, live stock and personalty of the corporation, which brought $750,000. The fourth lot consisted of all the claims, debts, etc., notes, bonds, evidences of indebtedness, which brought $500,000. From now on the speediest possible steps will be taken for the new company to put the properties into good shape.

THE APPLEYARD TRACTION TANGLE

M. H. Wilson and J. G. Schmidlapp, receivers for the Appleyard properties, have received the reports of experts appointed to make investigation as to the condition of the various properties. They decline to say anything as to the details of the report before it is filed with the courts, other than to say that the affairs of all the individual companies are badly tangled, and that the report is unsatisfactory, due to the inability to secure the books of the Great Northern Construction Company, which built the various roads. It is stated that it will probably be a long time before anything can be done toward the reorganization of the companies.

BIG CONSOLIDATION IN INDIANA

Under the name of the South Bend, Laporte & Michigan City Railway Company (capital stock $1,000,000), the Laporte & Michigan City Traction Company, which was composed of the bondholders of the Chicago & South Shore Railway Company, and which bought that road at receivers' sale, and the South Bend Western Railway Company, which is constructing an interurban line between Laporte and Michigan City, have been merged. The Indiana Railway Company, which owns and operates a system of interurban lines in Northern Indiana and Southern Michigan, owns a controlling interest in the consolidated company which is authorized to issue 5 per cent forty-year gold bonds to the amount of $1,100,000. The intention is to merge the new corporation and the Indiana Railway Company, which then will have more than 200 miles of main track, and to connect with line running into Northern Ohio on the east and Chicago on the west.

STATUS OF THE PROPOSED CANADA MIDDLESEX RAILWAY

The Middlesex Railway Company, which has attracted considerable attention recently, is a subsidiary enterprise of the Niagara Welland Power Company, which company has been absorbed by the Electric Development & Securities Company, of New York City, with the Canadian name of the International Electric Securities Company. The Niagara Welland Power Company holds a sweeping charter for the development of water power from the Niagara River by means of a canal, which follows a route affording a very much greater fall than can be obtained at Niagara Falls proper. A recent amendment to the charter grants an extension of time until 1913 for the completion of the work, and at the same time the privilege to the power company to build a tramway on its own right of way. The right of way, covering 272 miles, from Niagara Falls to Toronto, has been located with a view of utilizing it for railway purposes, particularly between Niagara Falls and London, where the company is contemplating building a high-speed line.

The president of the Niagara Welland Power Company is Harry Symons, K. C., of Toronto; vice-president, Charles Hesson, of St. Catharines; secretary, John S. Campbell, barrister and solicitor, of St. Catharines. The executive committee of the Electric Development & Securities Company is composed of Mr. Symons, of Toronto, and James B. Sheehan, of New York. Since the New York interests took hold of the project last October about $10,000 have been spent by the engineering department in surveys and computation work, which have been carried out under the direction of John MacCunn, M. Can. Soc. C. B., the resident engineer.

MAYOR DUNNE'S LATEST TRACTION OFFERINGS

Probably Chicago must count that day lost which does not bring forth some new scheme of solving its woful traction problem. The latest suggestions, which comes from Mayor Dunne, seem to show that he is beginning to realize "immediate municipal ownership" is practically impossible. On July 6 he placed two plans before the City Council, the substance of the same being as follows:

The first and preferred plan provides that a company composed of five men having the confidence of the people for business integrity and sympathy for municipal ownership, shall construct and operate a municipal system. This company is to be authorized to issue capital stock limited to the actual cost of the construction, and all earnings in excess of the cost of maintenance, operation and all earnings in excess of the cost of maintenance, operation and 6 per cent dividends are to be placed in a sinking fund for the purthe sinking fund, or apply the proceeds of both to purchase the property. The company is to receive a twenty-year franchise, but the city is to have the right of purchase at any time at a price and upon terms to be agreed upon.

The alternate plan provides for constructing a municipal system by the city on plans prepared by its engineers on a contract for construction and acquisition let to lowest bidder; issuing Mueller law certificates for the payment of the cost of construction; submitting ordinance to voters for approval, and testing the validity of the Mueller law certificates.

The contract plan now advocated by Mayor Dunne is the subject of much criticism on the part of the municipal ownership radicals, who call attention to his ante-election pledges. In defending his stand Mr. Dunne said: "My plan does not conflict in spirit with the third referendum proposition that no franchise should be granted to any company, though apparently in conflict with its letter. The company I propose will act in the interest of the city. It will be the city's company, not a private corporation. The corporation itself will make no profit except the 6 per cent dividends it will receive on its stock. During the campaign I supposed that only the streets of the Adams Street line would be available for a municipal system, and that we would need more streets. I now find we already have 100 miles of streets, and that during the two years of construction 140 miles more will be at our disposal. My plan is strictly in accordance with the Democratic platform. We are going ahead to acquire a system in the quickest way possible. I do not think it is advisable to condemn any lines while we have so much of the streets available at once."

Mayor Dunne declared that he had not considered the appointment of the directors of the company. He said that question would be taken up when the local transportation committee was preparing the ordinance.

At least one knot in the traction tangle has been untied by Judge Julian W. Mack, of the Circuit Court, who has decided that the leases by which the Union Traction Company is in control of the street car lines of underlying corporations are valid. He denied a motion for an injunction to prevent the company from continuing in control. The decision ends a year of litigation between the Union Traction Company and David A. Kohn and J. J. Townsend, who sought to prevent the company from reducing rentals paid under the leases. The fight hinged on the right of the Illinois Trust & Savings Bank to vote stock held in trust. Judge Mack held that the bank had right to vote the stock.

BROOKLYN RAPID TRANSIT PREPARES TO MOVE INTO ITS NEW OFFICES

Work on the Brooklyn Rapid Transit Company's new building, at Clinton and Remsen Streets, Brooklyn, has practically been completed, and the company has made arrangements to move into its new quarters on July 22. The new building, which is ten stories in height, adjoins the company's old building at Clinton and Montague Streets. The company will continue to use the latter building, which is now undergoing extensive improvements. With its new and old buildings the Brooklyn Rapid Transit Company will occupy the entire block on Clinton Street, between Remsen and Montague Streets, having a frontage of 184 ft.

The new building represents the most up-to-date type of fireproof construction in office buildings. Instead of using a concrete flooring, however, a German fireproofing material, called asbestolith, is employed.

The new structure, in conjunction with the old building, the company's officials believe, will afford ample room for housing every department of the company for many years to come. Beside its ten stories, the building has a basement and sub-basement. In the sub-basement will be the heating plant and three large vaults, one 45 ft. in length. The building contains a large number of these vaults, running from the sub-basement to the fifth story, all fireproof, and many of them burglar-proof. In these vaults will be kept the company's records.

A novel feature of the new building to be occupied by the Brooklyn Rapid Transit Company is an automatic telephone system by which persons in all parts of the building may talk to one another without having first to secure communication through the medium of a switchboard.

Another feature of the Brooklyn Rapid Transit Company's new home is that it does not contain a single gas pipe, as it will be lighted entirely by electricity.

The front of the building is done in brick and terra cotta. The style is that of the Renaissance. Four immense water tanks have been placed on the roof.

The arrangement of the offices in the new building is as follows: Basement, receivers' room, where money is counted, local postoffice, application and examining surgeon's offices for the employment bureau. First floor, secretary and treasurer's department, main office of employment and inspection departments, chief ticket agent's office. Second floor, general superintendent and his operating staff, including telegraph office of chief train despatcher for elevated system; general freight agent, superintendent of American Railway Traffic Company. Third floor, general attorney and claim agents. Fourth floor, comptroller and auditors. Fifth floor, attorneys and extra auditors' room. Sixth floor, president and vice-president and general manager. Seventh floor, purchasing agent, Brooklyn City Railroad offices, telephone operating room. Eighth floor, mechanical engineer, superintendent of power and assistants. Ninth floor, electrical engineer, department of reinforcement and repairs. Tenth floor, chief engineer. Eleventh floor, roof house, blueprint room. The Bell telephone switchboard used by the company requires six operators.

NEW YORK SUBWAY NOW COMPLETE FROM BATTERY TO WEST FARMS

Two important additions to the New York subway system were opened formally to traffic at 12:01 o'clock on the morning of July 10. One was the section of the tunnel from Fulton Street to the Battery, and the other the section running from 145th Street and Lenox Avenue under the Harlem River to the "L" extension running to West Farms. It is estimated that the running time from the Battery to 180th Street, West Farms, will be 50 minutes.

EFFECT OF ABSENCE OF WORLD'S FAIR TRAFFIC ON ST. LOUIS EARNINGS

Loss of the World's Fair traffic shows in the earnings of the United Railways, of St. Louis, for June, 1905, when compared with the earnings of the transit company for the same month last year. The decrease is $135,000, the largest for any month so far this year. This is fairly well balanced, however, by an increase of $93,000 over June, 1903, which gives a comparison with a normal period. The figures for the three periods are as follows: Gross earnings for the month of June, 1905 and 1904, June, 1905, $742,-104.25; June, 1904, $927,732.82. Decrease, $185,628.57. Gross earnings for the month of June, 1905 and 1903, June, 1905, $742,104.25; June, 1903, $648,745.92; increase, $93,358.33.

ELECTRIFIED DIVISION OF LONG ISLAND RAILROAD READY FOR SERVICE

The first practical application of electricity as a motive power for the suburban divisions of steam railroads in the East will be made this week, when operation under the new system of the western lines of the Long Island Railroad will be inaugurated, and electric passenger trains will be run from the Flatbush Avenue terminal over the Rockaway Beach division. Though the first trains this week will be run on the Rockaway Beach division, 70 miles of third rail have been laid, and a corresponding length of track is ready for the electric operation. The zone practically completed includes the road from Flatbush Avenue to Belmont Park, and from Jamaica past the Metropolitan race track to Springfield Junction, and the Far Rockaway branch, via Valley Stream, as far as Hammel's. In addition to the electrification already completed, it is planned to electrify the Manhattan Beach line and the North Shore branch to Whitestone and Port Washington.

SPECIFICATIONS FOR CAST-IRON CAR WHEELS

At the convention at Atlantic City, June 29, 30 and July 1, of the American Society for Testing Materials, the following specifications were tentatively decided upon, and copies were sent to the members of the society for a letter ballot.

PROPOSED STANDARD SPECIFICATIONS FOR CAST-IRON CAR WHEELS

The wheels furnished under this specification must be made from the best materials, and in accordance with the best foundry methods. The following pattern analysis is given for information, as representing the chemistry of a good cast-iron wheel. Successful wheels, varying in some of the constituents quite considerably from the figures given, may be made:

	Per Cent
Total carbon	3.50
Graphite carbon	2.90
Combined carbon	0.60
Silicon	0.70
Manganese	0.40
Phosphorus	0.50
Sulphur	0.08

1. Wheels will be inspected and tested at the place of manufacture.

2. All wheels must conform in general design and in measurements to drawings, which will be furnished, and any departure from the standard drawing must be by special permission in writing, and manufacturers wishing to deviate from the standard dimensions must submit duplicate drawings showing the proposed changes, which must be approved.

3. The following table gives data as to weight and tests of various kinds of wheels for different kinds of cars and service:

Wheel	33-inch diameter Frgt. and Pass. cars.			36-inch diameter.	
Kind of service	60,000 lbs capacity and less.	70,000 lbs. capacity.	100,000 lbs. capacity.	Passenger Cars.	Locomotive Tenders.
Number	1	2	3	4	5
Weight Desired	600	650	700	700 lbs.	750 lbs.
Weight Variation	Two per cent either way.				
Height of drop, ft	9	12	12	12	12
Number of blows	10	10	12	12	14

4. Each wheel must have plainly cast on the outside plate the name of the maker and place of manufacture. Each wheel must also have cast on the inside double plate the date of casting and a serial foundry number. The manufacturer must also provide for the guarantee mark, if so required by the contract. No wheel bearing a duplicate number, or a number which has once been passed upon, will be considered. Numbers of wheels once rejected will remain unfilled. No wheel bearing an indistinct number or date, or any evidence of an altered or defaced number will be considered.

5. All wheels offered for inspection must have been measured with a standard tape measure, and must have the shrinkage number stenciled in plain figures on the inside of the wheel. The standard tape measure must correspond in form and construction to the "Wheel Circumference Measure" established by the Master Car Builders' Association in 1900. The nomenclature of that measure need not, however, be followed, it being sufficient if the graduating marks indicating tape sizes are one-eighth of an inch apart. Any convenient method of showing the shrinkage or stencil number may be employed. Experience shows that standard tape measures elongate a little with use, and it is essential to have them frequently compared and rectified. When ready for inspection, the wheels must be arranged in rows according to shrinkage numbers, all wheels of the same date being grouped together. Wheels bearing dates more than thirty days prior to the date of inspection will not be accepted for test, except by permission. For any single inspection and test, only wheels having three consecutive shrinkage or stencil numbers will be considered. The manufacturer will, of course, decide what three shrinkage or stencil numbers he will submit in any given lot of 103 wheels offered, and the same three shrinkage or stencil numbers need not be offered each time.

6. The body of the wheels must be smooth and free from slag and blowholes, and the hubs must be solid. Wheels will not be rejected because of drawing around the center core. The tread and throat of the wheels must be smooth, free from deep and irregular wrinkles, slag, sand wash, chill cracks or swollen rims, and be free from any evidence of hollow rims, and the throat and thread must be practically free from sweat.

7. Wheels tested must show soft, clean, gray iron, free from defects, such as holes containing slag or dirt more than ¼ in. in diameter, or clusters of such holes, honey-combing of iron in the hub, white iron in the plates or hub, or clear white iron around the anchors of chaplets at a greater distance than ½ in. in any direction. The depth of the clear white iron must not exceed ⅞ in. at the throat, and 1 in. at the middle of the tread, nor must it be less than ⅜ in. at the throat or any part of the tread. The blending of the white iron with the gray iron behind must be without any distinct line of demarcation, and the iron must not have a mottled appearance in any part of the wheel at a greater distance than 1⅝ ins. from the tread or throat. The depth of chill will be determined by inspection of the three test wheels described below, all test wheels being broken for this purpose, if necessary. If one only of the three test wheels fails in limits of chill, all the lot under test of the same shrinkage or stencil number will be rejected and the test will be regarded as finished so far as this lot of 103 wheels is concerned. The manufacturer may, however, offer the wheels of the other two shrinkage or stencil numbers, provided they are acceptable in other respects, as constituents of another 103 wheels for a subsequent test. If two of the three test wheels fail in limits of chill, the wheels in the lot of 103 of the same shrinkage or stencil number as these two wheels will be rejected, and, as before, the test will be regarded as finished so far as this lot of 103 wheels is concerned. The manufacturer may, however, offer the wheels of the third shrinkage or stencil number, provided they are acceptable in other respects, as constituents of another 103 wheels for a subsequent test. If all three test wheels fail in limits of chill, of course the whole hundred will be rejected.

8. The manufacturer must notify when he is ready to ship not less than 100 wheels; must await the arrival of the inspector; must have a car, or cars, ready to be loaded with the wheels, and must furnish facilities and labor to enable the inspector to inspect, test, load and ship the wheels promptly. Wheels offered for inspection must not be covered with any substance which will hide defects.

9. A hundred or more wheels being ready for test, the inspector will make a list of the wheel numbers, at the same time examining each wheel for defects. Any wheels which fail to conform to specifications by reason of defects must be laid aside, and such wheels will not be accepted for shipment. As individual wheels are rejected, others of the proper shrinkage, or stencil number, may be offered to keep the number good.

10. The inspector will retape not less than 10 per cent of the wheels offered for test, and if he finds any showing wrong tape-marking, he will tape the whole lot and require them to be re-stenciled, at the same time having the old stencil marks obliterated. He will weigh and make check measurements of at least 10 per cent of the wheels offered for test, and if any of these wheels fail to conform to the specification, he will weigh and measure the whole lot, refusing to accept for shipment any wheels which fail in these respects.

11. Experience indicates that wheels with higher shrinkage or lower stencil numbers are more apt to fail on thermal test; more apt to fail on drop test, and more apt to exceed the maximum allowable chill than those with higher stencil or lower shrinkage numbers; while, on the other hand, wheels with higher stencil or lower shrinkage numbers are more apt to be deficient in chill. For each 103 wheels apparently acceptable, the inspector will select three wheels for test—one from each of the three shrinkage or stencil numbers offered. One of these wheels chosen for this purpose by the inspector must be tested by drop test as follows: The wheel must be placed flange downward in an anvil block weighing not less than 1700 lbs., set on rubble masonry 2 ft. deep and having three supports not more than 5 ins. wide for the flange of the wheel to rest on. It must be struck centrally upon the hub by a weight rof 200 lbs., falling from a height as shown in the previous table. The end of the falling weight must be flat, so as to strike fairly on the hub, and when by wear the bottom of the weight assumes a round or conical form, it must be replaced. The machine for making this test is shown on drawings which will be furnished. Should the wheels stand without breaking in two or more pieces the number of blow shown in the above table, the one hundred wheels represented by it will be considered satisfactory as to this test. Should it fail, the whole hundred will be rejected.

12. The other two test wheels must be tested as follows: The wheels must be laid flange down in the sand, and a channelway 1½ ins. in width at the center of the tread and 4 ins. deep must be molded with green sand around the wheel. The clean tread of the wheel must form one side of this channelway, and the clean flange must form as much of the bottom as its width will cover. The channelway must then be filled to the top from one ladle with molten cast iron, which must be poured directly into the channelway without previous cooling or stirring, and this iron must be so hot, when poured, that the ring which is formed when the metal is cold shall be solid or free from wrinkles or layers. Iron at this temperature will usually cut a hole at the point of impact with the flange. In order to avoid spitting during the pouring, the tread and inside of the flange during the thermal test should be covered with a coat of shellac; wheels which are wet or which have been

exposed to snow or frost may be warmed sufficiently to dry them or remove the frost before testing, but under no circumstances must the thermal test be applied to a wheel that in any part feels warm to the hand. The time when pouring ceases must be noted, and two minutes later an examination of the wheel under test must be made. If the wheel is found broken in pieces, or if any crack in the plates extends through or into the tread, the test wheel will be regarded as having failed. If both wheels stand, the whole hundred will be accepted as to this test. If both fail, the whole hundred will be rejected. If one only of the thermal test wheels fails, all of the lot under test of the same shrinkage or stencil number will be rejected, and the test will be regarded as finished, so far as this lot of wheels is concerned. The manufacturer may, however, offer the wheels of the other two shrinkage or stencil numbers, provided they are acceptable in other respects, as constituents of another 103 wheels for a subsequent test.

13. All wheels which pass inspection and test will be regarded as accepted, and may be either shipped or stored for future shipment, as arranged. It is desired that shipments should be, as far as possible, in lots of 100 wheels. In all cases the inspector must witness the shipment, and he must give, in his report, the numbers of all wheels inspected, and the disposition made of them.

14. Individual wheels will be considered to have failed and will not be accepted or further considered, which,

(1) Do not conform to standard design and measurement.

(2) Are under or over weight.

(3) Have the physical defects described in Section 6.

15. Each 103 wheels submitted for test will be considered to have failed and will not be accepted or considered further, if,

(1) The test wheels do not conform to Section 7, especially as to limits of white iron in the throat and tread and around chaplets.

(2) One of the test wheels does not stand the drop test as described in Section 11.

(3) Both of the two test wheels do not stand the thermal test as described in Section 12.

NEW YORK BOARD OF ESTIMATE AND APPORTIONMENT PERMITTED TO CONSIDER TRANSIT PLANS AND SPECIFICATIONS

That the New York Board of Estimate and Apportionment may consider plans and specifications submitted by the Rapid Transit Commission, but may not grant franchises, until the Appellate Division has given a decision on the question of the constitutionality of the law passed by the last Legislature taking away from the New York Board of Aldermen the power of granting street railway franchises is the substance of a decision given last week by Justice Gildersleeve in the Supreme Court. His decision was a modification of the stay granted by Justice Truax on June 29, pending appeal by the Aldermen's representative from Justice Blanchard's decision that the law is constitutional. By Justice Truax's decision the Board of Estimate was debarred from taking any action whatever with regard to new rapid transit routes.

In his decision, Justice Gildersleeve said he was satisfied that public interests might be subjected to serious injury if the stay continued in a form "entirely too broad," and he added:

"The stay must be limited to preventing the Board of Estimate and Apportionment from granting any franchises for rapid transit until the constitutionality of the act in question has been passed upon by the Appellate Division."

Assistant Corporation Counsel William P. Burr subsequently had an interview with Justice Gildersleeve, as a result of which Justice Gildersleeve handed down a revised decision, ending as follows:

"The stay must be limited to permit the Board of Estimate and Apportionment to proceed, as the time limit under the Rapid Transit Act expires to-day. There will be ample opportunity to prevent action after such approval, pending appeal, if he (the plaintiff) be so advised."

George Westinghouse has issued a denial of a newspaper statement that the Westinghouse interests were going extensively into the operation of trolley lines in competition with some of the large railroad systems. He said that he deemed it important to at once deny the statement, which he characterized as an attempt of unfriendly interests to prejudice the managers of the railways against the Westinghouse interests. As to the other statements in the article in question, Mr. Westinghouse sees no occasion to comment on them. The "other statements" had it that John F. Wallace, who recently resigned as chief engineer of the Panama Canal to accept a "$65,000 offer" from somebody whose identity is still undisclosed, was going to be identified hereafter with the Westinghouse interests.

CHANGE IN CONTROL OF LEAVENWORTH TRACTION PROPERTIES

Control of the Kansas City-Leavenworth Railroad Company has changed hands entirely. Conway F. Holmes has become president and general manager of the line. The new owners are Robert L. Gregory, Walton H. Holmes, C. F. Holmes, C. F. Hutchings, Kansas City, Kan.; Fisk & Robinson, New York, and C. J. Pack, Cleveland, Ohio. Fisk & Robinson are now completing the work of underwriting the reorganization bonds of the company, and have raised $1,500,000. Of this sum $400,000 is to be expended in straightening and improving the right of way, buying new equipment and otherwise bettering the service. The Gregory-Holmes syndicate has also acquired ownership of all the street railways in Leavenworth, extending as far as the fort. It is understood from those who are now in the field that the intention of the new owners is to lose no time in building to Atchison, and afterwards to go on to St. Joseph. The first thing to be undertaken, however, is to make it possible to shorten considerably the time between Kansas City and the present north terminus.

Thirty-eight cars are now in operation, and twelve up-to-date interurban cars have been ordered by President Holmes. These are to be rushed to completion as fast as possible.

A car is also to be purchased for express business. It is to run into Kansas City. The company has a contract which will permit it to cross the Sixth Street viaduct, when that structure is completed, and under the terms of the Metropolitan Street Railway Company's franchise it can send its cars as far as the commission houses on the Market Square without its having to lay more than two blocks of track in the city. This car, it is expected, will be operated for the benefit of the green market.

Several former Metropolitan Street Railway officers have rejoined the Holmes brothers in their new enterprise. Daniel Bontecum, formerly chief engineer of the Metropolitan Street Railway, of Kansas City, and at one time holding the same appointment with the Memphis Railway, is chief engineer of the trolley line under the reorganization company. Charles Grover, formerly with the Metropolitan, is the chief electrician of the reorganized company.

ELECTRIC RAILWAY EXHIBITS AT THE MILAN EXPOSITION NEXT YEAR

One of the main features of the Milan International Exposition, to be held in the summer of 1906, by way of celebrating the opening of the new Simplon tunnel through the Alps, will be the division of Carriage by Land, in which the exhibits will be devoted largely to electrical vehicles of all classes. The Italians have made such advances in this line of work, and are so seriously preparing to enter other fields than their own, that this part of the exposition will undoubtedly be very elaborate.

In the division will be included all branches of electric railway work. Thus, one section will be given up to generating plants, and will be devoted to plans and designs, models of water-power and steam plants, and of central stations, designs for direct-current generators, alternators and transformers in types specially suited for electric traction, and stationary accumulators for traction service.

In the equipment section there will be exhibits of poles, supports, insulators, systems for suspending wires and general attachments. A special feature which is invited for exhibit is displays of conductors for long-distance transmission and for service lines. The committee in charge is specially anxious to get exhibits of conductors and insulators for third rail, and overhead construction for heavy electric traction. Block signaling apparatus, telegraph and telephone apparatus for despatching and service on electric lines, and safety appliances are included in the programme for this section, and large exhibits will be made by the principal European firms.

In rolling stock, a branch of the business in which the Italians have not only excelled but have produced some very clever types, special designs for electric traction, cars and parts of cars, electric locomotives, controllers and the various styles of fenders will have an important place. The systems for taking current from the third rail, of particular interest in Europe at this time, will be given a special display in this section. The exposition will also offer a favorable opportunity to exhibitors of automotor cars for city service, trail cars and the trackless trolley cars. Several of these systems have proved successful in Europe for both summer and winter traffic.

SUBWAY CRITICS ANSWERED

In the Street Railway Journal for June 24 was published a letter that appeared in the "New York Sun" from Nikola Tesla in regard to certain alleged defects in the New York subway. In this connection it is a pleasure to print the following letter by L. B. Stillwell, written to the editor of the "Sun" in answer to Mr. Tesla's criticisms:

In a letter printed in your issue of June 16, Nikola Tesla points out what he says he considers a source of danger in the subway and reiterates an opinion which he has previously expressed in your columns to the effect that a mistake was made in not adopting what he calls "my alternating system of distribution, popularly known as the 'two, three, multi, or polyphase.'" It is probable that some of your readers who have read some of Mr. Tesla's prophetic essays, which have appeared from time to time during the last ten or fifteen years in the daily press, may attach weight to his opinions, and as the public is greatly interested in the subway and its operation, statement of a few facts seems pertinent and proper.

It will be recalled, perhaps, by your readers that in your issue of Nov. 1, 1904, a letter from Mr. Tesla was published, in which *inter alia* he expressed the opinion that polyphase induction motors should have been adopted instead of continuous-current motors. Incidentally he remarked also that the distributing mains ought to be insulated artificially by refrigeration, that he recently perfected inventions which, "abolishing all barriers to electrical development, will soon sweep the world with irresistible force," that he approved Mr. Belmont's private car, that he had not seen the tunnel and did not know its location, and was equally ignorant as regards the power house, that the system adopted was of his own invention, but that it represented "the state of the art more than ten years ago," that a mistake had been made in not asking the electric companies to furnish the best instead of the cheapest equipment, and that the Interborough Rapid Transit Company had never asked him for any advice or suggestion.

In a letter, which was printed in your issue of Nov. 11, 1904, I stated that Mr. Belmont and his associate directors had imposed upon their engineering advisers no limit of cost, that if any mistake in the selection of electric equipment had been made it was mine—not Mr. Belmont's—and suggested that if Mr. Tesla would present before the American Institute of Electrical Engineers a paper containing specific and definite criticism of the equipment, I should be glad to meet him for the purpose of a full and frank discussion.

This suggestion, for reasons which were perhaps satisfactory to himself, Mr. Tesla declined to adopt, and in a long letter, which you printed in your issue of Nov. 27, 1904, in declining to appear before the Institute, he referred to a number of alleged accidents in the subway—the majority of which never happened—and again stated that the system adopted was one which he had "devised many years ago," that its adoption in this instance "was altogether too absurd to dignify it with any serious comment," that polyphase induction motors should have been used, and that he believed in advertising.

In his latest letter (that of the 16th inst.) he reiterates some of the statments contained in previous letters, and calls attention in the following words to a new danger which he has discovered: "The danger to which I refer lies in the possibility of generating an explosive mixture by electrolytic decomposition and thermic disassociation of water through the direct current used in the operation of the cars." His alternating-current polyphase system, as he says, would be free from this danger. Obviously, a charge so serious as this should rest upon a very substantial foundation of fact, and no consideration of self-interest or of personal animosity will excuse its author unless he can prove his charge. And what does Mr. Tesla offer as evidence that electrolytic decomposition of water is taking place in the subway? He says: "It will be recalled that an expert found the percentage of free oxygen in the subway appreciably above that which might reasonably have been expected in such a more or less stagnated channel." In other words, the subway air contains more oxygen than Mr. Tesla expected, and upon this fact he constructs his theory of the production of oxygen and hydrogen gas by electrolysis. He does not offer in his letter a scintilla of evidence that oxygen is thus being set free. No one has alleged that the air in the subway contains more oxygen than uncontaminated and free air. If Mr. Tesla, therefore, is comparing an actual analysis with anything more definite than his own notion of the kind of air that might be expected of the subway, it is for him to make clear his reasoning.

Prof. Charles F. Chandler, who was recently employed by the Health Department of the City of New York to test the condition of the subway from a sanitary standpoint with especial reference to the purity of the air, says:

"According to the best authorities, as, for example, Dr. John S. Billings, in his work, 'Ventilation and Heating,' the chemical composition of the atmosphere when uncontaminated is as follows:

Oxygen	20.80
Nitrogen	70.20
Carbon dioxide	0.03 or 0.04

"The composition is not absolutely constant, the oxygen being sometimes a little higher and sometimes a little lower than the percentage given above.

"Thus far, fifty samples of subway air have been carefully analyzed, and the percentage of oxygen determined, the result being a maximum of 20.80 and a minimum of 20.30—average 20.55. At the same time, nine samples of surface air were examined, showing a maximum of 20.90 and a minimum of 20.60—average 20.76."

It will be noted that the percentage of oxygen in subway air, as determined by Dr. Chandler, is a little less than that of normal uncontaminated air; there is, therefore, no excess of oxygen to be accounted for.

Among all that Mr. Tesla has said upon the subject, three charges besides that relating to alleged excess of oxygen perhaps call for reply in order that any part of the public which may have been disturbed by his statements may be reassured. These charges are: (1) That a mistake was made in not adopting polyphase induction motors, (2) that "not a single electrician of the General Electric or Westinghouse Companies was consulted, and (3) that a mistake was made in not asking the electric companies to furnish the best instead of the cheapest equipment."

The last of these charges I answered in my letter of Nov. 11, 1904. It is absolutely without the slightest foundation of fact. The management of the company aimed to secure the best system available, and no limitation in respect to cost was imposed upon its engineers. Apparently, Mr. Tesla seeks to convey the impression that the polyphase induction motor system is more expensive than that adopted. As a matter of fact, the reverse is the case, the chief claim of the induction system residing in the fact that it is less expensive than the system which the Interborough Company has adopted. Several years ago, when tenders were submitted by manufacturers to the Metropolitan and District Underground Railways in London, the induction motor system was proposed by Ganz & Company, of Buda-Pesth, and the price asked was approximately two-thirds the average price of the competing tenders which were based upon the system which has since been adopted for the New York subway.

The responsibility for decision in respect to the system adopted rests primarily upon me, but the plans were duly examined and approved by Messrs. Duncan and Hutchinson, consulting electrical engineers to the Rapid Transit Commission. As regards consultation with electricians and engineers of the General Electric and Westinghouse Companies, I have been in touch with the leading representatives of both companies from the outstart of this work up to the present time. Many of these gentlemen have contributed largely to the success of the installation and operation of the electrical equipment, and, so far as I am aware, are unanimous in believing that the best system available was adopted.

In support of his contention that a mistake was made in adopting the system which is in use, Mr. Tesla has offered simply an expression of his personal opinion. The polyphase motor system, as developed by Ganz & Company, of Buda-Pesth, undoubtedly has very strong points to commend it under certain conditions, and for what Mr. Tesla did in the early days of its inception the engineering world is under obligation, which in America has been fully recognized. Since certain United States patents were issued to him in 1888, however, he has done little, if anything, toward perfecting the motors and still less toward the development of the multitude of other devices which in the aggregate constitute an electric traction system. Scott, Lamme, Steinmetz, Berg and others in Pittsburg and Schenectady have developed and improved the induction motor so that it is now extensively used in stationary work, but it has never been used in America for traction purposes upon any scale which would have justified its adoption by the Interborough Company. In Europe, within the last five or six years, the engineers of Ganz & Company have developed it for traction purposes, and under certain conditions they have demonstrated its value in this field. Possibly this fact explains Mr. Tesla's recently revived interest in the motor of this type.

In conclusion, I may mention the fact that the system adopted for the operation of the subway and the elevated is identical with that adopted in Paris for the operation of the Metropolitan, in London for the operation of the so-called "Two-Penny Tube," the Metropolitan and the District Railways, in Brooklyn for the operation of the elevated lines; that it has been adopted by the engineers of the Pennsylvania Railroad, the Long Island Railroad and the New York Central & Hudson River Railroad, and is largely used throughout America for the operation of interurban railways.

The induction motor system, as supplied in Europe by Messrs. Ganz & Company, is beyond question an operative and in many respects most excellent system. Hitherto, however, American manufacturers have not placed such a system upon the market. I think I am safe in saying that at the time when Mr. Tesla thinks the induction motor should have been adopted in the subway not a single motor of this type was in use in America for traction purposes. (Signed) L. B. STILLWELL.

ACCOUNTANTS' CONVENTION

Elmer M. White, of Hartford, Conn., secretary of the Street Railway Accountants' Association of America, is sending out the following circular:

The ninth annual convention of this association will be held in Philadelphia, Pa., in September. The first meeting will be on the afternoon of Thursday, the 28th, all day on Friday, the 29th, and, if necessary, Saturday, the 30th. Headquarters of this association will be at the Walton.

A convention circular will be issued during August.

The new collection of blanks and forms at the St. Louis convention was so helpful that it seems best to make an effort to bring the collection up to date for the Philadelphia meeting. I will, therefore, ask all the members to send to my address in Hartford a duplicate set of all blanks (four if printed on both sides), that they have adopted since the last meeting. The few members that did not contribute to the 1904 collection are earnestly requested to send a complete collection of all blanks. The blanks are received in so much better condition when sent flat that I will ask you to send them in that way, and not rolled.

As there have been several requests for charts of officials, or organization charts, I will ask any members that have printed copies to send them.

Only a few members have filed copies of annual reports, and as it seems a good practice I will ask all members that have printed reports to mail them as soon as issued.

The members are earnestly requested to make an effort to secure new members at once so that we may go to the next annual meeting with a larger membership than ever before. I regret to say that resignations have been more numerous than applications. This is not as it should be, for the present members can get more out of the association than they pay in dues, if they will only avail themselves of what we have to offer.

If we would only take the trouble to tell the companies that are not members of the advantages of our association we would have many applications.

Let us all take hold of this work with spirit.

RECENT WESTINGHOUSE CONTRACTS

The Westinghouse agents at Paris, which represents the Westinghouse interests in France, Spain, Switzerland, Italy and other countries on the continent of Europe, have been awarded a contract for the installation of the Westinghouse single-phase railway system on the Bergamo-Valle Brembana Railway, Italy. The length of the road will be 20 miles. It will be served by five 30-ton locomotives equipped with four single-phase motors of 75-hp capacity each, with multiple-unit control and pneumatically-operated bow trolleys. The gage of the track will be 4½ ft.

This is the second single-phase railway contract secured by the Westinghouse people in Italy, the first being the Rome-Civita-Castellana Railway. The value of the Bergamo-Valle Brembana contract is about $1,500,000.

Through the New York offices of the Japanese engineering and contracting firm of Takata & Company, a contract has been closed for the installation of a big hydro-electric plant at Kanazawa, to be operated by the Kanazawa Electric Light Company.

Two large domestic contracts are those obtained from the Fort Wayne & Wabash Valley Traction Company, of Fort Wayne, Ind., and the Cincinnati (Ohio) Northern Traction Company. The Fort Wayne contract calls for the entire electrical equipment, comprising both three-phase and two-phase apparatus, the former for the railway and the latter for lighting service. The machinery will be capable of developing 10,000 hp. Steam turbines will be installed. The electrical apparatus will be built by the Westinghouse Electric & Manufacturing Company, while the turbines will be turned out at the Westinghouse Machine Company's shops at East Pittsburg. The Cincinnati Northern Traction Company's contract calls for the equipment of the main generating station and four rotary converter sub-stations. The power house will be located at Hamilton, Ohio. The original installation will be of 5000-kw capacity, with provisions for eventually increasing it to 10,000 kw.

PROGRESS ON THE UNITED ENGINEERING BUILDING

Progress on the United Engineering Building, which is to house the Institutes of Electrical Engineers, Mining Engineers and the Mechanical Engineers, is marked by the award last week, by the committee in charge, of the contract for its construction. The contract was awarded to Wells Brothers Company, of New York, the contract being for the sum of $795,000. This does not include any allowance for the steam heating plant, electric wiring, etc., but relates simply to the general construction of the edifice. The ground is already excavated and the work will begin forthwith. October, 1906, is mentioned as the probable date of completion and readiness.

CONTRACTS GIVEN OUT FOR ELECTRIFYING THE LULU ISLAND ELECTRIC RAILWAY, BRITISH COLUMBIA

The electrification of the Lulu Island Electric Railway, which the British Columbia Electric recently took over, is being pushed ahead as fast as possible. It will cost $150,000 to do the work. The contract for the wire has been given to the firm of Eugene Phillipps & Company, of Montreal, and calls for 106 miles of wire. The contract for the overhead work, insulators, etc., has been let to the Canadian General Electric Company. The single-pole type of construction, with the pole set at one side of the track, will be used. The company is building a number of interurban cars for use on the line. They will be equipped with motors of 2000 hp, provided by the Canadian General Electric Company. The trucks are from the J. G. Brill Company, of Philadelphia. These cars will be equipped with air brakes, supplied by the Canada Foundry Company. In addition they will be equipped with the Sterling-Meaker safety hand-brake as an auxiliary. Each car will be provided with portable telephone instrument, so that any breakdown can be reported at once. Freight cars are also being built for use on the road. A contract has also been awarded to Ironsides, Rannie & Campbell for the construction of a sub-station at Eburne, 50 ft. x 60 ft. in size, and built of brick and concrete.

Mr. Hazlitt, of the British Columbia Electric Railway, is the purchasing agent for the Lulu Island Railway, and Mr. Buntzen is the managing director of both roads, with offices at Vancouver.

IMPROVEMENTS IN BROOKLYN

One of the most important of the improvements being made by the Brooklyn Rapid Transit Company is the construction of a four-track station, a new shop building, inspection pits and sheds and a storage yard for equipment at the old Union station, Fifth Avenue and Thirty-Sixth Street. Actual work on these changes and improvements, which will cost in the neighborhood of $250,000, has just been begun. The traffic to Coney Island and Bay Ridge has become so large in recent years that it became necessary to make some improvements to facilitate the movements and assure the safety of trains at this important point, for it is here that the Bay Ridge line branches off and the Bath Beach, Culver and Sea Beach lines leave the elevated structure for the surface. A new four-track station is being built, with two island platforms, each more than 300 ft. long. The tracks will be connected by underhanging galleries. The tracks and yards will be protected by a new set of electric interlocking switches, operated from a steel tower opposite the station.

In the rear of the station is being built a storage yard and inspection shed, with a capacity of 260 elevated cars. These tracks will be parallel to Thirty-Sixth Street, and will be crossed by a ladder track to carry cars from one track to another, which is to be reached by an incline from the main line. In order to gain space for the storage track the main line tracks are being relocated and are to be carried off to the side of a high hill between Thirty-Seventh Street and Thirty-Eighth Street. The inspection shed, 350 ft. x 110 ft., is to have eight tracks, each with accommodations for a six-car motor train. Under these tracks will be pits of concrete for the inspection of the motors and other equipment. The old station building will be entirely reconstructed. The upper floor will be extended and used for a shop superintendent's office, mill room, locker and lavatory rooms. There will be a mezzanine floor for the train despatcher's office. The lower floor will be extended to Thirty-Seventh Street, making a 200-ft. frontage on a level with Fifth Avenue. Here will be the machine shop, the stock room and elevators for lowering trucks and other equipment from the tracks overhead.

EXPERT BOARD FOR THE MICHIGAN CENTRAL RAILROAD TUNNEL

President Newman, of the Michigan Central Railroad Company, has announced that the construction of the Detroit Tunnel Line from Windsor, Ontario, to West Detroit yard, Michigan, including the electrification thereof, has been placed in charge of an advisory board of engineers, consisting of William J. Wilgus, vice-president of the New York Central & Hudson River Railroad; Howard Carson, consulting engineer, and W. S. Kinnear, chief engineer of the tunnel company.

The chief engineer will be in direct charge of construction, reporting to H. B. Ledyard, chairman of the board of directors, on executive and financial matters, and to the board of advisory engineers as to plans, specifications and methods of doing the work.

WM. K. VANDERBILT, JR., INSPECTS OHIO AND MICHIGAN INTERURBANS

William K. Vanderbilt, Jr., last week made a trip over the Northern Ohio, Lake Shore Electric Railway and the Detroit, Monroe & Toledo Short Line. He went as the guest of Horace Andrews and John J. Stanley, of the Cleveland Electric Railway, in the private car "Josephine." With the party were W. N. Kehrnan, of the Utica & Mohawk Valley Railway, and Warren M. Bicknell, of the Lake Shore Electric. Naturally the daily newspapers placed great significance on the trip, intimating that the roads inspected were to be absorbed by the Vanderbilt-Andrews interests, which are building up an electric railway system in Central New York. It is extremely improbable that any move of this kind is on foot at this time, as the syndicate will have its hands full for a time developing the properties it has already acquired. It was stated that Mr. Vanderbilt made the trip simply to acquaint himself with the operating conditions on some of the Ohio roads, because, as is generally known, he is to take an active interest in the work in Central New York.

An exciting incident occurred on the trip over the Lake Shore Electric. A short distance out of Cleveland the motor leads on the "Josephine" became heated and the floor caught fire. Mr. Stanley wrestled with a fire extinguisher, but could not open it, while the others ran to a neighboring farm house and brought pails of water and soon extinguished the fire. The car was taken to the repair shop, not far distant, and while temporary repairs were being made the whole party turned out and played baseball, Mr. Vanderbilt proving himself a star player. Mr. Vanderbilt was called home unexpectedly, and was unable to inspect several other roads in this district as he had planned.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED JULY 5, 1905

793,758. Brake-Rod Connection; George A. Woodman, Chicago, Ill. App. filed Aug. 15, 1904. A brake-jaw for car brake-rods having a transverse opening to receive the rod and a keeper adjacent to one end of said opening to secure the end of the rod.

793,763. Car Truck; William P. Bettendorf, Davenport, Ia. App. filed March 21, 1904. Comprises a transom and side frames having journal-boxes made integral therewith of one body of metal, having a transverse opening, the sill of which forms a horizontal support upon which the end portions of the transom rest, and having lugs projecting inward therefrom with which the ends of said transom interlock.

793,764. Car Truck; William P. Bettendorf, Davenport, Ia. App. filed March 25, 1904. Comprises side frames having integral journal-boxes made of one body of metal therewith, and axles journalled in said boxes and movable vertically independent of said boxes.

793,863. Car Seat; Henry F. Vogel, St. Louis, Mo. App. filed March 1, 1905. A hand grip at the upper corner of the seat back and a hand-rod extending along the top thereof.

793,924. Track Cleaner; Benjamin L. Dresser, Uxbridge, Mass. App. filed Dec. 7, 1904. A shaft mounted in advance of the car axle, and driven therefrom is connected at each end through a universal joint with stub shafts carrying brushes, whereby the brushes may operate at an angle to the line of axis of the shaft and to the track rails. A second shaft mounted in advance of the first and driven thereby carries cutter wheels for removing ice, etc., from the rails.

794,020. Trolley Head; Harry I. Jeffers, Tuscaloosa, Ala. App. filed Aug. 20, 1903. When the wheel leaves the wire the wheel will drop down into the harp to the level of a pair of spiral guide rollers, which engage the wire and guide it to the wheel, after which the wheel will again rise to operative position.

793,965. Trolley; William F. Thompson, Coraopolis, Pa. App. filed Dec. 28, 1904. A pair of spring arms mounted on the harp are adapted to overlie the groove of the trolley wheel, and are displaced laterally to pass an obstruction. The trolley wheel is vertically movable in the harp.

794,051. Automatic Switch; William D. Simpson, Columbia, S. C. App. filed April 10, 1905. Details of construction of a shoe for engaging and throwing the switch tongue from a movable car.

794,076. Brake; Thomas F. Brennan and Michael J. Brennan, Scranton, Pa. App. filed Oct. 7, 1904. A brake wheel mounted on the car axle, a band surrounding the same and means for tightening the band.

PERSONAL MENTION

MR. HERBERT M. YOUNG, superintendent of the Milford, Attleboro & Woonsocket (R. I.) Street Railway and of other roads under the same management, has resigned. His place is taken temporarily by Mr. Winthrop B. Nye, assistant superintendent, who is made acting superintendent. Mr. Young had been with the company since 1887, serving it first as driver of a horse car. About fifteen years ago he was made superintendent of the Woonsocket line, and has been put in charge of the various lines as they have been attached to the system.

MR. H. E. REYNOLDS, who has been connected with the Old Colony Street Railway for twenty-one years, has been promoted to the new office of assistant general manager, created by the Boston & Northern and Old Colony Street Railways. Mr. Reynolds has worked his way up gradually from the ranks to his present position, starting with the old Brockton Street Railway Company as a conductor, then acting as cashier, bookkeeper, assistant treasurer and treasurer. At the time of the consolidation of the many street railways south of Boston, into what is now known as the Old Colony Street Railway, he was appointed superintendent of the Quincy and Hyde Park divisions of the company, where he remained until July, 1903, when he was appointed assistant general superintendent of the entire system, with headquarters at Brockton. In 1904 he was tendered the position of purchasing agent of the Old Colony and Boston & Northern Street Railways, which he held until his present appointment. The two companies operate over 850 miles of track north and south of Boston, extending from Nashua, N. H., and along the Merrimac Valley and the North Shore, through the entire State of Massachusetts to Providence and Newport, R. I., serving twenty-two cities and sixty-six towns. Philip M. Reynolds, who has been in the employ of the companies for some time, will succeed Mr. Reynolds as purchasing agent.

H. E. REYNOLDS

MR. SAMUEL A. FRESHNEY, of Muskegon, Mich., general manager of the Muskegon Lighting & Traction Company, has been chosen by the Grand Rapids Board of Public Works for the recently-created position of general manager of the public service department. He will have general supervision of the municipal water works, lighting plant and all public service departments. Mr. Freshney became connected with the Muskegon Traction Company in 1902, when the company was reorganized. Since then the electric light, street railway and the gas department have been rebuilt and enlarged and many other improvements have been made. Mr. Freshney was born in London, Eng. His first electrical work was in Cleveland, Ohio, where he was for a number of years employed in the engineering and sales department of the Brush Electrical Company and Short Electric Railway Company. From 1902 to 1897 he was manager of the old Muskegon Electric Light works, now a part of the Muskegon Traction & Lighting Company. He has been with the Fort Wayne (Ind.) Electric Works as manager of the Cincinnati office, and later in Grand Rapids as manager of their western Michigan office.