

INDEXED

# Street Railway Journal

Vol. XXIX.

NEW YORK, SATURDAY, JANUARY 26, 1907.

No. 4.

PUBLISHED EVERY SATURDAY BY THE

## McGraw Publishing Company

MAIN OFFICE:

NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

BRANCH OFFICES:

Chicago: Monadnock Block.

Philadelphia: Real Estate Trust Building.

Cleveland: Schofield Building.

London: Hastings House, Norfolk Street, Strand.

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

Copyright, 1907, McGraw Publishing Co.

### TERMS OF SUBSCRIPTION

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

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

Single copies ..... 10 cents

Combination Rate, with Electric Railway Directory and

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

Both of the above, in connection with American Street

Railway Investments (The "Red Book"—Published annually in May; regular price, \$5.00 per copy).....\$6.50 per annum

To All Countries Other Than Those Mentioned Above:

Street Railway Journal (52 issues), postage prepaid..... \$6.00  
25 shillings. 25 marks. 31 francs.

Single copies ..... 20 cents

Remittances for foreign subscriptions may be made through our European office.

### NOTICE TO SUBSCRIBERS

REMITTANCES.—Remittances should be made by check, New York draft, or money order, in favor of the STREET RAILWAY JOURNAL.

CHANGE OF ADDRESS.—The old address should be given, as well as the new, and notice should be received a week in advance of the desired change.

BACK COPIES.—No copies of issues prior to September, 1904, are kept on sale, except in bound volumes.

DATE ON WRAPPER shows the month at the end of which the subscription expires. The sending of remittances for renewal prior to that date will be much appreciated by the publishers.

CLUB RATE.—On five or more subscriptions from one company or its employees, a club rate of \$2.50 each per annum is quoted.

### NOTICE TO ADVERTISERS

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.

During 1906 the Street Railway Journal printed and circulated 426,950 copies, an average of 8210 copies per week. Of this issue 8000 copies are printed.

### Using Passenger Cars as Work and Freight Cars

On small electric railway systems the mistake is sometimes made of not having a work car or a car for rough service, and in such instances extra passenger cars must frequently be put into heavy service for which they were

not intended. Occasionally they are used to carry rails or other track or line material from one portion of the system to another, but more often they are employed in pulling heavily loaded freight cars. Such service cannot help but result in considerable harm to the car. It is an exceptional track or line gang that will not injure the car body when loading or unloading heavy material. If perchance glass or seat castings are not broken, paint will be scraped off and the car will be filled with dirt to such an extent as to give it a shabby appearance in a very short time.

Usually the draft rigging of passenger cars and other parts of the body are not built with the intention of standing the heavy strains that will be thrown upon them if the car is used in switching heavily loaded work or freight cars, and when put into such service, even if something does not give way, there is great liability of the body being racked and loosened. If it is felt that the company cannot afford to purchase work cars for the small amount of service required of them, instead of using passenger car bodies the suggestion is made to build cheap work car bodies for the passenger car trucks. Then when a work car is needed, it would not require much time to run the trucks with motors out from under an extra passenger car and put them under the work car. The work car body need be nothing more than a flat car with a mast for the trolley, and should not cost more than, say, \$200. It would, however, be necessary to wire it and provide it with a controller and rheostats, and this would entail the greater portion of the expense of the duplicate equipment. Such a car body, it is true, would necessitate an outlay of several hundred dollars, but compensation for a part of this expenditure would come through the time saved in loading and unloading and the greater adaptability of the car to the work in general. A considerable cost would also be offset by the lessened maintenance expense on the passenger equipment.

### The Rear of the Switchboard

Switchboard details are so seldom designed by the operating electric railway force, that it would be a waste of time to dwell upon the subject if it were not for the actual working results which every switchboard layout creates. Just as in the modern telephone organization, the traffic department states the operating necessities to the engineers and leaves the latter to scheme out the minute particulars of jack sizes, relay resistances and signal locations, so should the electrical department of the railway system make known its wants in the way of switching flexibility and protection to the manufacturer through suitable broad specifications. Unless the operating and the construction



forces unite in the suggestion and execution of the design, trouble is liable to come.

The back of the switchboard needs as much intelligent consideration from the purchaser as the front of the panels. This is particularly the case with the growing use of alternating current in one branch or another of electric railway service. The mere statement of the switching, measuring and regulating functions desired on the front of the panels is not a complete solution of the problem from the operating end. Of course, hard and fast specifications in regard to minute details of switchboard wiring are unwise in many cases—at least until a conference has been held with the factory engineers. Closer co-operation will result in better satisfaction all around. Unless the man who designs the switchboard in detail can be given the local conditions in the plant where the board is to be installed, he cannot be expected to meet all present and future requirements at one and the same time.

Switchboard wiring has been vastly improved during the past few years, in both its mechanical strength and its electrical intelligibility—if such a term can be used. The front of a 600-volt d. c. railway board resembles the older designs quite closely, but behind the scenes much more care is used to separate and insulate conductors of opposite potentials. Bulky field rheostats are often relegated to the basement ceiling, instrument wiring is run in heavily insulated covering or even in armored piping, with 90-deg. bends and straight, horizontal or perpendicular runs. Curves and slants are being avoided as much as possible, and it is much easier to understand the main wiring behind many boards than in earlier days. Instrument leads, potential and current transformers, special fuses and lightning arresters, oil switch relay connections and synchronizing wires are the really complex elements in the a. c. board, and in the arrangement of these there is ample scope for conferences in specific operating problems between the purchasing company and the manufacturers. It is still not uncommon to find too little space behind the switchboard for convenient working, and in a recent installation which defied criticism in almost every other particular, three bare-knife 2300-volt line switches and a grounded bus projected from the rear of the switchboard and paralleled the adjacent wall, respectively, leaving a gap of but 15 ins. in which to work,—a construction too dangerous to be tolerated, and yet one which might have been avoided by co-operation between the purchaser and the designer. In another case a set of 6600-volt knife switches was installed against the station wall within a foot of the floor. Compactness is sometimes led to defeat its own ends, and while it is a desirable feature of all switchboard layouts, it is worthy of more cautious application in more than a few cases.

### Steam Railroad Delays

It is perhaps more than a coincidence that the State Boards of Railroad Commissioners of the two neighboring States of New York and Massachusetts should have been investigating recently with a great deal of care the delays to passenger traffic on steam railroads. The work of the New York Commission has been local, that is, related to

the service into the New York terminal of the New York Central & Hudson River Railroad, where the interruptions to the schedule owing to the work of electrification have been general. The Massachusetts inquiry has been broader in that it has covered the service of practically all of the principal steam lines in that State. For this reason the report issued a week or two ago is of general interest, even to electric railway companies, although trolley service is not referred to in any way in the text. Steam and electric railways have many points of common interest in these days, and it is not seldom the practice of one type of road is full of significance to the other, although the conditions of operation are necessarily at variance.

Without going too much into detail, the Massachusetts report attributes the extraordinary delays of railroad service in the State this winter to eight principal causes: heavy business, unfavorable weather, delayed through trains, overcrowded terminals, bad coal, insufficient coal, lack of motive power and false economy in the maintenance of equipment. The results have been vexatious delays in the movement of trains, and the board does not hesitate to criticise our steam railroad brethren at considerable length for their failure to maintain better schedules.

It is not easy to suppress one's satisfaction that, during this period of overstrained steam schedules, the trolley lines in both New York and Massachusetts have been giving excellent and reliable service, with the result that the fire of hostile criticism has been almost entirely turned in other directions. Of course, the electric roads have not had the complications of an enormous freight traffic to contend against, and there have not been foreign cars on limited schedules to handle on through routes from points 500 or 1000 miles away; but the same weather has been experienced by the trolley lines; the same questions of proper maintenance expenses have been considered; the fuel question has had to be solved in the face of the winter's business; the crowded city street has had to be negotiated no less than the intricate and easily upset terminal station, and sufficient motors have had to be purchased to take care of anticipated increases in traffic. The traffic on the street railways has reflected the general prosperity of the country in no small degree in the past year, and there is no question that the rush-hour peaks of the electric lines have been much harder to handle than the extra morning and night suburban service of the steam railroads. In the light of recent experience, it is clear that the boasted advantage of the steam locomotive's independence of a power station is not as great as some people are disposed to assert, and there is no escaping the conclusion that a well managed electric line is capable of giving better passenger service than a poorly operated or crippled steam road.

There is a note of warning in the foregoing list of train delay causes, however, which ought not to be overlooked. Like accidents, some train (and car) delays are, humanly speaking, unpreventable. In heavy storms and fogs safety in operation imperatively demands cautious running, and if time tables are made up on a fair weather basis, departure from schedules is inescapable. But modern demands for transportation will not tolerate slow-running, stormy-



weather schedules in days of sunshine. We prefer to make allowances the other way. Then there are increases of traffic which no one can fully foresee, and delays in the delivery of equipment from factories swamped with orders which cannot be completed within the guaranteed time limits. Forecasts of coming conditions cannot be made with absolute certainty, even in times of high prosperity like the present. Relief from congestion, due to overcrowded tracks, cannot be instantly obtained by a stroke of the president's pen, no matter how large a check he authorizes the treasurer to sign to cover the new construction.

On the other hand, and here is where the electric railway manager needs to avoid trouble, there is little excuse for delays due to faulty fuel or to too great zeal for dividends at the expense of proper maintenance of the property. Fuel can be accurately tested by chemical analysis or calorimetric measurement before a ton is accepted, and the cost of such determinations by a competent chemist or engineer is a mere bagatelle in proportion to the value of the test. As for that great sin of omission—stinginess in maintenance of equipment—it is good to note the ever-widening appreciation of its false economy in electric railway circles. In the older days of the industry repairs were not regarded with the interested eye and ear of the present manager, and chances were taken which the higher speeds and heavier rolling stock of 1907 would not for a moment justify. With the lesson of the Massachusetts report before one—and false economy was given as the root of the whole trouble—no thoughtful electric railway man can fail to appreciate anew the immense importance of adequate equipment maintenance in the performance of a profitable and satisfactory public service by his property.

### Steam vs. Electricity for Suburban Service

It was Rochefoucauld, we believe, who was the author of the sinister aphorism, "There is something even in the misfortunes of our best friends not altogether unpleasing to us." It is not without a certain feeling of this kind that we have regarded the failures of steam suburban traffic out of Boston and New York mentioned above. The difficulties on the New York Central Railroad already referred to can be excused, as that road is engaged in the herculean task of at once introducing an entirely new system of motive power and of completely changing its terminal station. Its patrons have the satisfaction of looking forward to better conditions soon to come. The same is not true, however, with the suburban lines which serve New York from Jersey City and with the Boston lines referred to. This is the season of the year when one is always forcefully reminded of the claim of the steam railroad operator that a purely passenger business is unprofitable, and the suburban systems of many of our steam roads seem to be run on this principle. In fact, matters have come to such a pass in the Boston instance that petitions have been circulated and bills introduced in the General Court of Massachusetts looking to the cancellation of the lease under which the Boston & Albany road operates its so-called Albany Circuit which serves the towns to the southwest of that city. We have neither oc-

casional nor desire to sit in judgment on the merits of its controversy, and we merely state the demands of the patrons of the road in question.

For some years past there has been a great deal of talk about the conversion to electricity of this line. In fact, at the time when the South Station was built, special provision was made for the circuit trains, and it was then generally believed that some step would be taken toward electrification of this particular line. There has also been considerable talk about the equipment of the trans-Hudson roads. All of these lines are peculiarly well situated for conversion into electric roads. They run through well-populated and rapidly growing suburbs, and furnish traffic which needs only the stimulant of a proper electric service to grow into exceptionally remunerative density. All of them also touch tidewater, so that there are admirable opportunities for building power stations on sites particularly favorable for cheap power. If the alternating current motor system were to be adopted a single power station would be ample for any of the systems. If it were desired to adhere to the older direct current then at most a few sub-stations only would be necessary, and in the Boston case a single one would undoubtedly suffice. Yet with all these advantages year after year has gone by, and the electric system has been admirably developed elsewhere, but these steam suburban systems have remained under the old regime, with their timetables little altered as the years have gone by. The suburbanites, who ten years ago disturbed the last act in most of the New York and Boston theaters by their hurried exits trainwards, still bolt at the same inopportune period to catch the last opportunity for getting home.

There seem to have been no serious efforts made by the companies interested toward the much-talked-of conversion to electricity. The Erie suburban plans are said to have been abandoned, at least for the present; the more vague proposals of the Lackawanna seem no nearer completion, and last of all comes a suggestion that the Boston & Albany Road, including the Circuit under consideration, is to move bodily out of the South Station, which was supposed to have been prepared for its convenience, and is to seek terminal facilities of its own. This would give to Boston three independent stations between which passengers who do not wish to stop permanently in the Hub must seek such transportation as they may find. The moral which this story teaches is somewhat as follows: "It is easy to drive a steam railroad to the current but exceedingly difficult to make it drink,"—as in the case of the traditional horse.

It seems to be much easier and cheaper to drag along in the same old way, giving the same old service and turning the same old deaf and unresponsive ear to complaints than it is to go ahead and do the thing which any enterprising street railway management is doing and is glad to do all the time. If these suburban systems had been owned by the electric railway corporations in the districts affected it is safe to say that they would long ago have been electrified and would be building traffic for themselves at a surprising rate, a fact which teaches the lesson that if a community seeks suburban rapid transit it should turn over the facilities for getting it to those who know best how to utilize them.



## THE LAS VEGAS RAILWAY & POWER COMPANY

Las Vegas, New Mexico, although having hardly over 11,000 inhabitants, is of much more importance than its size would lead the stranger to suppose. It is of industrial importance as the center of a district, from which great quantities of limestone, gypsum and wool are exported, and in recent years it has become a great health resort. The mild, dry

springs and an artificial lake. The great charm of the ride, however, is afforded by the more rugged beauties of Nature, which come into view after leaving the Montezuma, when the line turns abruptly through the cañon made by the Gallinas River. Here the tracks follow the now rapid stream through deep clefts and yawning gorges in the shadow of rocky cliffs hundreds of feet high.

On the right, the passenger may look at the broad scenic highway clinging in its tortuous course to the mountain side, while on the left the narrow stream is seen to broaden now and then to lakes with steep wooded shores. In fact, the southern slopes are so high that in winter the lake surfaces are not warmed by the direct rays of the sun, so that a thick coat of ice is formed. It is a unique yet frequent picture here to see skaters dashing on the ice under the shadow of the cliffs while in the warm sunshine on the northern banks boys are running barefoot. A view of one of these skating parties is shown in one of the accompanying illustrations of scenes along this route.

After leaving these picturesque lakes the railway terminates at a large ice house within sight of the Sangrè de Cristo range.

### FREIGHT BUSINESS AND PROBABLE EXTENSIONS

In the Gallinas cañon there are all told nine large dams and as many ice houses. The so-called ice harvest takes place the latter part of December and in January and February. During this ice harvest the company handles about fifty cars of ice per day. These dams are from 6 to 8 miles from the city of Las Vegas, and the average grade on the run is about 3 per cent, and in some cases, at the upper end



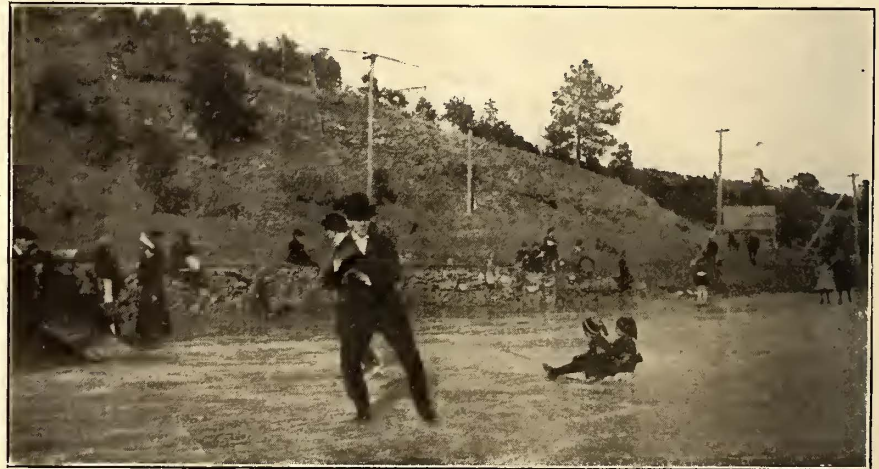
THE STARTING POINT OF THE LAS VEGAS RAILWAY, FROM THE LAS VEGAS DEPOT OF THE SANTA FE RAILWAY, OPPOSITE CASTANEDA

climate of this part of New Mexico has brought thousands of health seekers to and near Las Vegas, besides others who have come to aid in the great development of the Southwest.

Clear evidence of the progressiveness of this bustling town is afforded by the success of the Las Vegas Railway & Power Company, which is giving Las Vegas its electric railway, light and power service. Previous to the organization of this company the street railway was operated by the Las Vegas & Hot Springs Electric Railway, Light & Power Company, and the electric light and power business by the Las Vegas Light & Fuel Company. Upon the organization of the Las Vegas Railway Company, the two functions were combined and a new power plant was constructed on a site well adapted both for the railway and the electric light and power business.

### THE ROUTE

The railway line starts in Las Vegas from the Santa Fe station, and within a few minutes has left the town to traverse one of the most picturesque routes in the country. The vicinity of Las Vegas has several great health resorts. Among those reached by the railway are the territorial hospital for the insane, the hospital owned by the employees of the Santa Fe Railway, and the Montezuma Hotel. Here there are some hot springs which, together with the hotel, have not been exploited for the last two years, despite the fact that the location is very healthful and the springs are considered to be among the best in the country. There appears to be little question among Las Vegans that this could be built up into a great health and pleasure resort by a good hotel man. Before reaching the Montezuma the line passes by one of the finest race tracks in the Southwest and along Gallinas Park, a well-cared-for grove full of shady paths, rustic seats, hidden



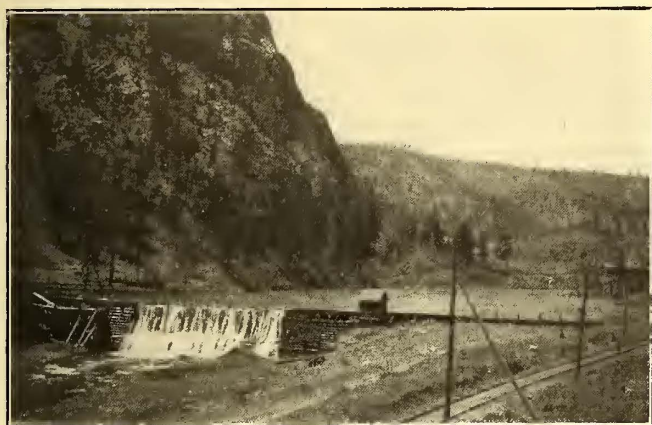
ICE SKATING ON ONE OF THE LAKES ALONG THE LINE OF THE LAS VEGAS RAILWAY & POWER COMPANY

of the cañon from 4 per cent to 6 per cent. The electric locomotive operated by the company usually hauls from fifteen to twenty empty freight cars per day. During the ice harvest the company is compelled to hire a steam locomotive from the Atchison, Topeka & Santa Fe Railroad to help bring up the balance of the empties needed. Coming down no assistance is needed, the electric locomotive taking thirty-five to forty cars in one string, loaded with ice. This ice is distributed by the Santa Fe along its various icing stations, as far east as Dodge City, Kan., and west as far as Phoenix, Arizona.

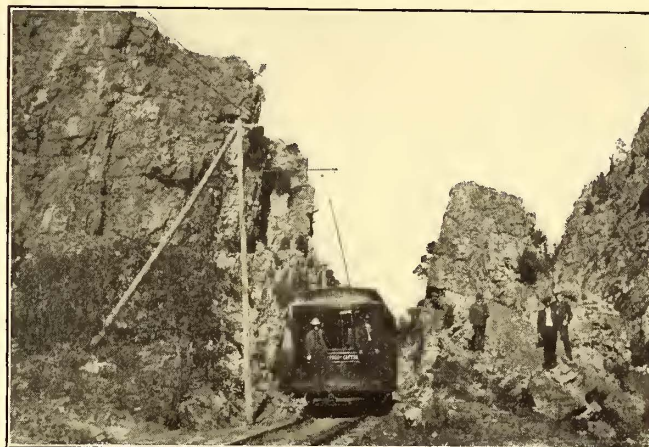


Another interesting feature is the fact that there is some very valuable farm country and timber as well as coal lands from 35 to 40 miles from Las Vegas, anxiously waiting to be entered by some railroad. The inhabitants in these localities as well as those of Las Vegas have been so urgent in their demands for a railroad in that country that the company

ft. 4 ins. over the corner posts and equipped with double trucks. Each car has two electric motors of the GE-800 type, and a Westinghouse air-brake equipment. The sides are of long leaf yellow pine reinforced with steel plates extending the full length of the car body, and all the body



ONE OF THE DAMS OF THE GALLINAS RIVER, WHERE ICE IS CUT FOR TRANSPORTATION BY THE LAS VEGAS ELECTRIC RAILWAY



A TYPICAL VIEW ALONG THE LINE OF THE LAS VEGAS ELECTRIC RAILWAY, SHOWING THE RUGGED NATURE OF THE SCENERY

has practically made up its mind to tap this valuable part of New Mexico by extending its electric line some 40 to 50 miles. New plans have not yet been definitely decided on, but will be very shortly. The new line will also cover one of the finest scenic routes in the United States.

framing is of dry and well-seasoned white ash. The interiors have space for advertising cards, push buttons, signal bells, and other features of modern cars. The cars are equipped with electric headlights. The Las Vegas Company has also purchased two cars 38 ft. 6 ins. long over the platforms, with bodies 28 ft. 6 ins. long, of the same general type as those described above. Each of these cars is equipped with four GE-54 motors and with Westinghouse air brakes. All of the

TRACK AND ROLLING STOCK

The Las Vegas Railway & Power Company has approxi-



BRIDGE STREET, LAS VEGAS, NEW MEXICO, SHOWING CAR CROSSING THE STEEL BRIDGE ACROSS THE GALLINAS RIVER. ONE OF THE RAILWAY COMPANY'S COMBINATION PASSENGER CARS MAY BE SEEN ON THE RIGHT, AND ITS ELECTRIC LOCOMOTIVE ON THE LEFT OF THE ROADWAY

mately 3 miles of track in the city limits and 9 miles outside. Practically all of this track is of recent construction. Sixty-lb. T-rail is used throughout, with No. 0000 copper bonds placed between the angle-bar and the rail.

The new rolling stock purchased consists of three complete car equipments, each car being 35 ft. 4 ins. over all, 25

above cars were furnished by the St. Louis Car Company, St. Louis, Mo.

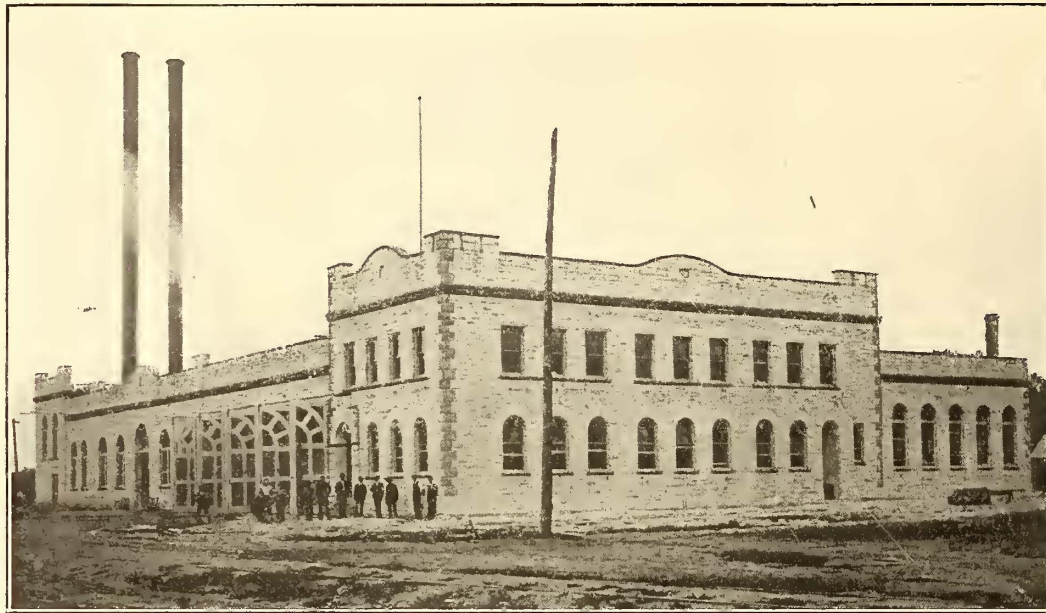
The company has, in addition to the rolling stock mentioned, one small electric locomotive for use in delivering freight, and one open car of the double-truck type. Both of these cars are equipped with Westinghouse motors and air



brakes. These last two cars were furnished by the American Car Company, of St. Louis.

The car sheds, as shown in the plan, are between the main office and the engine room of the public service building de-

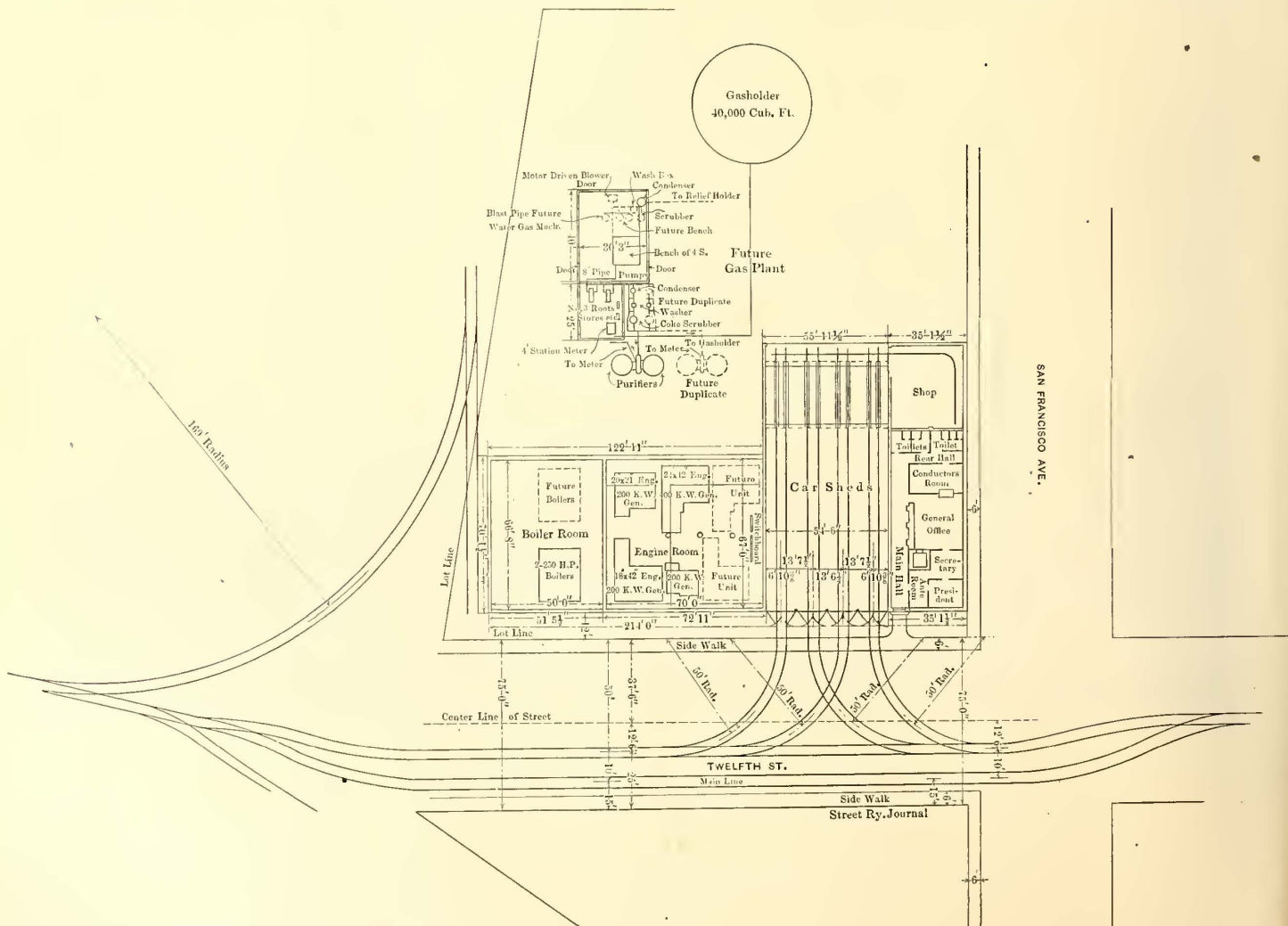
scribed later. They comprise a total width of 55 ft. 11½ ins. and have four tracks in all spaced 13 ft. 6¼ ins. and 13 ft. 7½ ins. centers. As the walls are solid no openings were left except in the front and the rear of the car sheds, so the only additional cost for constructing car sheds was that for the roof. A repair pit in the rear of the car sheds extends the entire width of the building under all the tracks.



THE PUBLIC SERVICE BUILDING OF THE LAS VEGAS RAILWAY & POWER COMPANY, LAS VEGAS, NEW MEXICO

**PUBLIC SERVICE BUILDING**

The handsome stone structure shown in one of the accompanying illustrations was built by Wallace & Davis, of Las Vegas, as a combination service building for the Las Vegas Railway & Power Company. It is located at the intersection of Twelfth Street and San Francisco Avenue. The section set aside for the power station runs parallel with Twelfth Street



GENERAL PLAN OF THE PUBLIC SERVICE BUILDING OF THE LAS VEGAS RAILWAY & POWER COMPANY. THE TRACK ARRANGEMENT LEADING TO THE CAR STORAGE THEREIN, LAYOUT OF THE POWER GENERATING EQUIPMENT, FUTURE GAS POWER PLANT, OFFICES, ETC.



and is alongside the car sheds. That part of the building parallel with San Francisco Avenue used for offices and a show room for electrical fixtures is two stories high, while the one-story division is used for the shops.

THE POWER PLANT

Practically none of the equipment of either the old railway plant or of the new plant of the Las Vegas Railway & Power Company was retained, all of the machinery and equipment being new and installed to conform with present requirements. The Las Vegas company has approximately twenty-five railway motors, aggregating some 200 hp., on the day service, and a peak load for lighting of about 230 kw. Arrangements have been made for the extension of the property both for additional boilers and machinery for light and power, and also extensions of the street railway equipment. The plans for the entire installation were prepared by Ruebel & Wells, St. Louis, Mo.

In purchasing the property, sufficient space was provided for the erection of a coal gas plant to be installed at some future time. The proposed location of this gas plant and holder is shown on the plan drawing on the opposite page.

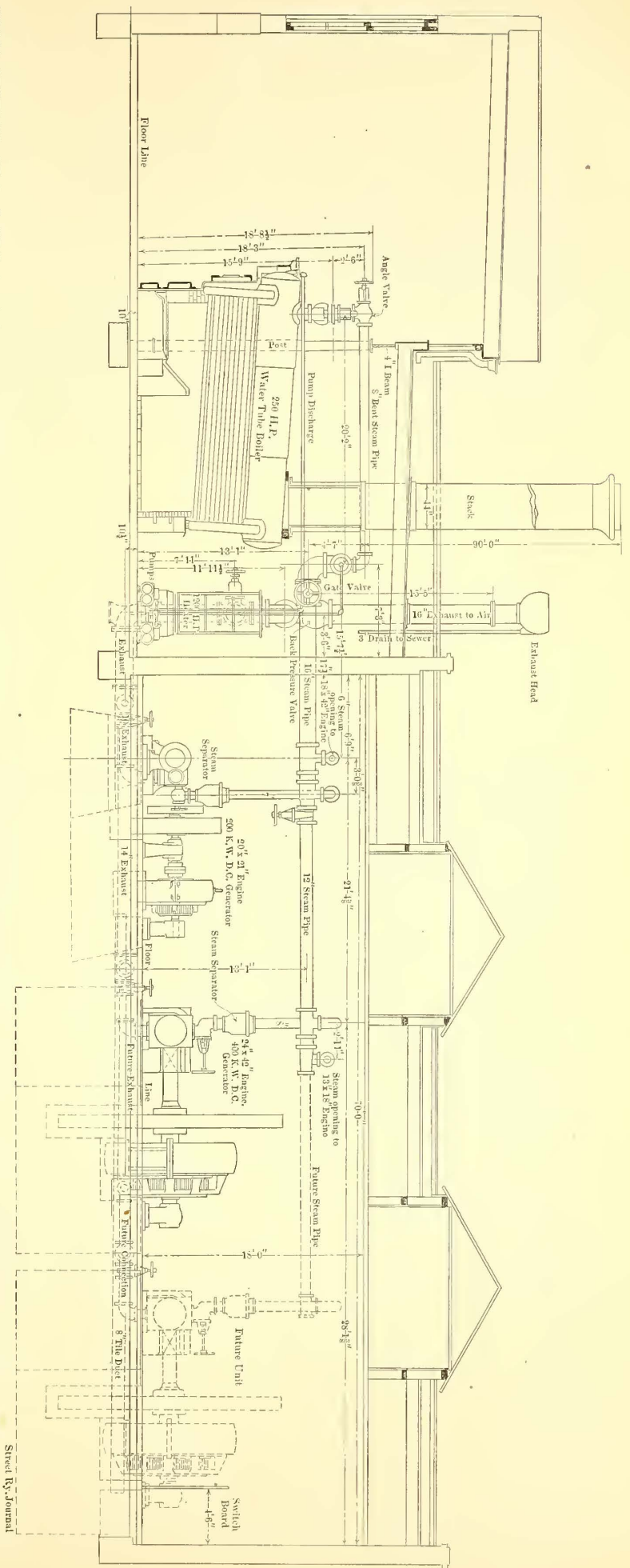
The steam generating equipment is located in a room 50 ft. wide by 66 ft. 8 ins. long, and consists of two boilers of the inclined water-tube type. Each boiler is rated at 250 hp, designed on the basis of 10 sq. ft. of heating surface per horsepower; contains 140 mild steel tubes, 3½ ins. diameter by 18 ft. long; and is guaranteed for a working pressure of 150 lbs. per sq. in. and a test pressure of 225 lbs. per sq. in. The boilers are suspended in front by I-beam supports and are each connected with a stack 90 ft. high and 44 ins. in diameter, built of No. 8 and No. 10 steel. The boilers were furnished by the John O'Brien Boiler Works, of St. Louis.

The steam piping is of heavy wrought-iron pipe with extra heavy fittings throughout and all large valves arranged with by-pass. Connections between the steam heater and the engines are made by pipe bends. The piping of the main header has been designed for the ultimate capacity of the plant, as is also the case with the exhaust piping.

The feed-water heater, which was furnished by John E. Angell & Company, of St. Louis, Mo., is of 1200-hp capacity and of the receiver type, arranged so that the exhaust steam can be taken from the heater for heating the entire building and offices of the company. Traps are furnished for draining the separators for the different engines and also for draining the heater. There are two boiler feed pumps, each of sufficient capacity for the entire plant. They are of the Blake outside-packed plunger type with bronze plungers.

The engine room is 70 ft. long and 66 ft. 8 ins. wide. It contains four steam engines, each direct-connected to a generator. There are two generating sets for the electric light and power service. One set consists of a Filer & Stowell heavy-duty Corliss engine, 18 ins. x 42 ins., operating at 100 r. p. m., direct connected to

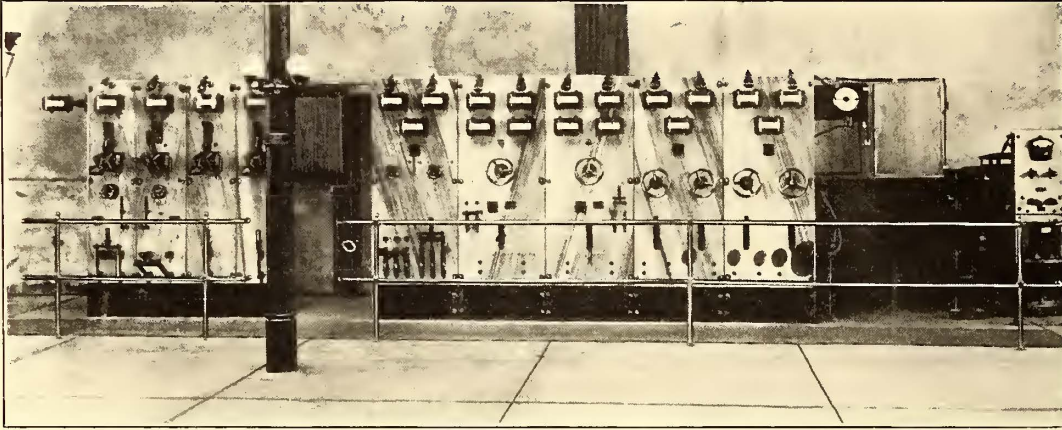
CROSS SECTION OF LAS VEGAS RAILWAY & POWER COMPANY'S POWER PLANT, SHOWING THE ARRANGEMENT OF BOILERS, STEAM AUXILIARIES, GENERATING MACHINERY AND SWITCHBOARD





two 60-cycle, 2200-volt, two-phase, revolving field Allis-Chalmers generators with a 22½-kw, 125-volt, 525-r.-p.-m. exciter driven from the engine shaft by a Renold silent chain. The other set consists of a Buckeye simple 13-in. x 18-in. engine and a 125-kw Allis-Chalmers generator of the same type as

the board was furnished and erected by the Frank Adam Electric Company, St. Louis, Mo. The light and power panel is arranged to control two-phase generators for single-phase distribution, there being four single-phase circuits. Each circuit is connected with a hand regulator controlling



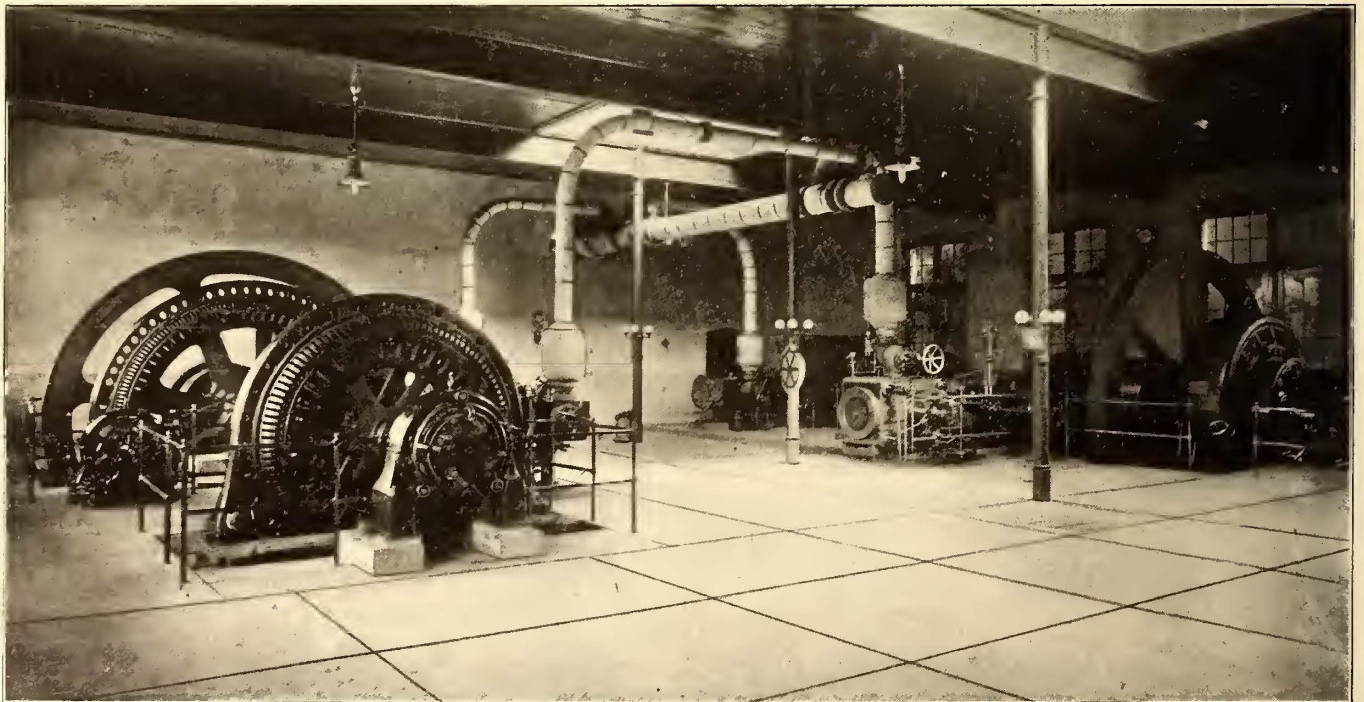
THE LAS VEGAS SWITCHBOARD, ONE SECTION CONTROLLING THE DIRECT-CURRENT RAILWAY CIRCUITS, AND THE OTHER THE ONE AND TWO-PHASE LIGHT AND POWER CIRCUITS

the other, operating at 225 r. p. m. and having a 12-kw exciter direct-connected to the engine shaft.

For street railway service there is one Filer & Stowell heavy-duty, simple Corliss engine, size 24 ins. x 42 ins., operating at 100 r. p. m. in connection with a 400-kw, 550-volt, 100-r.-p.-m. Westinghouse d. c. generator, and also one 20-in. x 21-in. Buckeye engine operating at a speed of 200 r. p.

erators and for paralleling the direct-current dynamos.

The State Railroad Commission has issued a rule requiring that all electric cars on lines crossing steam roads at grade shall be stopped at such crossings not closer than 10 ft. to the steam road and not further away than 50 ft., and



GENERAL VIEW OF THE INTERIOR OF THE LAS VEGAS POWER STATION, SHOWING THE ALTERNATING-CURRENT LIGHTING AND POWER GENERATORS IN THE FOREGROUND, AND THE DIRECT-CURRENT RAILWAY MACHINERY IN THE BACKGROUND

m., connected to a 550-volt, 200 r.-p.-m. Sprague direct-current generator. As noted in the plan of the power house, space has been provided for two additional units, one for railway service and one for lighting service.

The switchboard has two sections, one for controlling the railway circuits and the other for the light and power wiring. Both parts are equipped with instruments made by the Wagner Electric Manufacturing Company, St. Louis, Mo., but

that some one in the employ of the road, the conductor if the car has one, shall go ahead and see that the track is clear and safe for the passage of the electric car. The utmost vigilance is required of the employee who undertakes this work that accidents may not occur. The car is in no case to proceed until signaled to do so by the person who has gone ahead and ascertained that the way is clear. A copy of the rule is to be posted up in each car.



### THE SPOKANE-PEND D'OREILLE RAPID TRANSIT COMPANY

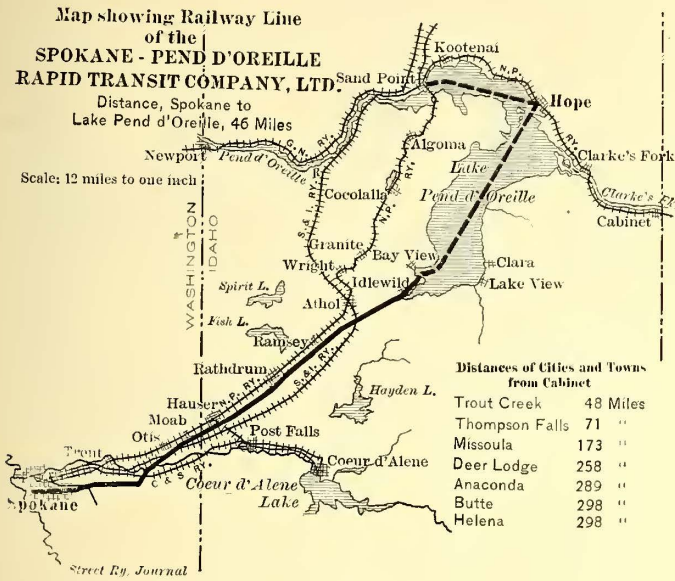
Probably no other section of the United States has been growing so rapidly in wealth and population as the territory popularly known as the "Great Northwest" or "Inland Empire." The latter title is well deserved, for it would be difficult to find elsewhere an area of equal extent possessing

steam railroads serving it, thus opening up a promising field for electric railways. Among the projects now under way to give electric service to this territory that of the Spokane-Pend d'Oreille Rapid Transit Company, Ltd., may be taken as typical, on account of the length of the line to be built, the district it will serve and the character of the service.

The Spokane-Pend d'Oreille Rapid Transit Company's line, which is to be of the high-speed interurban type, is now under construction from Spokane through the irrigated Spokane Valley to Lake Pend d'Oreille, a large intermountain sea surrounded by the most tempting scenery. The Spokane Valley extends eastward from the city for a length of 46 miles and a width varying from 5 to 15 miles. Much of this valley is level as a floor, and with the tributary Spirit and Hoodoo valleys covers nearly 500 square miles. The Spokane River runs through this district for 35 miles.

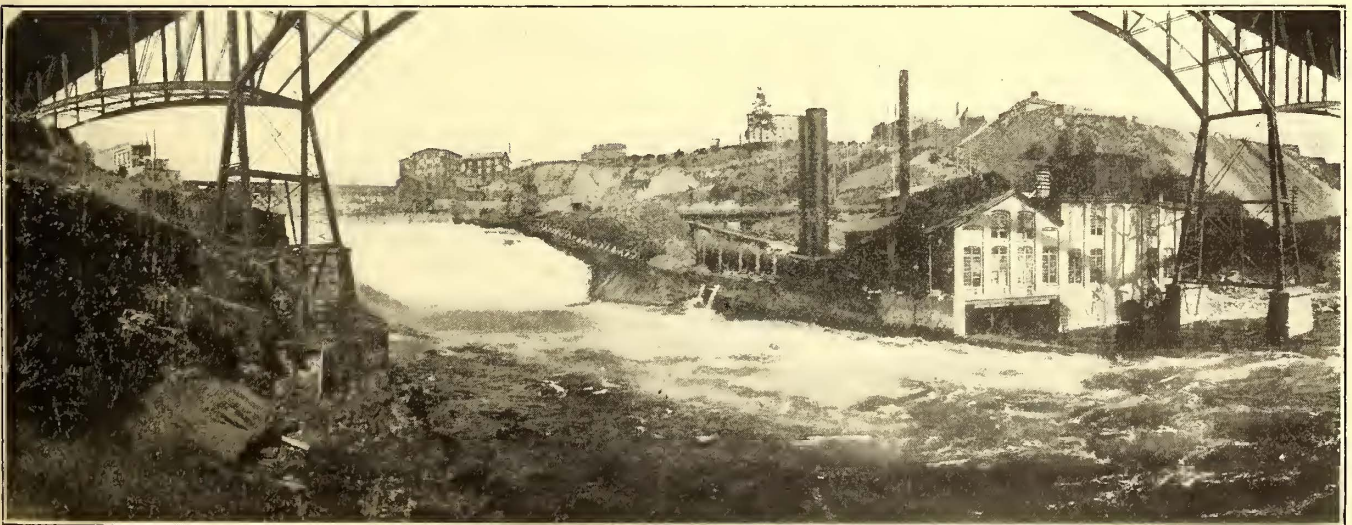
Along the borders of this valley are nine mountain lakes most of which are popular summer camps for Spokane citizens. At present the only means of reaching these lakes is by vehicle from railroad stations several miles distant. Five of these lakes are now used as reservoirs for irrigating the Spokane Valley, and a further supply is to be taken from the Spokane River at Post Falls.

The total population along the new line comprises the 86,400 people at the Spokane terminal, the suburban population of 4800 tributary in Washington (taking only one-half of Green Acres), and the Idaho population of 10,200 around Lake Pend d'Oreille. The lake is at a convenient stage in the journey between Spokane and the thriving mountain towns of Montana whose close business connections with Spokane cause considerable railway travel. Among the towns within easy reach are Anaconda, Butte, Helena and Missoula. The population of the Montana copper district is now estimated to exceed 150,000. As the trip via boat and the electric railway will be 16 miles shorter than the steam railroad course around the north bend of the lake, it is be-



ROUTE OF THE SPOKANE-PEND D'OREILLE LINE

such varied resources in minerals, timber and agriculture. Within a 200-mile radius of Spokane are located the Coeur d'Alene silver and lead mines; the rich copper deposits in the Boundary and Roseland districts of British Columbia; the Palouse wheat and fruit belt, and the Big Bend country with its stock and agricultural regions. This territory is



HYDRO-ELECTRIC PLANT OF THE WASHINGTON WATER-POWER COMPANY AT SPOKANE FALLS, SPOKANE

also believed to contain more timber than any other part of the country. To cap these advantages, Spokane, the center of all this promising development, has within its borders the famous falls of the Spokane River—the principal water power of the State. The city has grown in population from 36,800 in 1900 to 86,400 in 1906—an increase of over 134 per cent in six years.

The increase in the population and productions of the "Inland Empire" has long outstripped the facilities of the

believed that the electric railway will attract most of the Montana-Spokane travel. Pleasure riding is expected to prove quite a factor, as the lake is already renowned as an outing resort, while the trip through the orchards of the Spokane Valley ought to induce such travel on that portion of the line.

The Spokane-Pend d'Oreille Rapid Transit Company, Ltd., has now completed all preliminary work and surveys of definite location. Franchises have been secured in Spokane and Rathdrum—in the latter place for fifty years.



Practically all the right of way has been secured and property purchased for terminals in Spokane and on Lake Pend d'Oreille. Grading is under way for several miles and rails have already been laid in Spokane.

The total length of the route is 42 miles. Owing to the flat character of the Spokane Valley the cost of the grading including rock work, is estimated at the extremely low figure of \$2,000 per mile. In all there are the following grades: One 300 ft. long, 3.5 per cent; one 1000 ft. long, 1.5 per cent; 1 per cent maximum in the valley in two or three places; 1.4 per cent maximum down to the lake. There are three 10-mile tangents and less than 3 per cent of the line has curves greater than 8 to 10 degs.

The track work will be of the usual interurban type, using a 70-lb. T-rail. At the great lake terminal the track will be arranged in herring-bone fashion, the sidings branching from a main track and with a circle around the freight house. Between sidings there will be a space of 22 ft. for teams and trackage for storage cars.

The Spokane terminal provides for a double-track loop; its area is 142 ft. x 200 ft. It is proposed to erect on this plot, which is within one block of the business center, an eight-story building for the offices, waiting rooms and special conveniences for patrons shopping in the city. The company has applied for a franchise covering a 2000-ft. loop around four blocks to secure abundant storage room.

Power is to be purchased from the Washington Water Power Company and transmitted at 3 phase, 60 cycles to three sub-stations. The price for the 2300-volt current delivered at the power company's switchboard in Post Falls, Idaho, will be \$20 per annum calculated upon 75 per cent of the maximum amperes recorded at any time during each month. The present contract contemplates the use of about 1000 hp. The trolley line will be of catenary construction.

The rolling stock to be adopted is quite extensive both for passenger and freight service. There will be six seating

for the motorman. These cars will be used to haul twenty box cars and forty flat cars equipped with air brakes.

It is apparent from the foregoing statements with reference to terminal facilities and freight rolling stock that the company expects to do a large freight business. In fact, following the plan of the other Pacific Coast electric lines,



ECHO BAY, AT THE SOUTH END OF LAKE PEND D'OREILLE

special attention will be given to fruit and produce trade. The tonnage to Spokane from cordwood alone will be a heavy factor for the next ten or fifteen years, while the agricultural products must increase from year to year as the valley is developed further. Track connections for freight traffic are to be made with the Northern Pacific, the Canadian Pacific and the Union Pacific (the Oregon Railway & Navigation Company) systems.

The officers of the Spokane-Pend d'Oreille Rapid Transit



A VIEW OF SQUAW BAY, LAKE PEND D'OREILLE, WHERE THE LARGE TERMINAL IS BEING LAID OUT

72 passengers and furnished with a 10-ft. baggage and a 12-ft. smoking compartment. These cars will be 60 ft. long, 8 ft. 3 ins. wide, 13 ft. 3 ins. high. They will be furnished with rattan seats. The ten trail cars are of the same dimensions but are upholstered in plush and have no compartments. For freight service there will be two express cars (with Westinghouse No. 121 motors) similar to those furnished by the J. G. Brill Company to the Washington Water Power Company. These will be 39 ft. 4 ins. long, 11 ft. 11 ins. high, with arched roof and hood covered with canvas. They will be furnished with an enclosed vestibule

Company are: President, C. H. Reeves, partner of the Hercules mine in Coeur d'Alene, Idaho; first vice-president, J. J. Browne, president of the Coeur d'Alene Bank & Trust Company, the Columbia Valley Bank, of Wenatchee, Wash., and an officer of two other banks; second vice-president, D. K. McDonald, manager of the Oregon Mortgage Company, Portland, Ore.; treasurer, J. Grier Long, vice-president and manager of the Washington Trust Company, of Spokane; manager, R. A. Hutchinson, president of the Modern Irrigation Company; secretary, Mark F. Mendenhall, attorney and stockholder in the Spokane Canal Company.



## CORRESPONDENCE

### ENTRANCE INTO BALTIMORE

WASHINGTON, BALTIMORE & ANNAPOLIS ELECTRIC  
RAILWAY COMPANY

Baltimore, Md., Jan. 21, 1907.

Editors STREET RAILWAY JOURNAL:

In your issue of Jan. 12 you kindly refer to progress of the work on our line which is to connect the cities of Baltimore, Washington and Annapolis, but I wish to correct the statement in the last paragraph of the article which states that arrangements have been made for an entrance into Baltimore over the tracks of the United Railways & Electric Company. The Baltimore Terminal Company, which is owned by the Washington, Baltimore & Annapolis Electric Railway Company, has an independent franchise and entrance into the heart of the city of Baltimore and is not dependent for it upon the United Railways & Electric Company. With the exception of the latter company, ours is the only one having similar rights in the city of Baltimore.

GEORGE T. BISHOP, President.

### ANNUAL CONVENTION OF THE INDIANA ENGINEERING SOCIETY

The twenty-seventh annual convention of the Indiana Engineering Society was held in the Commercial Club rooms, Indianapolis, Jan. 17, 18 and 19. The meeting was well attended, there being 122 of the 165 active members present. Much interest was shown during all the sessions of the convention. C. C. Brown, secretary of the society, made a very encouraging report, showing the society to be in a most prosperous condition and that the membership had increased materially during the past year.

Robert P. Woods, president of the association, delivered his annual address, in which he congratulated the society upon the good showing, progress and growth, increased interest and results, and then presented the interesting paper on "Engineering of Interurban Railway Construction," published elsewhere in this issue. Mr. Woods' paper was highly commended in the discussion that followed.

The report of the committee on electric railroads was presented by J. P. Moore, chairman. The report stated that very few people realized the rapid development that was being made in electric railroads in Indiana. There are now 1650 miles in operation, 273.95 miles were constructed during the past year, and 533.33 miles are now under construction, while 573 miles are projected. The report set out the companies, number of miles of each line, and named the principal cities connected and to be connected; also dealt in figures relative to expenditures and earnings. The report aroused hearty applause and astonished many of the engineers present.

"Paving Between Street Car Tracks" was the subject assigned to B. J. T. Jeup, who described in a very interesting manner what he considered the best pavement for street car tracks. He exhibited drawings and material to illustrate his talk, declaring that his experience convinced him that with the advent of the heavy interurban cars the T-rail was the best, and concrete foundation and brick for paving between the rails the most durable and satisfactory roadbed for many reasons, principally because they were easily removed to make repairs on the rails, replace ties, etc. He said neither wooden blocks nor asphalt was as durable nor as easily and cheaply repaired as brick pavement between the track. Mr. Jeup exhibited a grooved brick to be placed next to the rail to admit the deep flanges of interurban cars.

Mr. Jeup's paper brought out quite a discussion, which left the impression that there was considerable difference of opinion as to the best between-rail paving material.

"The Work of the Railroad Commission" was presented by Union B. Hunt, president of the commission. Mr. Hunt addressed the meeting at length and earnestly advocated the necessity for certain changes in the law limiting the power of the commission. He related what the commission had accomplished by persuasion because it lacked the power to compel or penalize railroad companies for their wrongdoing. He said the commission was asking the Legislature to give it power to regulate and adjust crossings of steam and interurban line tracks, to compel the use of safety devices at crossings and otherwise to assume jurisdiction of all railroads for the betterment and safety of life and limb. "We are asking the Legislature to give us power to require the railroads of the State to report any accident within five days after its occurrence, that the commission may determine its cause, and if possible to provide a preventative against a similar accident in future. We are asking for power to appoint inspectors to keep the commission advised as to whether the railroads of the State are maintaining their roadbeds and equipment in proper condition and repair for the security of the employees and the public, and the providing of adequate stations, properly lighted and heated and in sanitary condition." Mr. Hunt also said that the commission was asking for power to deal more effectively with railroads that suffer blockades or refuse to furnish cars to shippers and to compel the moving of freight at least 50 miles per day.

"Track Elevation Plans for Indianapolis" was presented by Mr. Jeup and Mr. Stearns. They described in an interesting way what had been accomplished, and gave interesting account of the engineering features of the work. An astonishing revelation was brought out in the fact that in the work thus far completed the elevation over the streets was not high enough to admit interurban cars several of the new roads are now building.

The report of the committee on materials of construction and paper on "Unit Stresses for Designing Timber Structure," by Prof. Hatt, of Purdue University, were listened to with interest and profit.

Prof. Plumb, of Purdue University, read an interesting paper on "Electric Car Braking." This paper was illustrated with stereopticon views and proved to be an instructive and technical illustration of the principles of effective car braking. Prof. Plumb said he did not expect to present anything new, but to explain the best he could the improvements made and the results obtained by the use of the best type of brakes now in use.

An enjoyable banquet was held on Thursday evening at the Denison House, and 122 members participated in the feast of viands and flow of oratory. Prof. W. K. Hatt, of Purdue University, was elected president; Daniel Luten, of Indianapolis, vice-president, and C. C. Brown, re-elected secretary.

It is announced that the steel cars for the Hudson Companies' tunnels will contain a number of novel features. Posts extending from floor to roof will be used instead of straps and the cars will have double doors at the center as well as end doors. The center doors will be operated pneumatically. The floors will be of cement in which will be embedded carborundum to prevent slipping. The station at Cortlandt Street will contain five tracks and separate platforms will be used for receiving and discharging passengers.



**STANDARD RAIL SECTIONS FOR PAVED STREETS \***

BY C. GORDON REEL,

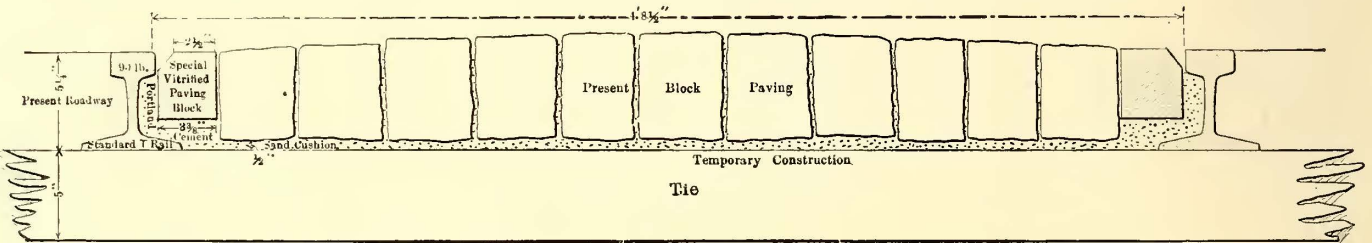
Vice-President and General Manager, Kingston Consolidated Railroad Co.

Before enumerating the many advantages of standard rail sections for paved city streets it will be instructive to consider for a moment the history of the so-called girder rail, which, by the way, is now happily obsolescent.

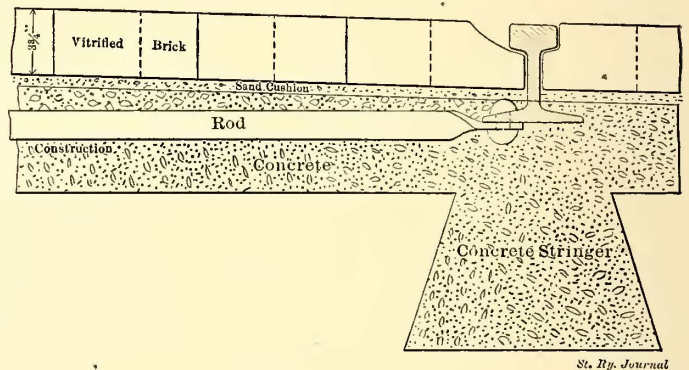
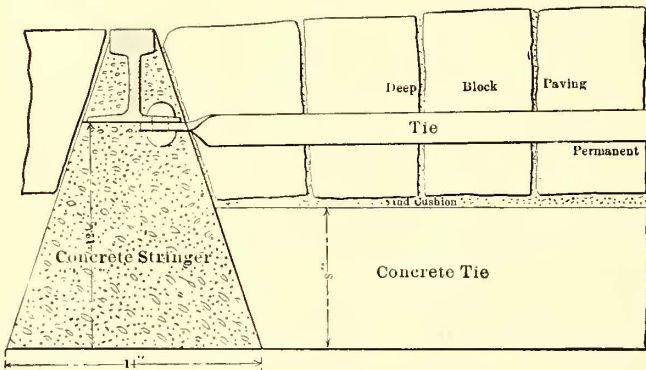
In the horse-car days strap rails were used and were spiked directly to wooden stringers, these in turn being carried on cross-ties. The shape of the strap rail then used was very similar to the top of the girder rail, and inasmuch as this strap was supported throughout its entire width the design did not violate any fundamental principle of mechanics. These principles were immediately violated, however, when the web and base were added to the strap rail, thus producing the girder rail, because the web was placed

3. The wheel load being carried over to one side of the web causes the rail to tend to move out from the center of the track when the load is on it. The only way this tendency can be overcome is to use numerous tie rods and thus hold the rail bodily from moving sideways. Correct engineering would require a section with no such tendency to lateral movement. The effect of this lateral movement is that the tracks get wide to gage and the pavement is loosened up generally.

4. When a heavy wheel load is impressed upon the head of a girder rail there is an inevitable bending moment which must be overcome in the structure of the web. No amount of tie rods can prevent this stress in the web, and in fact the greater the number of tie rods the weaker the web becomes, and just where it should be strongest. Similarly, when a heavy truck wheel bears down on the end of the projecting flangeway the bending moment is in the opposite



PROPOSED TRACK CONSTRUCTION WITH 90-LB. A. S. C. E. RAIL, AND PRESENT PAVING BLOCK IN KINGSTON



PROPOSED TRACK CONSTRUCTION WITH 90-LB. A. S. C. E. RAIL WITH 10 1/2-IN. PAVING BLOCK AND VITRIFIED BRICK, IN KINGSTON

beneath the middle of the top, which brought it directly under the gage line. The general result is that these rails have the following bad features:

1. By reason of the unscientific arrangement of the metal in the rail section the head is shallow, resulting in short life, and the flangeway is necessarily shallow, which is very objectionable as regards the operation of interurban cars; furthermore, the projecting wagon tread makes the rail difficult to spike. It is safe to assume that fully 50 per cent more metal is required in such a section than is required in a standard section for a rail of equal carrying power and life.

2. As the web is at one side of the head the weight is carried on a sort of projecting cantilever, which results in an absolute inability to maintain joints. There is not a railroad man here who does not know that it is impossible to hold girder rail joints, however heavy the rails may be, or however elaborate the system of splice bars and bolts. Every large city system which has used heavy girder rail has demonstrated this fact beyond the possibility of contradiction.

direction. Where traffic is heavy these alternate stresses have so "fatigued" the metal that longitudinal cracks have appeared along the middle of the web.

ADVANTAGES OF T-RAIL SECTIONS

All of the foregoing difficulties evaporate into thin air upon the introduction of T-rail sections. The advantages of using T-rails are without number. The T-rail is simply the substitution of a correct design for an incorrect design, an intelligent section for a clumsy section which can only carry present wheel loads when weights per yard run up to almost 150 lbs., whereas the very heaviest steam railroad equipment is easily carried on standard rail sections weighing less than 100 lbs. to the yard. A few of the principal advantages of the T-rail might be summarized as follows:

1. Its symmetrical section, the load coming directly over the center of the rail; its full deep head, insuring long life, and the unlimited flangeway; also the fact that it is easily spiked to the ties.

2. The long angle-bar joint with T-rail sections is practically perfect.

3. The load being symmetrical there is no tendency for

\* Paper presented at quarterly meeting at Buffalo of New York State Street Railway Association, Jan. 11, 1907.



the tracks to get wide to gage or to move around in the street, and therefore no tendency for the pavement to become loose along the tracks. It is clear that the construction which requires least repairs is best for the company as well as the community which it serves.

4. The flangeway being gritty a vehicle turns out of the tracks with the greatest ease.

5. T-rail tracks are less noisy. In Montreal the residents have insisted on T-rail for this reason.

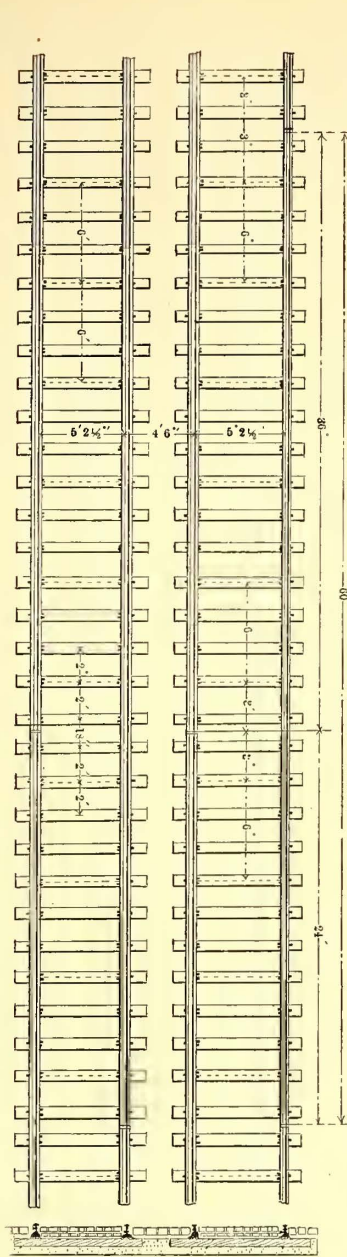
From the foregoing it is evident that there can be no question as to the great advantage of T-rails over girder rails. We will now consider for a moment the still further advantages which the standard rail sections possess over the high T sections:

1. The standard sections are more substantial in every way. They have a larger head, a thicker web and a wider base; and as has been demonstrated by years of service, they realize the maximum efficiency in rail design.

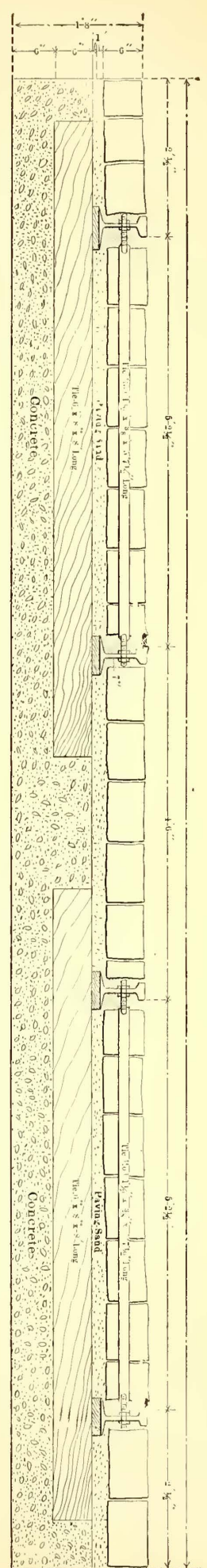
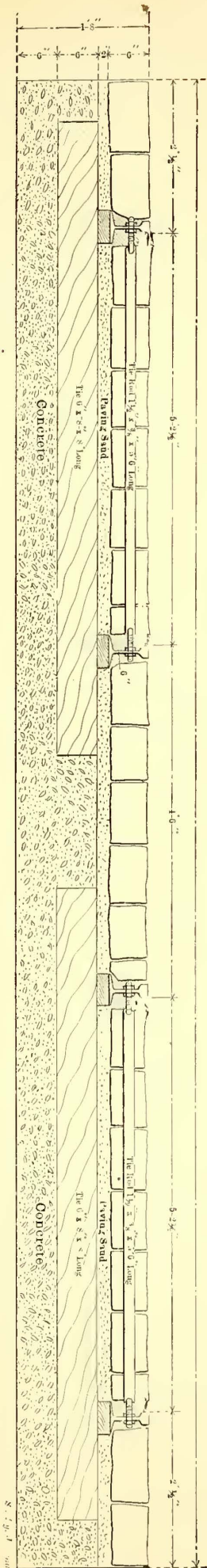
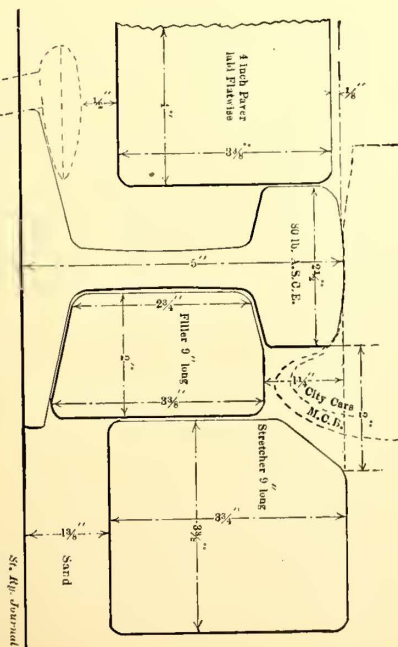
2. The all-important question of joints; for, after all, the life of any construction in a street is measured by the life of the joints and is solved to the best advantage with the standard sections.

3. Some city engineers, while approving the high T sections, have objected to the standard sections on the theory that these latter are not sufficiently deep for paving, but, as we all know, there is nothing in this objection, because there is no reason why the pavement cannot extend down below the base of the rail. We are all familiar with such construction, it is standard in many cities where deep block pavement is used. With brick or asphalt pavement of course, the objec-

SECTIONS AND PLAN OF STANDARD 6IN. AND 7IN. T-RAIL TRACK CONSTRUCTION, CINCINNATI TRACTION COMPANY



SECTION OF SPECIAL FILLER AND STRETCHER BRICK FOR 80-LB. RAIL AND 4IN. PAVING, CINCINNATI NORTHERN TRACTION COMPANY





tion with reference to insufficient height cannot be raised.

4. The standard sections not being so slim and topheavy have a way of staying where they are put to a much greater extent than the high T's.

5. From the standpoint of economy—since the mills are able to produce standard T sections at a considerably less cost per ton than the high T sections in a ratio of 28 to 36

ton, we find that a better result is obtained with a standard section than with a girder section costing something like 93 per cent more than the standard. This money might better be spent some other way than literally sunk in the ground.

When a company proposes to lay T-rail to replace girder it is apt to meet with some opposition on the theory that ruts will wear along the rails. This objection seems reasonable on the face of it, but the fact is that in spite of all predictions of ruts they fail to appear. There seems to be no greater tendency for a rut to form along the rail than along the outside edges of a girder rail.

The best argument in favor of T-rail construction is that there is not a single instance on record, when it has been properly laid, that it has not proven satisfactory to the city authorities. On the contrary, wherever tried it has been adopted, as the accompanying letters from city engineers of large cities and other authorities throughout the country prove.

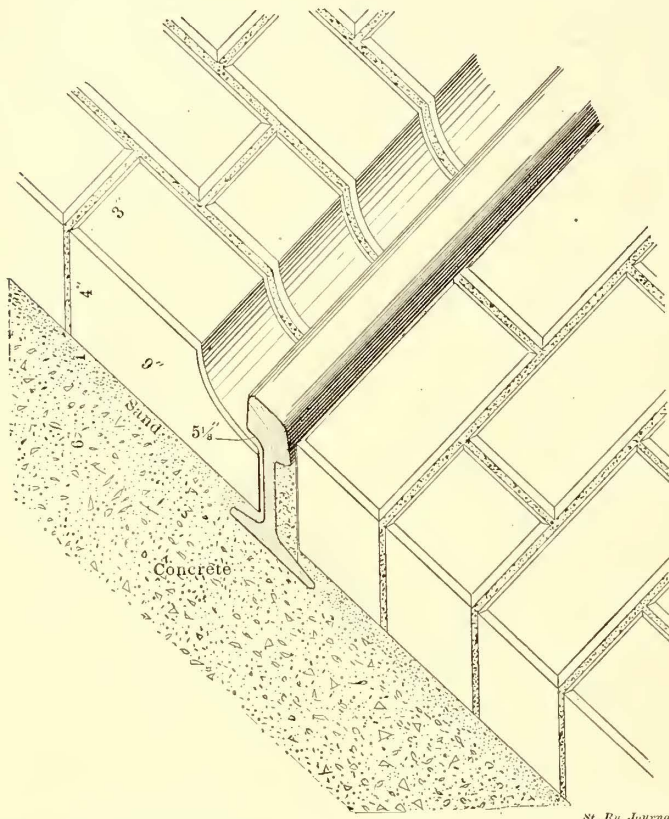
DATA RELATIVE TO T-RAIL CONSTRUCTION

Amsterdam, N. Y.: F. E. Crane, city engineer, under date of June 29, 1906, says: "We have in this city brick block pavement laid along 70-lb. T-rail. This pavement is laid on a concrete foundation with a thin layer of sand. It has been laid since 1900 and is on the street of our heaviest traffic. This pavement shows no tendency to wear in ruts.

Battle Creek, Mich.: E. N. Hunt, city engineer, under date of April 23, 1906, states that most of the track in that city is 7-in. T, although they have considerable 6-in. T. In Mr. Hunt's opinion rails should be at least 5 ins. high.

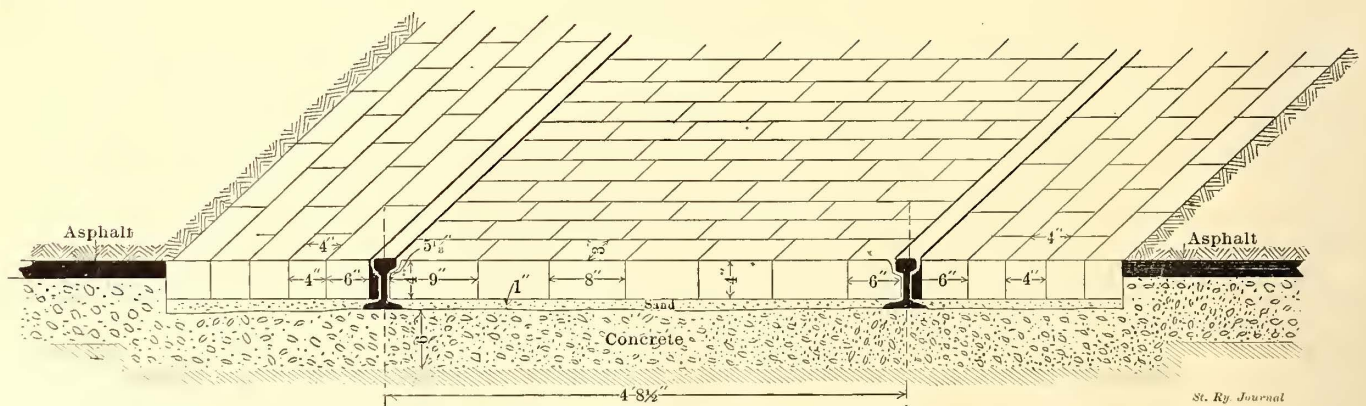
Brooklyn, N. Y.: J. F. Calderwood, vice-president and general manager of the Brooklyn Rapid Transit Company, under date of May 1, 1906, says that while they have no T-rail construction in his system, there is no serious objection to the use of T-rail in paved streets, since it is much easier to maintain. He says high T-rail is very objectionable in that it is very high compared with the base, therefore the track easily gets out of gage, and there is no reason for making a high T-rail because the ordinary 80 lb. or 90-lb. rail is of ample depth.

Brunswick, Me.: E. D. Reed, engineer of the Lewiston, Brunswick & Bath Street Railway Company, under date of April 30, 1906, says that where Belgian block pavement is required he would lay T-rail in a concrete stringer 14 ins. deep



SECTION SHOWING T-RAIL AND SCORIA BLOCK CONSTRUCTION IN MONTREAL

we are enabled to buy a 90-lb. standard section for the same price as a 70-lb. high T section, and by using the standard section get a track which will outlive the high T twice



ISOMETRIC DRAWING, SHOWING T-RAIL CONSTRUCTION IN MONTREAL

over. If we now assume that a 90-lb. T-rail is equivalent to a girder rail of 50 per cent more weight (which assumption is by no means extravagant when we consider the question of eccentric loading as compared with symmetrical loading, and the impossibility of maintaining the joints of girder rails as compared with the practically perfect joint of the standard rail) and then apply the ratio of cost per

and 12 ins. wide, holding the rail to gage every 5 ft. with tie straps.

Buffalo, N. Y.: T. W. Wilson, general manager of the International Traction Company, under date of April 10, 1906, says that T-rail is used exclusively in several Western States, prominent among which is Milwaukee, where the municipal authorities will not permit anything but T-rail to be laid.

Cincinnati, Ohio: In Cincinnati a 6-in. and also a 7-in.



T-rail are laid on blocks which rest on sawed ties spaced 3 ft. centers and laid in concrete. This construction is used with ordinary block paving and the paving blocks go down below the level of the base of the rail.

The Cincinnati Northern Traction Company uses a standard 80-lb. T-rail laid on ties and paved against with vitrified brick, a filler brick being used next to the web of the rail.

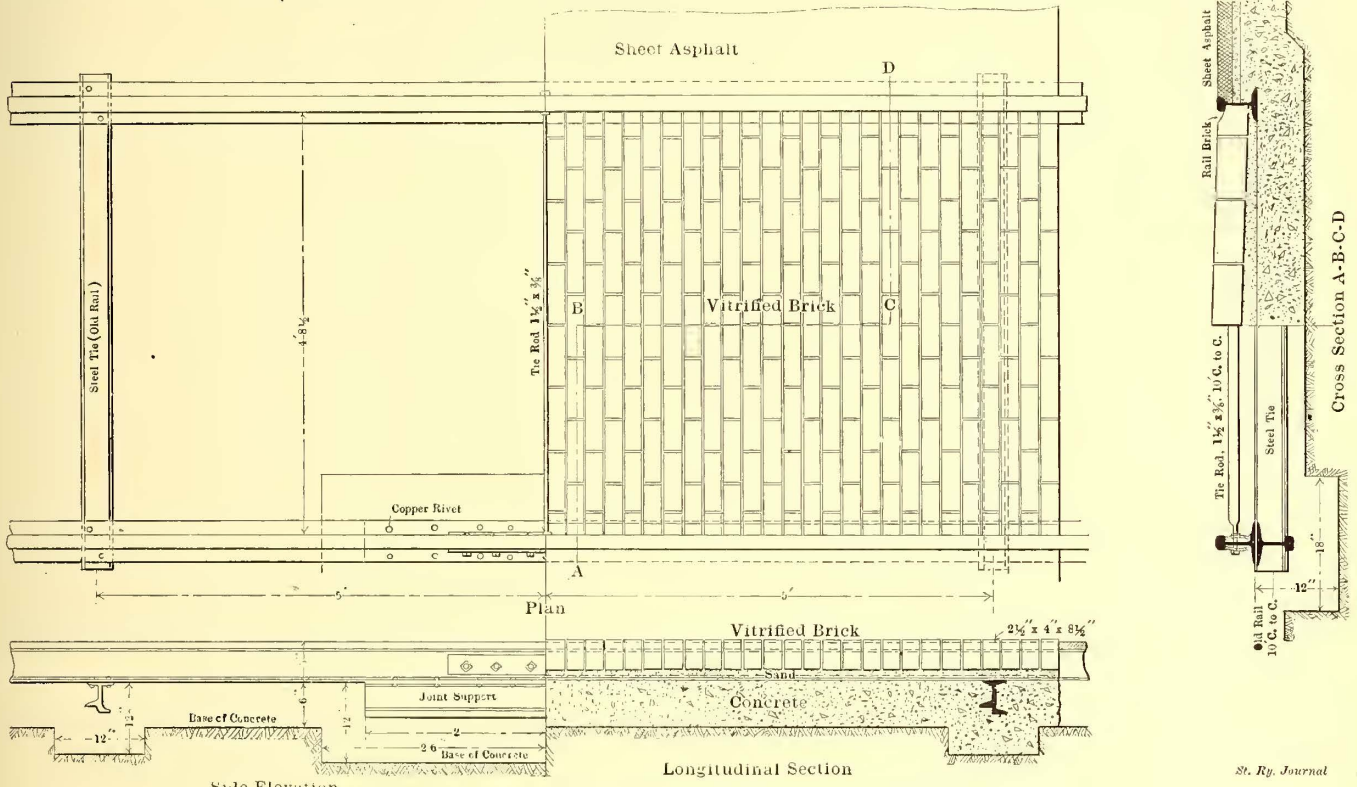
Dayton, Ohio: Robert E. Kline, city civil engineer, under date of Nov. 12, 1906, says: In the past five years T-rail has been adopted and used on all track construction where street paving is contemplated or used in this city. The construction of same has been found to be satisfactory in every respect.

Davenport, Iowa: The ordinances prevented the use of T-rail, but the street railway company obtained permission from the City Council to lay 800 ft. of double track with T-rail in paved streets, choosing the location where traffic was heaviest. After this trial section of track had been in use for

his letter: "We do not favor the 7-in., 70-lb. rail, as it is too light in flange and web and does not hold its line well."

Erie, Pa.: B. E. Briggs, city engineer, under date of Dec. 28, 1906, says that he recommended 80-lb. T-rail seven or eight years ago. Although the adoption of the T-rail was opposed by some of the older heads of the city it has proven and is now acknowledged by all to be entirely satisfactory. Mr. Briggs explains that there are strong arguments in favor of T-rail as used from the standpoint of the street car systems which, however, he had not considered in the foregoing.

Glens Falls, N. Y.: D. E. Van Wirt, chief engineer of the Hudson Valley Railway Company, under date of April 11, 1906, says: "As you are aware, nearly three years ago we paved in Sandy Hill against a 5-in. T-rail, using A. S. C. E. section standard T-rail. At that time I designed a special rail block for the work. We have found it very satisfactory from an operating standpoint, giving us ample room for the various flanges we have been running over our road, and also that it



T-RAIL CONSTRUCTION FOR PAVED STREETS IN SCRANTON

a few months, and after frequent inspections had been made by the members of the Council, permission was granted to use T-rail in all of the new track work in Davenport. (STREET RAILWAY JOURNAL, Jan. 5, 1907, page 5)

Delaware, Ohio: J. S. Dike, city engineer, under date of May 10, 1906, says that they use a 4-in. T-rail raised on a 1-in. block, and special paving block made by the Nelsonville Sewer Pipe Company to form the necessary flangeway, with a special filler brick next to the web of the rail. He expresses himself as greatly pleased with this style of paving, and says: "We like this construction better than grooved rail and have never had any trouble except with a car or two which had a very narrow tread which broke a few of the stretcher brick."

Denver, Col.: John A. Beeler, vice-president and general manager of the Denver Tramway Company, under date of May 10, 1906, says that he uses a 6-in., 72-lb. T-rail laid in concrete which is standard in all paved streets. The rail is in 60-ft. lengths and laid on ties 24 in. centers and ballasted in gravel to a depth of 8 ins. below the ties. A double row of toothing blocks is used on the outside of the rail of each track, and on the inside a single row of beveled blocks going under the ball of the rail. This construction is found to stand the wear and tear of street traffic and the practice of washing the streets has no effect upon the pavement. The above blocks are made from basalt trap rock 5 ins. in height. I quote from

affords vehicles a much better crossing than the girder rail commonly used in paving. The only opinion I have ever heard of this work from residents of Sandy Hill has been favorable."

Hamilton, Ohio: E. H. Berry, engineer of roadways, of Cincinnati, under date of May 3, 1906, says that several miles of standard A. S. C. E. rail have been laid in Hamilton with good results.

Indianapolis, Ind.: Blaine H. Miller, city engineer, under date of April 17, 1906, states that when the new franchise was made with the Indianapolis Traction and Terminal Company, of that city, tests were made to ascertain which rail was best for all purposes. The result of the test was that the 90-lb. T-rail combined the good qualities of the old grooved and girder rails. These rails were not used except in unpaved streets for some time after the new rail was adopted, but now the use of special grooved vitrified brick has made it possible to use heavy 90-lb. T-rail in permanently improved streets with quite a saving in repairs, especially since the heavier interurban cars have entered the city. This rail is being substituted for the old grooved and girder rails, and is a vast improvement in every respect.

Kansas City, Mo.: The STREET RAILWAY JOURNAL under date of Dec. 9, 1905, says: "The Kansas City Railway & Light Company has adopted 80-lb. standard A. S. C. E. section



T-rail for brick-paved streets, and is using that rail on track laid in such streets this year. No more girder rail will be used in the city. A special shape of brick is used for the flangeway. The track is laid on broken stones with concrete around, but not under the ties. The paving brick is laid directly in the concrete without any sand cushion."

Kingston, N. Y.: At a hearing on Mr. Chamberlain's bill No. 1653 E. B. Codwise, city engineer of Kingston, N. Y., spoke as follows: "In the matter of T-rails for railroads, there are things to be said in favor and against them. If T-rail is high enough I do not see any great objection to using it, because it can be paved against. My objection would be to a low T-rail."

Mauch Chunk, Pa.: Franz Mackl, city engineer, under date of May 16, 1906, says they use 70-lb. standard T-rail, paving inside with special beveled bricks in streets paved with Warren bithulithic paving block.

Memphis, Tenn.: J. A. Omberg, city engineer, under date of May 2, 1906, says: "It is my opinion that you can use your 90-lb. T-rail with the special blocks you mention and get very satisfactory results. I am sure that the construction you would get in this way would be greatly better than the old-fashioned tram rail."

Milwaukee, Wis.: C. J. Poetsch, city engineer, under date of April 16, says: "We use T-rail on all streets."

Minneapolis, Minn.: Andrew Rinker, city engineer, under date of April 16, 1906, says: "The street railway company of this city now uses T-rail exclusively. It is the best rail for the purpose and the public interests are better subserved by its use." In a general statement Mr. Rinker has the following to say: "The latest type of rail used is the T-rail weighing 80 lbs. to the yard. These rails are spiked to wooden ties bedded in concrete. The rail is a continuous one with cast joints. This makes a very rigid and substantial rail, and as far as our experience goes is perfectly satisfactory. We find that T-rail is not objectionable to the public travel, as the street railway company paves generally with granite close to the rail on the inside and we lay our pavement in contact with the rails on the outside. The general supposition here is that in order to give good service for rapid transit to the much larger percentage of the public that such construction is advisable. While our method of construction does not prevent teams from crossing the tracks or even following the tracks lengthwise, we believe that it is better policy to permit the railway company to use the space occupied by them (15 ft. in width for double tracks) unhampered by teams, and that the millions of people who are carried annually by the street railway lines get better service than they would if the teamsters were permitted to use the rails and obstruct the street railway travel to the extent that they usually do where flange rails are laid."

Montreal, Canada: John R. Barlo, city surveyor, under date of April 25, 1906, states that by the use of T-rail properly paved the vibration is considerably reduced and cars run much more smoothly than otherwise. The rail used is 86-lb. standard railroad rail. This rail is 5½ ins. high and is laid on a bed of concrete without ties.

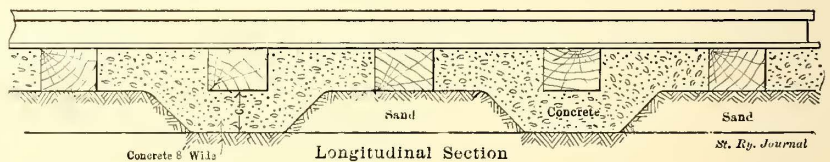
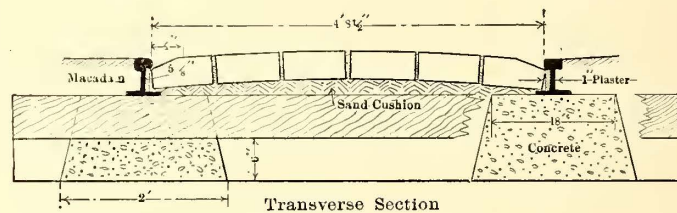
New Haven, Conn.: Calvert Townley, first vice-president of the Consolidated Railway Company, under date of April 17, 1906, says: "We have T-rail on the greater part of our tracks and use it exclusively for new work all over Connecticut except in the city of Hartford, where an old contract between the city and a previous management obliges the railroad company to use a different type. We hope to convince the city authorities of the advantages of T-rail, which the State Railroad Commissioners have indorsed, and thus secure a modification to the contract."

Ottawa, Canada: Newton J. Ker, city engineer, under date of May 14, 1906, says they use a 7-in., 80-lb. T-rail laid on ties 8 ft. centers without tie-rods, and use Nepean sandstone blocks for paving, running grout in and around the same. These blocks are 5 ins. deep and raised on a 6-in. bed of concrete with a 1-in. sand cushion intervening.

Under date of May 10, 1906, Mr. Ker states that all of their tracks are laid with T-rail. "In recent years the old rails have been replaced with the 90-lb. standard T-rail in 62-ft. and 64-ft. lengths, and have proved very satisfactory. Wherever we lay permanent pavements these rails are laid on 6 ins. of concrete. The ties spiked 8 ft. apart and embedded in concrete. The paving blocks are specially cut to fit under the rail and to allow the flange of the wheel to run freely."

Rochester, N. Y.: Richard E. Danforth, general manager of the Rochester Railway Company, under date of April 9, 1906, says: "I fought this question to a finish with the Common Council of the city of Sandusky, at the time we were obtaining a renewal of franchise, and the Council finally specified standard T-rail, weighing not less than 70 lbs. to the yard, as the rail to be thereafter laid in all the streets of the city."

Under date of April 14, 1906, Mr. Danforth says: "In reply to your favor of the 12th, would say that I am pleased to note that your city engineer is coming around to feel more favorably inclined toward the use of T-rail. He is mistaken if he thinks that a standard American Society T-rail cannot be used with brick pavement to the satisfaction of the people. Everything depends, in this regard, upon the kind of work done. As I told you the other day, I put in T-rail in the city of Sandusky, Ohio, after having persuaded the Common Council to specify in our franchise that standard American Society T-rail should be used. In a letter received recently



LONGITUDINAL AND CROSS-SECTION OF T-RAIL CONSTRUCTION, WITH SPECIAL PAVING BRICK, IN UNION AVENUE, SCHENECTADY

from the general manager of the Lake Shore Electric Railway, F. J. Stout, he refers to the work in Sandusky, and states that it is in perfect condition. He says that recently he attempted to lay some girder rail which he has had in stock for the past five years, and the city authorities stopped him. They would have none of it, and he was obliged to buy T-rail for the purpose. The height of the rail necessary to be used in paved streets depends upon the character of the pavement, and where standard forms of vitrified brick are used a 5-in. rail will be found to give perfect satisfaction. It is a mistake to use—in paving around tracks—a sand cushion under brick pavement over three-quarters of an inch deep, and I have found that a cushion of one-half inch is sufficient. I would recommend that a brick abutting rail on either side be set in Portland cement mortar, and that if possible a special header brick be used on gage side. In cities where tram-head girder rail is commonly used, the people will be perfectly satisfied with T construction in brick or stone pavement, if the brick on the gage side is depressed so that the top of the brick goes under the head of the rail and the brick at gage line is connected so that the center is about on a level with the rail. This is the practice now followed in the city of Milwaukee, where they are now engaged in removing a considerable quantity of tram-head girder rail laid a great many years ago, and installing in its place T-rail of the same height. They have been using T-rail in Milwaukee for quite a number of years, and adopted it as a standard rail, I believe, about eight years ago. Rather than give in on the point made by the city



engineer; you would be justified in paying his expenses to Grand Rapids, or even to Indianapolis or Minneapolis, to talk with the local authorities."

Schenectady, N. Y.: J. Leland Fitzgerald, city engineer, under date of April 16, 1906, approves of T-rail for the following reasons: "With the modern smooth pavement the tendency of traffic is to avoid the use of the railroad tracks on account of the greater speed and frequency of the cars, and there is no advantage from easier traction for this reason, there is no use for the iron wheel tread for vehicles. We also had much difficulty in paving under the wide flange of the girder rail, as there was a space that could not be properly filled, but paving against T-rail with the molded brick makes possible a solid construction throughout. There appears to be no excessive wear on the brick at the point of contact. Mr. Peck, general manager of the Schenectady Railway Company, now has about 500 ft. of experimental track in which he uses standard 85-lb. rail."

Schenectady: B. Penoyer, engineer maintenance of way of the Schenectady Railway Company, under date of April 25, 1906, writes: "We are sending you herewith plan showing our T-rail construction with special paving brick. This section of track was laid in October, 1905, in Union and Wendall Avenues; length, 560 ft."

Scranton, Pa.: Henry Jifkins, chief engineer of the city of Scranton, under date of April 23, 1906, writes: "Mr. Codwise is not quite correct in saying that 'Nothing but girder rail is used in the central part of Scranton.' While a good deal is used, it is old, but has not yet outlived its usefulness. When that time arrives it will be relaid, but its place will be taken by T-rail. Furthermore, a ride of two minutes in most any direction from the central city will bring you to the T-rail construction. We do advocate and have adopted the 7-in. high T-rail, but we have many miles of 5-in. and 6-in. T-rail, and I have no hesitation in saying that a 5 $\frac{3}{8}$ -in., 90-lb. rail, properly laid and with a properly beveled brick between the rails to form a sufficient groove for the wheel flanges, is infinitely superior to any girder rail and almost practically as good as high T."

St. Paul, Minn.: L. W. Rundlett, engineer of public works, under date of April 28, 1906, states that T-rail is used exclusively in St. Paul on paved streets, the street car company paving with granite between their tracks, having a special cut block with a groove for the flange. These blocks are set on a concrete foundation. Mr. Rundlett states that, in his opinion, they have better track construction in St. Paul than in any city he has visited.

Tacoma: Frank L. Davis, city engineer, under date of May 1, 1906, says: "Our street car company uses 6-in. T-rail on all paved streets. We use no girder rail. So far as I know rails are similar to rails used on railroads and, of course, all right. We find them satisfactory. All rails recently laid are 60 ft. in length."

Toledo, Ohio: F. J. Consaul, city engineer, under date of April 16, 1906, says: "I believe heavy T-rail construction with special rail blocks properly fitted superior to girder rails." Under date of April 18 Mr. Consaul says: "For many years we thought that the girder rail or flange rail, as it is sometimes called, a better construction for paved streets on account of being better adapted to make good joints with the pavement. However, with the special rail blocks that are now made this objection is eliminated. I consider the heavy T-rail the better construction, as it is more desirable and rigid than the girder, thus causing less frequent tearing up of the pavement to make repairs."

Article from STREET RAILWAY JOURNAL of April 21, 1906:

"The development of interurban roads has called renewed attention to the desirability of the use of T-rails in paved streets. In response to a recent request for information, B. V. Swenson, secretary of the American Street & Interurban Railway Association, prepared a short report on this subject. Some of the reasons why T-rails are superior to girder rails in paved streets are given in the report as follows: (1) The paving can be maintained in far better condition with T-rail than with girder rail. (2) The wear on the paving is reduced, owing to the fact that the vehicular traffic will distribute itself over a larger surface of the street instead of attempting to

make use of the area adjoining the electric railway tracks. (3) As vehicles will not make so general use of tracks laid with T-rail, the number of accidents due to collision of cars and other vehicles is materially reduced. (4) With T-rails there will be a material reduction of broken wheels and axles on wagons and other vehicles, due to the wrenching of wheels by reason of the groove in grooved girder rails. (5) T-rails have all the advantages of grooved rails, with none of their disadvantages. (6) The T sections give a stronger structure with less metal than the girder sections. This is an important feature in eliminating, in so far as possible, a foreign element in the make-up or construction of the pavement. (7) The joint troubles are materially reduced by reason of the physical construction and form of T-rails as compared with girder rails. Hence T-rails give an easier riding track and insures greater comfort to the passengers than when the cars are run upon girder rails. (8) Actual experiments have demonstrated that cars passing over T-rails do not make nearly as much noise as when passing over girder rails, and T-rail construction will therefore reduce the noise incident to electric railway operation. (9) The T rail entirely eliminates the delays and annoyance caused by snow, ice and dirt filling the grooves of girder rails. T-rail construction will, therefore, facilitate car movements and permit a more regular service. (10) It is the recognized law of economics that that which accomplishes the same result for less capital, outlay or investment reacts to the general good, weal and welfare of the people or public as a whole.

"After stating that these arguments had been suggested by W. E. Harrington, of J. G. White & Company, the report refers to the benefits to villages and cities afforded by modern electric interurban railways, and the necessity of providing a rail on which they can enter the terminal cities. In the present stage of the art, nothing will accommodate satisfactorily the wide tread and deeper flange of wheel required by these cars except a T-rail section. A refusal to permit T-rail to be laid in city streets, therefore, will act as a direct obstacle to electric railway development and consequently as a serious check to the progress and welfare of the community. Examples of communities, among many in which T-rail has been laid and is now in use with the entire sanction and approval and to the satisfaction of municipal authorities, the public and the railway companies, are the following: Milwaukee, Minneapolis, Denver, Indianapolis, Cincinnati, Dubuque, Ia.; Battle Creek, Kalamazoo, New Haven, and Montreal, Canada. As indicating the general trend of opinion in this direction, it may be stated that a considerable stretch of T-rail for electric railway operation is now being laid on Boylston Street in Boston."

Prof. B. V. Swenson, secretary and treasurer of the American Street and Interurban Railway Association, under date of May 3, 1906, says:

"The easier and more comfortable riding in cars which are operated upon T-rails than when the cars are run upon girder rails. The public does not seem to recognize the fact that in any form of girder rails one side of the rail (that side opposite the tram or groove) is virtually in all respects a T-rail. The public is therefore familiar with at least half a T-rail in all girder-rail construction. Under the recognized law of economics that which accomplishes the same result or gives better results for less capital, outlay or investment, reacts to the general good, weal and welfare of the people or public as a whole."

In addition to the foregoing, I wish to quote from President Ely's annual address at the Philadelphia convention, as follows:

"The experience of the steam railroads with double and single-track construction is being repeated by the electric interurban railroads. There is practically no difference between them, except that of motive power. In all other things it would seem that good, common judgment would dictate that we avail ourselves of the long experience of the steam roads. Double tracks are much simpler, easier and safer of operation, and the increased fixed charge occasioned by the double track is, in the judgment of experienced operators, more than compensated for by the saving in dispatchers, signal men and other like employees, and the injuries and damage accounts, to say nothing of the greatly increased carrying capacity.

"In consideration of this branch of the case are involved proper traffic agreement between interurban and city roads,



and the laying of T-rails in cities where practicable to accommodate the deeper flange and broader tread of the wheels of the interurban cars. It is interesting to observe the growing tendency on the part of municipal authorities to recognize the good to be derived from the installation of T-rails in paved city construction.

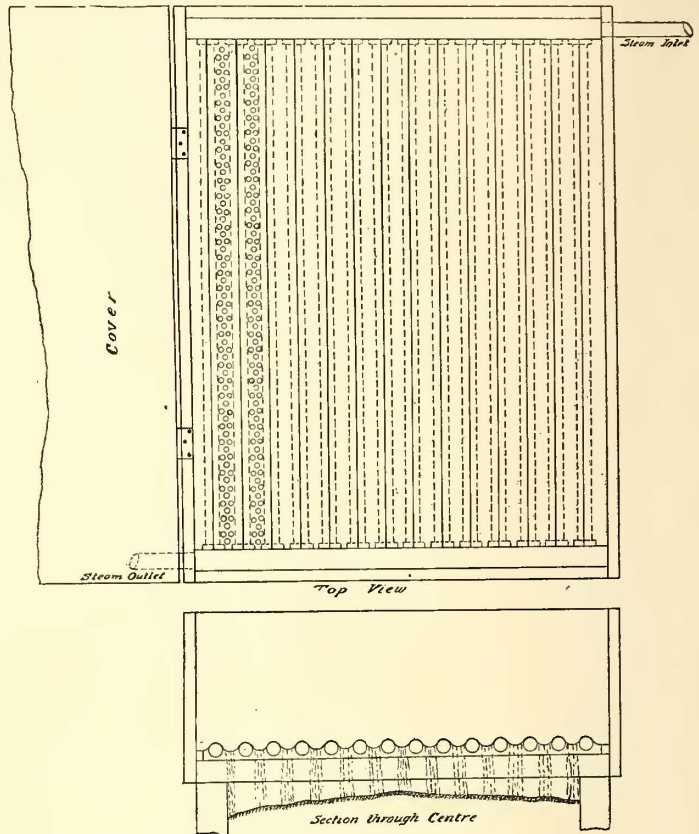
"There is a great tendency towards the use of Standard T-rails as against the high T-rails which are used in some cities. Such standard T-rails are used in many of the representative cities of America, such as Schenectady, Scranton, Sandusky, Montreal, Milwaukee, Minneapolis, Denver, Indianapolis, Cincinnati, Dubuque, Battle Creek, Kalamazoo and New Haven. The Boston Elevated is also installing a considerable amount of T-rail in Boylston Street, Boston. The standard T-rail can be readily adapted to deep-block paving by using a method which has been employed in several cities which is somewhat similar to the accompanying sketch. The results obtained have been very good indeed, and this construction employing the standard A. S. C. E. section appears to my mind to be much preferable to the unsymmetrical and top-heavy rail sections which are required in some cities."

Worcester, Mass.: Prof. E. A. Engler, president of the Worcester Polytechnic Institute, under date of April 16, 1906, says: "I believe it is generally understood that the T-rail is preferable to the girder rail because the metal in it is better distributed in the cross-section and because the weight of the car goes more nearly, if not directly, over the web."

E. G. Connette, general manager of the Consolidated Railway Company, under date of April 16, 1906, says: "Ninety-pound T-rail track paved with vitrified paving blocks is the best construction that could be placed in streets, for the reason that the continuity of the rails is not so easily disturbed at the joints, consequently not so much wear and tear to the streets."

Since the presentation of this paper at Buffalo, the Common Council of Kingston has granted permission to the Kingston Consolidated Railroad Company to lay standard T-rails as requested by Mr. Reel.

on straight track, as it is rigidly attached to the truck. An interesting feature of the sanding is the type of sand valve, whereby the size of the apertures through which sand can flow is regulated in the same fashion as a camera shutter. The levers to operate these valves are placed directly op-



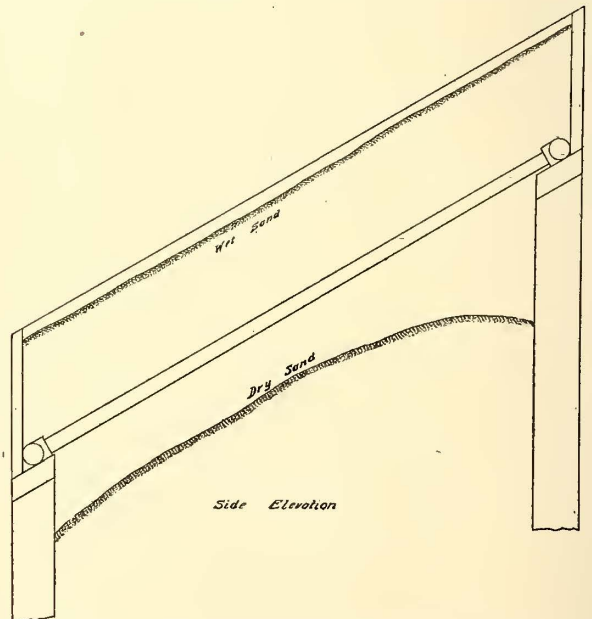
PLAN AND SECTION OF SAND DRYER

### SAND DRYER AND TRACK SANDING METHODS IN NEWBURGH, N. Y.

Newburgh, N. Y., is built on several of the hills in the Highland region of the Hudson River, and some of the street grades on which the Orange County Traction Company operates are so steep that they cannot be surmounted without great difficulty even by using more or less circuitous routes. Hence the problem of keeping the tracks well sanded is of unusual importance on this system. To secure plenty of dry sand and then distribute it efficiently, General Manager Boynton and Supt. F. S. Berry devised the sand dryer and sanding mechanism described in this article.

After being screened the sand is placed for drying in an inclined wooden bin heated at the bottom, by exhaust steam circulating through fourteen coils of 1½-in. wrought-iron pipe covered with a sheet of galvanized iron perforated with holes of ¼-in. diameter. As soon as the sand dries the lumps break up and drop through the screen to the floor.

In addition to the ordinary sanding from passenger cars, Mr. Boynton has installed a special sanding car, which is kept going all the time in bad weather. The car is a single-truck freight car, furnished with a sand bin on each side. These bins are fully 18 ft. long, 1 ft. 6 ins. wide and, owing to their sloping sides, vary in depth from 1 ft. 6 ins. at the ends to 2 ft. 6 ins. in the middle. From the center of each bin there is a 4-in. diameter wrought-iron pipe directly over the rail. This pipe sands the rail on curves just as well as



SIDE ELEVATION OF SAND DRYER USED BY THE ORANGE COUNTY TRACTION COMPANY

posite one another, so that one man standing in the center of the car can work both sides at the same time. The extent of opening is indicated by the position of an indicator on the lever over a dial plate corresponding to the four degrees of opening adapted for different track conditions.



## ENGINEERING OF INTERURBAN RAILWAY CONSTRUCTION

This was the subject taken by Robert P. Wood for his presidential address before the Indiana Engineering Society at the meeting in Indianapolis, Jan. 17-19, 1907. After referring to the difficulty of drawing a hard and fast distinction between suburban and interurban lines, Mr. Wood discusses the principal factors entering into their construction, which he defines as organization, franchise, contracts, specifications, materials of construction, details of construction, distribution of accounts, blank progress forms and reports on projects.

Under the subject of franchises he outlines in abstract a municipal franchise considered fair to all parties, which would consist of fourteen sections, as follows:

Sec. 1. Consent of authorities and designation of route. Sec. 2. Kind of rails with top conforming to surface of highway or street. Sec. 3. Right of company to repair and obligation to maintain existing pavement for width of 8 ft. Sec. 4. Obligation to repave the 8-ft. width with new materials when balance of street is being paved, but the railway company is allowed privilege of doing its own work. Sec. 5. Right of company to maintain, construct and operate the railway over and across all railroads and bridges. The bridge provision is omitted in county franchises. Cars are entitled to the tracks against all vehicles, except funeral processions and fire department when on duty. Sec. 6. Location, kind and manner of setting poles, and height of cross-wires. Poles and wires are not to interfere with existing telegraph, telephone, fire alarm or electric light wire unnecessarily. Sec. 7. In a municipal franchise the city is relieved from any responsibility or damage done by or to Traction Company. Sec. 8. Nothing granted shall be construed to take away from the Common Council the exclusive power it now has over the streets and alleys. Sec. 9. Right to transport passengers, mail, express and freight and regulate its own rates. Sec. 10. Company agrees to adjust tracks and fix grades during new improvement work. Sec. 11. Company has right to run schedule it deems consistent. Sec. 12. Length of franchise, fifty years. Sec. 13. As a consideration for franchises the company shall construct, complete and operate a line of electric railway in said city, town or county, within two years from acceptance of grant, otherwise franchise is void. Sec. 14. Ordinance is in force from and after its passage and acceptance by grantee.

He then takes up the subject of accounts and offers a suggested form with forty-three items, assembled under sixteen subdivisions, as follows:

1. Organization.—This account includes all expenses incurred in getting out the papers of organization and incorporation, attorneys' fees, etc., also all incidental expenses connected with the calling of meetings, railroad fares, hotel bills, getting out of stock and minute books and the issuance of stock.

### RIGHT OF WAY

2. Real Estate.—This account includes the actual cost of real estate purchased for right of way purposes only.

3. Franchises.

### ROADWAY

4. Grade.—This account includes the cost of grading roadbed, whether excavations or embankments; clearing up fences, clearing out brush and trees (includes supplies for blasting, etc.), building temporary roads or bridges in order to get at work with teams; running ditches and drains along grade for drainage; cost of material taken from borrow pits, and amounts paid for privilege of making waste banks outside of company's property. Also includes cost of retaining walls and other masonry or riprap for protection of embankments, cuts and

slopes. Also expenses of securing labor, transporting labor and tools while on the work, and other miscellaneous expenses connected with building roadbed. Also material and labor for temporary trestling for fills.

5. Bridges, Culverts and Trestles.—This account includes cost of all bridges, concrete arches, culverts and trestles erected to carry tracks over water courses, streams, ravines, streets or other railways. This covers all material, as iron pipe, and tile for culverts, sand, gravel, crushed stone, cement, lumber, nails, wire for cribbing and forms for concrete work, piling and timber for wooden trestles and bridges (the cost of temporary trestling for fills should be charged to account 4); iron material for superstructures; fastening for bridge ties and guard rails and lumber for guard rails, including transportation. Also, labor, excavating for pipe and placing same; excavating, building cribs and forms and handling concrete, building trestles and erection of iron work for bridges (this includes labor and material of false work for same, when false work is removed it should be credited to this account and charged to account benefited); framing, bridge ties and guard rails, and placing same. Also expenses of unloading, storing and hauling material chargeable to this account. Also expenses of securing labor, transporting labor and tools while on the work, and supplies for machinery, such as fuel, oils, waste, etc.

6. Fencing.—This account includes cost of labor and material used in constructing fences along right of way or limits of roadbed. Do not charge to this account cost of fences around stations or other properties outside of right of way, which should be charged to their appropriate accounts.

7. Crossings and Cattle Guards.—This account includes the cost of labor and material used in constructing farm, country road or street crossings at grade, overhead bridges, cattle guards and wing fences to same and transportation.

8.

### TRACK

9. Track Laying.—This account includes cost of unloading from cars, hauling and distributing ties, rails and rail fastenings; the placing of the ties ready for the rails, laying the rails, spiking and bolting. Also proportionate charge of construction-train service and supplies. Also expenses of securing labor, transporting labor and tools while on the work, supplies such as fuel, oils, waste, etc., and miscellaneous expenses connected with track laying.

10. Ties.—This account includes cost of cross, switch, bridge and other ties including inspection and transportation.

11. Rails and Fastenings.—This account includes cost of rails, splices, fish-plates, rail-joints, tie-plates, chairs, spikes, bolts, nuts, tie-rods, etc., including transportation.

12. Special Work.—This account includes cost of all special work for switches, crossings, Ys, turnouts and sidings, including transportation.

13. Bonding Material.—This account includes cost of all rail and cross-bonds; transportation charges and cost of unloading and hauling.

14. Bonding Labor.—This account includes cost of labor and expenses of drilling rails and placing bonds in track.

15. Ballast Material.—This account includes cost of all ballast, whether broken stone, slag, gravel or other material especially provided for this purpose, together with transportation, when purchased outright. When secured from pit it covers only the cost of rental of land used for gravel pit.

16. Ballast Labor.—This account includes cost of labor and expenses of distributing ballast and ballasting, lifting, lining and surfacing track. When ballast is taken from company's pit, this account includes all expenses of pit.

17. Street Pavement.—All kinds, excepting macadam and cheaper varieties.

18.

### LINE

19. Line Construction.—This account includes cost of unloading, hauling and distributing poles and overhead material, dressing, gaining and setting poles, stringing wires and all work in construction of overhead line; also all expenses of securing labor, and the transporting of labor and tools while on the work.

20. Poles.—This account includes cost of poles and transportation.

21. Overhead Material.—This account includes cost of all materials and supplies used on construction of line, except poles, such as cross-arms, braces, lag screws, pins, brackets; all guy,



trolley and high-tension feeder wire, hangers, pull-overs, switches, line insulators, eye bolts, etc., including transportation.

22. Dispatching System.—This account includes cost of installing system for handling cars, whether by block or telephone, and includes cost of labor, apparatus, and supplies for erection of same.

23.

24. Real Estate Used in Operation of Road.—This account includes cost of land for car and power station, sub-stations, storehouses and offices.

25. Building used in Operation of Road.—This account includes cost of buildings complete for car and power stations, sub-stations, repair shops, store houses and offices, including platforms, sidewalks, excavations, foundations, drainage, water, gas and sewer pipes and connections, outhouses, oil houses, sand sheds, steam heating apparatus, electric light and power fixtures, including wiring for same; pits in car houses, preparing grounds before and clearing up same after construction, connections with water supply systems and shop wells. This account includes amounts paid when erected by contract, and labor materials, including transportation when built by company. This account includes track and overhead work, inside of buildings.

#### POWER-PLANT EQUIPMENT

26. Foundations.—This account includes the labor and material (including transportation) of all descriptions used in the construction and foundations of engines, boilers, pumps, heaters, condensers, generators, etc., in power station. Also the cost of excavating for same.

27. Boilers and Accessories.—This account includes cost of boilers, heaters, pumps, piping, etc., up to the engines; all coal and ash conveyors, mechanical stokers, stacks, etc., also all transportation charges and expenses of unloading and erection.

28. Engines and Condensers.—This account includes cost of engines and condensers and lubricating devices to be used therewith. Includes transportation charges, expenses of unloading and erection and incidental expenses thereto.

29. Electrical Equipment.—This account includes cost of generators, rotary converters, transformers, switchboards and appurtenances thereto, including transportation for main and sub-stations, also cost of unloading and installation of same.

30. Miscellaneous Expenses.—This account includes items arising in connection with installation of power plant which cannot be directly charged to any of the foregoing accounts.

31.

#### ROLLING STOCK

32. Car Bodies and Trucks.—This account includes cost of car bodies complete, with all fittings, such as seats, heaters, registers, bell register and bell cords, wiring supplies for lights and light fixtures, head lights, pilots, etc. Also cost of trucks and braking apparatus. Also cost of unloading and transportation.

33. Electrical Equipment.—This account includes cost of motors, controllers, trolley stands, etc., wiring supplies for same and all electrical equipment used in connection therewith. Also cost of unloading and transportation.

34. Assembling.—This account includes the labor and miscellaneous supplies in setting up the cars ready for operation, such as mounting bodies on trucks, installing motors and brakes, etc., etc., etc.

35.

#### SUSPENSE ACCOUNTS

36. Construction Train Service.—This account includes labor and expenses in connection with handling the construction trains. (Items included in this account are to be recharged to appropriate account as fast as necessary data is secured, otherwise a pro rata charge will be made to the different kinds of work for which the train is used.)

37. Fuel, Oils, Waste, Etc.—This account includes the cost of supplies for construction trains, steam shovels and accessories, such as fuels, oils, waste packing, etc. (Items included in this account are to be recharged to appropriate account as fast as necessary data is secured, otherwise a pro rata charge will be made to the different kinds of work for which machinery is used.)

38. Storehouse.—This account includes the expenses connected with the care of general material from time of receipt to such times as same is called for to be used in the construction

work. This includes cost of storehouses, wages of storekeepers, watchmen, etc. (This account will be charged pro rata to the different accounts upon completion of work.)

39. Engineering and Superintendence.

40. Legal.

41. General Office Expense.

42. Miscellaneous.

43. Construction Equipment.—If same is permanent fixture with the company, and includes locomotives, steam shovels, ballast, flat and push cars and hand cars, proper working tools for each class of work, camp outfits, gravel-pit track layouts, coal docks and water supply and piping, blacksmith shop and tools, a per cent for depreciation may be charged off to each individual road.

Specifications should be prepared for the following:

1. Roadway.—(a) grading, (b) fencing, (c) cattle guards, (d) trestles, (e) masonry abutments, (f) arch masonry, (g) reinforced structures, (h) steel super-structures.

2. Track.—(a) ties, (b) rails, (c) track bonding, (d) special track, (e) track-laying, surfacing and lining.

3. Line.—(a) poles, (b) overhead materials, (c) line construction.

4. Buildings.

5. Power-Plant Equipment.—(a) foundations, (b) boilers and accessories, (c) engines and condensers, (d) electrical equipment, (e) miscellaneous items.

6. Rolling Stock.—(a) car bodies, (b) trucks, (c) heater, (d) air brakes, (e) electrical equipment, (f) assembling.

Details of work would include design and selection, two items that cover an immense field. The scope of this paper will not permit of much discussion along those lines. Exclusive of the elements of construction given under specifications, other features are the following:

Location.—Maximum curves and grades on open track in municipalities, width of right of way, probable second track, grade separation from railroads and highways, maps and profiles.

Grade.—Width of roadbed and rate of slopes, allowance for shrinkage and overhaul, method of staking work, progress, profiles.

Track.—Throat and flange ways for all special work; car house track layouts, Ys, hard center points in city streets, single or double-spring rigid frogs, split or spring switches, distance between double tracks or turnouts, tie plans for standard turnouts.

Line.—Arrangement of wires and fixtures on poles.

Power-Plant Equipment.—Scheme and character of power and distribution of current, location of power station and sub-stations with or without waiting rooms.

Rolling Stock.—Lengths, widths, weights and heights of cars.

Construction Outfits and Tools.—Locomotives, steam shovels, ballast, flat, push and hand cars, proper working tools for each class of work, camp outfits, store houses, gravel pit or stone quarry, including coal docks and water supply and piping, blacksmith shop and tools, pit-track layout.

Miscellaneous.—Train schedule.

Blank Progress Forms are very essential, although not all used in the same piece of work, yet at sometime or another the following printed forms are used to advantage. An ordinary time-book, a field foreman's daily report, a board deduction blank, a postal card report on daily progress and distribution of ballast, the same for amount of track laid, another for track surfaced, a daily report blank on overhead progress on which are the various sub-divisions of that class of work, a notice to the tie inspector, a report from the tie inspector, requisitions for materials, requisitions for tools, receipt for tools, time slips, storekeeper's daily report, notice of shipment, report of cars released by railroad company, freight notice, voucher, order for material, contracts for small purchases, damage release from injured persons, weekly report on disbursements, force account blank, bi-monthly progress reports.

#### MATERIALS OF CONSTRUCTION

A thorough knowledge of these, including costs, is one of the most valuable assets of the engineer, and like Details of Work, should be systematically tabulated under some such subdivisions as the basis heretofore assumed. The nature of a particular proposition may be such as to require



a further subdivision of these. Sufficient enumeration has been made of these items, and it remains but to submit a form of compilation. It has been found practicable to take sheets of plain paper 11¼ ins. x 30 ins. x 36 ins. and rule lines lengthwise or horizontally across the sheet about ⅜ ins. apart. Vertical columns the short way of the sheet are then made of varying widths and on the top line, or near thereto, are the captions. 1. Between stations. 2. Name of section or division of road, as preferred. 3. Length in miles, and then following in order the various items under the different subdivisions or kinds of work. The name of the subdivision itself, as grade, track, line, etc., is placed in large letters above the items pertaining thereto. Three or four horizontal lines may be used for each division, the first containing the units per mile required in number, pounds, tons, pairs, kegs, etc.; second, containing price per unit, number, pounds, tons, pairs, kegs etc.; third, containing amount of material required for the division; fourth, total cost for the division.

In writing the captions better results are obtained by placing at an angle of 45 degs. Manifestly materials of such subdivisions as buildings, power plant equipment, rolling stock and construction equipment are not listed in units of quality or price per mile. They are itemized separately. The method outlined, however, suits the needs of roadway, track and line admirably. Line alone requires as many as sixty items.

#### REPORTS ON PROJECTS

It requires a familiarity with commercial affairs to properly assemble facts for a report on a prospective railway. The engineer must not necessarily air too much knowledge, nor must he be too brief. The general character depends largely on the extent of the purpose in view as well as the information on the subject already known by the persons to whom the compilation is prepared. There are general lines around which a report can be made that would suit a majority of cases, to-wit:

(a) Organization, the essentials of which are: Name of company, purpose, capital stock, bonds, State laws of special interest, franchises, construction details, estimate of cost, revenues and expense.

(b) Location of Route.

(c) Tributary population, including that of cities and towns en route and the rural for 3 miles on either side of the line, dividing the totals along the line per mile of track including cities and towns and number of people.

(d) Industries, including agricultural, manufacturing and other products, local conditions as, general property, as indicated by public buildings, colleges, etc., parks, possibilities for municipal and commercial light and power supply.

(e) Character of construction, specifying in more or less detail, kind of roadbed, grades, curves, rails, ties, rail-joints and bonds, bridges and their capacities, ballast, line materials and power.

(f) Estimate of cost, detailed to accord with purpose and summarizing under sub-headings of 1, right of way; 2, roadway; 3, track; 4, line; 5, buildings; 6, power contract equipment; 7, rolling stock; 8, superintendence, engineering and legal; 9, contingencies.

(g) Earnings include gross receipts, gross expenses and net income. Gross receipts per annum are often approximated by comparison with other similar roads assumed gross receipts per mile of track per annum, or ascertaining the gross receipts by multiplying the number of persons tributary to the line by an assumed amount per person per annum. A more comprehensive method is to estimate probable passenger, freight and special revenues separately, that for the passenger receipts by multiplying number of car-miles run by unit receipts per car-mile, and adding thereto a lump sum for special occasions and conventions, athletics and amusements. The freight receipts are sometimes found by number of car loads of freight in and out of the territory served multiplied by an average rate per car and adding

thereto a lump sum for express and light package business. Special revenues would include rentals and sale of power. Gross expenses are operating and interest charges, damages and taxes. Net income is generally applied to depreciation and dividends on common stock.

The scope of interurban engineering is wide and, like many other things worth acquiring, requires much hard work. There is a multiplicity of involved factors, commercially and technically tending to affect the result, and it remains for the engineer to prove himself equal to the demands either way, and at any time.

#### PREMIUM SYSTEM FOR POWER HOUSE EMPLOYEES AT SHEBOYGAN, WIS.—MAKING BOILER WALLS TIGHT

At the convention of the Northwestern Electrical Association held at Chicago, Jan. 16, 17, 18, Ernest Gonzenbach, general manager of the Sheboygan Light, Power & Railway Company, Sheboygan, Wis., gave some interesting facts concerning a system he employs in the power house for encouraging the men to operate the station in the most economical manner. Ten per cent of the reduction of the total cost incurred for the month below 1.1 cents per kw-hour is divided among the employees. The basis, 1.1 cents, was the average cost per month before the inauguration of the premium system. At the present time the company is paying out in premiums from \$40 to \$80 per month. This means, of course, that from \$400 to \$800 per month is being saved in power house expenses, and the company is saving nine-tenths of this. The premium is divided among employees according to rank, the engineers receiving the highest per cent and the oilers the lowest. Firemen at \$45 per month usually receive a premium of from \$5 to \$10. The inauguration of the system in a power house, he said, produces quite a change in the interest taken by the men in their work. Every man not only tries to do his best, but in addition helps the other man to do his best also. The engineers watch the firemen to see that the coal is burned under the most economical conditions, and the firemen in turn object if the engineers run the larger units at low load instead of putting in smaller units. As costly repairs would wipe out premiums every employee is on the alert for hot bearings. Carelessness in one employee will not be tolerated by the others, and the incompetent man cannot remain long in the station.

In a paper read at the same meeting of the association A. Bement spoke of the attention that the passage of cold air through boiler walls is receiving at the present time. He said that even at the very best brick settings are very leaky and allow the entrance of much cold air. Steel jackets for the walls and reinforced concrete have been used as a remedy, and in some instances brick settings have been sealed by the application of a tight cement covering over which canvas has been pasted and then painted.

The Indiana, Columbus & Eastern Traction Company has adopted the policy of putting its agents in small towns upon a strictly commission basis. Heretofore agents owning stores have been allowed to send and receive freight without charge, as well as to have other courtesies shown them that resulted in a saving. While the company will treat its agents with the utmost consideration, this practice of courtesies will be stopped and the business put upon a cash basis as nearly as possible.



REPORT OF NEW YORK RAILROAD COMMISSIONERS

In the last issue of the STREET RAILWAY JOURNAL a table was published showing the capitalization and operating statistics of the New York State companies, as compiled from the official figures on file with the Railroad Commissioners. Advance sheets from the annual report are now available and supplement the matter already published. According to the report the total gross earnings from operation of the street surface, elevated and subway railways were \$78,819,304.09, which is an increase of \$8,089,218.43 over 1905. Operating expenses were \$43,501,438.27, which is an increase of \$3,305,994.73 over 1905. A complete year for the subway was not included in 1905, as it was in operation but eight months of that year. The percentage of dividends to capital stock of said companies is 4.79; in 1905 it was 4.83. The miles of said railways operated increased 58.049 miles. The number of passengers carried on street surface railroads in the boroughs of Manhattan and the Bronx, New York City (including transfers), was 630,297,151; an increase of 28,536,284 compared with 1905. The number of transfers was 198,632,861. The number of transfers in these boroughs increased 9,894,552. The average number of passengers carried on street surface railways in the boroughs of Manhattan and the Bronx per day (365 days) was 1,726,841 during 1906. These figures as to Manhattan and the Bronx include some passengers carried in Westchester County. The number of passengers carried in the borough of Brooklyn (including transfers and including those carried on the elevated railways) was 492,659,270. The number of transfers was 102,887,834. The average number carried per day (365 days) in the borough of Brooklyn was 1,349,751. These include some carried in the borough of Queens by the Brooklyn roads.

Following will be found tables giving percentages of operating expenses:

PERCENTAGES OF OPERATING EXPENSES TO GROSS EARNINGS.		
	1905.	1906.
Maintenance of way and structures.....	4.93	5.37
Maintenance of equipment.....	7.95	7.64
Operation of power plant.....	9.50	9.30
Operation of cars.....	25.05	23.55
General expenses.....	9.40	9.33
	56.83	55.19

PERCENTAGES OF SUBDIVISIONS OF OPERATING EXPENSES.		
	1905.	1906.
Maintenance of way and structures.....	8.70	9.72
Maintenance of equipment.....	13.99	13.87
Operation of power plant.....	16.70	16.85
Operation of cars.....	44.07	42.66
General expenses.....	16.54	16.90
	100.00	100.00

PERCENTAGE OF OPERATING EXPENSES TO GROSS EARNINGS FROM OPERATION FOR TEN YEARS		
1897 .....		60.57
1898 .....		60.07
1899 .....		59.62
1900* .....		58.78
1901* .....		56.89
1902* .....		58.91
1903* .....		57.70
1904† .....		56.30
1905† .....		56.83
1906† .....		55.19

\*Including elevated roads in Brooklyn.  
 †Including elevated roads in Brooklyn and Manhattan and (beginning with 1905 the Subway in Manhattan

The table at the bottom of the page gives statistics relative to the operation of some of the more important companies.

The following table shows increases and decreases in street surface and subway railroad mileage in the State during the year:

INCREASES.	
Brooklyn, Queens County and Suburban.....	.622
Bush Terminal (Brooklyn).....	2.675
Cortland County Traction.....	5.000
Electric City (Niagara Falls).....	2.415
Glen Cove.....	3.280
Interborough (New York City):	
Rapid Transit (Subway).....	4.830
Ithaca and Cayuga Heights.....	2.380
Long Island Electric.....	.100
Marcellus and Otisco Lake.....	9.000
Newark and Marion.....	8.190
New York City Railway and leased lines.....	.593
New York City Interborough.....	4.120
Ocean Electric (Far Rockaway).....	.240
Oneonta and Mohawk Valley.....	2.980
Rochester:	
Rochester and Sodus Bay.....	.170
Rochester and Suburban.....	.060
Rochester and Eastern Rapid:	
Ontario Light and Traction.....	.060
Syracuse, Lake Shore and Northern.....	.430
Syracuse Rapid Transit.....	.150
Union (New York City).....	.071
Warren and Jamestown.....	10.000
Waverly, Sayre and Athens.....	1.330
Westchester Electric.....	.055
City of New York—Williamsburgh Bridge.....	1.577
	60.32

RECEIPTS AND EXPENDITURES PER PASSENGER AND COST OF OPERATION PER CAR MILE FOR YEAR ENDING JUNE 30, 1906.

NAME OF ROAD.	Number of Passengers Carried, Including Transfers.	Total Car Mileage.	*BASED UPON GROSS EARNINGS FROM OPERATION AND OPERATING EXPENSES.		*BASED UPON RECEIPTS FROM ALL SOURCES AND TOTAL EXPENDITURES, INCLUDING FIXED CHARGES.		PER CAR MILE.		
			Average Earnings per Passenger.	Average Cost of Operation per Passenger.	Average Receipts per Passenger.	Average Expenses per Passenger.	*Gross Earnings.	*Operating Expenses.	*Total Expenses Including Fixed Charges.
Albany and Hudson.....	1,395,461	703,088	15.16	12.11	19.04	18.76	30.09	24.03	37.27
Auburn and Syracuse.....	4,931,345	1,184,058	6.28	3.72	6.31	5.25	26.17	15.48	21.89
Binghamton.....	7,289,545	1,477,900	3.97	2.07	4.00	3.27	19.61	10.21	16.13
Brooklyn Heights†.....	323,534,625	49,208,602	4.04	2.25	4.12	3.59	26.56	14.82	23.51
Coney Island and Brooklyn.....	40,093,248	6,871,509	4.10	2.98	4.15	3.74	24.12	17.37	21.85
Crosstown Street (Buffalo).....	17,744,498	2,806,971	3.38	1.94	3.41	3.00	21.56	12.26	18.09
Forty-Second Street, Madison and St. Nicholas Avenues (New York City)‡.....	32,588,835	3,841,281	2.83	2.15	3.08	3.36	24.02	18.28	28.53
Geneva, Waterloo, Seneca Falls & C. L.....	1,940,164	446,990	4.69	2.82	4.69	3.96	20.18	12.25	17.19
Hudson Valley.....	6,555,010	1,977,596	8.48	4.99	8.71	9.05	28.11	16.55	30.00
International (Buffalo).....	102,264,448	16,358,461	4.00	2.36	4.12	3.30	25.04	14.72	20.62
Interborough Rapid Transit.....	395,716,386	93,654,185	4.97	2.23	5.16	4.36	18.03	8.97	18.41
Jamestown.....	4,716,490	817,584	3.28	2.21	3.31	2.92	18.93	12.75	16.84
Kingston Consolidated.....	2,686,244	563,316	4.86	2.78	4.88	4.25	23.27	13.27	20.29
Nassau Electric.....	83,227,057	11,989,411	3.94	2.31	4.10	3.38	26.92	16.03	23.44
New York City¶.....	494,230,839	52,047,663	3.53	1.94	3.74	4.21	33.48	18.40	39.97
New York and Long Island.....	3,055,681	853,912	6.73	3.37	6.78	5.09	24.09	12.06	18.26
New York and Queens County.....	21,125,464	3,623,929	3.97	2.07	4.03	3.64	23.17	15.58	21.20
Rochester.....	54,448,964	8,036,938	3.76	2.21	3.86	3.24	25.46	14.99	21.92
Rochester and Eastern.....	1,146,497	730,656	19.98	12.64	20.75	20.06	31.34	19.84	31.47
Schenectady.....	12,794,203	3,241,573	6.79	4.37	6.89	6.02	26.79	17.25	23.30
Syracuse and Suburban.....	1,995,687	497,559	8.76	5.13	8.87	7.96	21.05	12.33	19.14
Syracuse Rapid Transit.....	25,453,517	4,320,371	4.01	2.28	4.04	3.29	23.62	13.41	13.41
United Traction.....	36,331,703	7,562,079	4.86	3.07	4.91	4.03	23.34	14.76	19.35
Utica and Mohawk Valley.....	16,535,761	3,543,233	5.43	3.16	5.46	4.25	25.33	14.76	19.84
Union (New York City).....	47,214,708	7,028,279	3.18	2.24	3.22	2.85	21.38	15.09	19.16

\*Includes earnings and expenses of freight, express, mail and all other business. †Includes all lines operated by Brooklyn Heights not making separate reports. ‡Includes portion operated by horses. ¶Includes all lines operated by New York City Railway Company not making separate reports and also includes lines operated by horses



The above does not include the following, which have constructed road since June 30, and up to Jan. 1, 1907, as follows:

- Buffalo, Lockport & Rochester, 2 miles.
- Syracuse & South Bay, 10 miles of track laid and poles set up.
- Danbury & Harlem, 6.50 miles.
- Liberty & Jeffersonville, 2.40 miles. This track has also been constructed for some time previous to this year.
- Rochester, Syracuse & Eastern, constructed from Rochester to Lyons, 37 miles, in operation since the early part of September and turned over to the company, which began operations on Nov. 1, 1906.

Elmira, Corning & Waverly. "None of the railroad is absolutely finished, although a large part of the construction work has been completed."

The average number of persons, including officials, employed during the year ending June 30, 1906, on all the street railways of the State (including street surface electric, cable and horse railways, the Brooklyn Union Elevated Railroad, the Manhattan elevated railway and the subway) was 43,285. The aggregate amount of salaries and wages paid them was \$28,882,153.60. The percentage of gross earnings from operation paid in salaries and wages in 1906 was 36.64. The companies owned and operated on June 30, 1906, 6855 electric motor or cable box cars; 3895 electric motor or cable open cars; 1035 electric motor combination box and open cars; 545 electric motor semi-convertible and combination passenger and baggage cars; 42 electric motor mail cars; 536 electric motor express, freight and other cars; 400 electric motor snow plows, sweepers and sprinklers; the total being 13,308. Fenders to the number of 15,837 were reported in 1906 as in use on cars. Some of these fenders are transferred from one end of the car to the other at terminals, and some of the devices reported as fenders are wheelguards; 2529 other cars (being cars operated by horses, and box, open, freight, express, service cars and snow plows not equipped with motors) were also owned and operated on June 30, 1906.

The number of tons of freight reported as carried on the street surface railroads of the State during the year ending June 30, 1906, was 1,603,182; the number carried during each of the years, beginning with the year 1899, was as follows:

1899.....	129,040
1900.....	153,343
1901.....	287,311
1902.....	394,641
1903.....	516,460
1904.....	633,674
1905.....	829,291
1906.....	1,603,182

On some of the roads separate express companies operate and in some of these cases the amount of freight carried is not reported.

The Boston Elevated Railway Company is building an extension at its Milton car house which will require the casting and sinking of 413 concrete piles from 10 ft. to 35 ft. long. The work of casting piles has already been begun, and as soon as the piles are sufficiently set they will be driven. The piles are square in section, 13 ins. x 13 ins., reinforced with No. 3 Clinton wire cloth. They will be sunk to ledge by means of a water jet, and are required to sustain a load of 30 tons each. The addition to the car house will more than double its present capacity.

## REPORT OF MASSACHUSETTS RAILROAD COMMISSIONERS

The report of the Massachusetts Railroad Commissioners for the year ending Sept. 30, 1905, figures from which have been briefly quoted in the STREET RAILWAY JOURNAL, has just been issued. Returns for the year were received from ninety street railway companies. During the year two new companies were organized under the general law and added to the list, namely, the Worcester & Northern, and the Worcester & Providence. One company was organized during the year under the general law and added to the list being the purchaser of a railway sold at receiver's sale; the Ware & Brookfield, purchaser of the Hampshire & Worcester. During the year the Georgetown, Rowley & Ipswich (Sept. 28, 1906) was consolidated with the Boston & Northern; the Hoosac Valley (June 30, 1906) with the Berkshire; the Lowell & Woburn (Sept. 28, 1906) with the Boston & Northern; and the Taunton & Buzzards Bay with the New Bedford & Onset (June 11, 1906).

The Massachusetts companies now own 2,230.020 miles of street railway line, 420.124 miles of second main track, and 153.478 miles of side track, making a total length of track, reckoned as single track owned 2,803,622 miles. All of the street railway mileage owned is located in this State except 18.766 miles of main track and 0.760 of a mile of side track belonging to the Woonsocket,—in all 19,526 miles of track—which is located in Rhode Island. All the track owned is surface street railway track with the exception of 6.644 miles of elevated line and 6.468 miles of elevated second track. Of the sidings, all are surface track with the exception of 2.903 miles of elevated track. All of the elevated track is confined to Boston. The Old Colony leases and operates the Newport & Fall River, having a mileage of main and second track of 19.289 miles located in Rhode Island; and the Boston & Northern leases and operates the Nashua, having a mileage of main and second track of 14.899 miles located in New Hampshire. Accordingly 52.954 miles of main and second track are operated outside the State. The total miles of main track (including track-*age* rights) operated is 2,736.052,—an increase of 67,551 miles over the previous year.

The aggregate capital stock of the ninety companies, Sept. 30, 1906, was \$71,216,925,—a net increase of \$889,940.22 over the preceding year.

The total amount of dividends declared the last year was \$3,554,073.24,—an increase of \$379,568 over the preceding year. Thirty-seven out of the ninety companies paid dividends ranging from 2 to 10 per cent, and fifty-three companies declared or paid no dividends.

One company paid 10 per cent; five, 8 per cent; one, 8 per cent on preferred and 7 per cent on common; one, 7.22 per cent; one, 7.20 per cent; two, 7 per cent; eleven, 6 per cent; one, 5.5 per cent; eight, 5 per cent; two, 4 per cent; one, 3.75 per cent; one, 2.50 per cent, and two, 2 per cent.

CAPITAL STOCK, NET INCOME AND DIVIDENDS, 1897-1906.

YEARS.	Capital Stock.	Net Divisible Income.	Dividends Declared.	Percentage on Total Capital Stock
1897.....	\$32,670,273	\$2,593,147	\$1,965,243	6.02
1898.....	38,933,917	2,534,002	2,076,233	5.33
1899.....	41,380,143	2,502,942	2,318,398	5.60
1900.....	48,971,168	3,037,502	2,409,874	4.92
1901.....	54,069,933	3,398,183	3,417,117	6.32
1902.....	60,036,328	3,388,851	3,138,711	5.23
1903.....	68,404,480	3,682,917	3,586,248	5.24
1904.....	68,542,038	2,998,114	3,214,496	4.69
1905.....	70,326,985	3,556,690	3,174,505	4.51
1906.....	71,216,925	4,160,073	3,554,073	4.99



per cent; eight paid 5 per cent; two paid 4 per cent; one paid 3.75 per cent; one paid 2.50 per cent, and two paid 2 per cent.

The aggregate funded debt of the companies, Sept. 30, 1906, was \$58,176,000,—an increase of \$2,395,500 over the preceding year.

The amount of real estate mortgages outstanding Sept. 30, 1906, was \$74,400,—an increase of \$2,400 over the preceding year.

The total unfunded debt, including the above mortgages, was \$20,279,338,—an increase of \$783,580.

The gross debt, funded and unfunded, was \$78,455,338,—an increase of \$3,179,080.

The net debt (the gross debt less \$10,447,216 of cash and current assets) was \$68,008,122,—an increase of \$5,047,569. In computing the net debt the sum of \$6,096,828 returned as "miscellaneous assets," covering materials and supplies on hand, etc., is not included with cash and current assets in the deduction from gross debt.

#### CAPITAL INVESTMENT

The total capital investment (capital stock and net debt) of the street railway companies of the State advanced the last year from \$133,287,538 to \$139,225,047,—an increase of \$5,937,509. The average cost of the street railways of the State, per mile of main track (including the cost but not the length of side track), as reported by the companies Sept. 30, 1906, was \$28,974.35 for construction; \$10,211.87 for equipment, and \$13,616.23 for lands, buildings (including power plants) and other permanent property,—making a total average cost of \$52,802.45 per mile of main track.

The total income of the companies from all sources, for the year ending Sept. 30, 1906, was \$31,237,446.83, and the total expenditures (including dividends declared) were \$30,631,447.12,—making a net surplus of \$605,999.71 to be added to the surplus of previous years.

The gross earnings and expenses of operation the last year are classified and compared with those of the previous year, in the following table:

GROSS EARNINGS AND EXPENSES OF OPERATION, 1905 AND 1906.

EARNINGS AND EXPENSES.	1905.	1906.	Increase.
Revenue from passengers.....	\$26,384,587	\$28,793,806	\$2,409,219
From mails and merchandise.....	105,625	134,456	28,831
From tolls and advertising, etc.....	551,079	635,630	84,551
Gross earnings from operation.....	\$27,041,291	\$29,563,892	\$2,522,601
Operating expenses.....	18,269,259	19,954,000	1,684,741
Net earnings from operation.....	\$8,772,032	\$9,609,892	\$837,860

#### VOLUME OF TRAFFIC

The total number of passengers carried during the last year on the railways in operation of the ninety companies making returns to the board was 581,450,906,—an increase of 48,719,889 passengers over the previous year.

GROSS AND NET EARNINGS FROM OPERATION PER MILE OF MAIN TRACK OWNED, 1897-1906.

YEARS.	AVERAGE PER MILE OF TRACK OWNED.		
	Gross Earnings.	Expenses of Operation.	Net Earnings.
1897.....	\$11,187	\$7,713	\$3,474
1898.....	10,995	7,589	3,409
1899.....	10,459	7,132	3,327
1900.....	10,452	6,878	3,574
1901.....	9,998	6,690	3,308
1902.....	9,609	6,510	3,099
1903.....	10,124	6,944	3,180
1904.....	10,178	7,145	3,033
1905.....	10,300	6,959	3,341
1906.....	11,156	7,529	3,627

GROSS AND NET EARNINGS FROM OPERATION PER CAR MILE RUN AND PER PASSENGER CARRIED, 1897-1906.

YEARS.	AVERAGE PER CAR MILE.			AVERAGE PER PASSENGER.		
	Gross Earnings.	Expenses of Operation.	Net Earnings.	Gross Earnings.	Expenses of Operation.	Net Earnings.
	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
1897.....	25.68	17.71	7.97	5.12	3.53	1.59
1898.....	24.80	17.11	7.69	5.11	3.52	1.59
1899.....	24.74	16.87	7.87	5.09	3.47	1.62
1900.....	24.46	16.10	8.36	5.06	3.33	1.73
1901.....	23.40	15.66	7.74	5.02	3.36	1.66
1902.....	23.42	15.87	7.55	5.05	3.42	1.63
1903.....	23.76	16.30	7.46	5.06	3.47	1.59
1904.....	24.29	17.05	7.24	5.04	3.54	1.50
1905.....	24.75	16.72	8.03	5.08	3.43	1.65
1906.....	25.86	17.46	8.40	5.08	3.43	1.65

The total number of miles run by street cars was 114,312,626,—an increase of 5,053,887 miles over the previous year.

The following tables give for each of the last ten years the average gross earnings, operating expenses, and net earnings from operation, (1) per total mile of main track owned, (2) per car-mile run and per passenger carried,—thus showing more in detail the changes from year to year in the earnings, cost and net results of operation.

#### GENERAL DISCUSSION

Following the action of the Legislature of last winter declaring its adherence to the old-time policy of prohibiting railroads from holding the stocks of other corporations, the Attorney-General of the Commonwealth in October instituted certain proceedings which are now pending in the Supreme Judicial Court to test the legality of the action of the New York, New Haven & Hartford Railroad Company in dealing with street railways in Massachusetts.

Meanwhile petitions have been brought for the approval of consolidation of railways and issues of stock by some of the street railway companies, which, whether by valid or invalid processes, are directly or indirectly controlled by the same interests that control the New York, New Haven & Hartford Railroad.

These petitions relate to the economic administration of business and to improvement in street railway accommodation. In instances where action upon these matters would promote the public interests it would seem that, whatever the outcome of the legal contest as to holdings of stock in these companies may be, the management of their affairs, in so far as it affects the traveling public, ought not to be affected by the pending litigation. The street railway companies are independent corporations, and their issues of capital, their charges and methods of conducting business are under State supervision. The board is therefore proceeding with an inquiry into the merits of the pending cases upon the assumption that an economical and progressive management of existing lines is desirable.

#### SAFETY DEVICES FOR STREET CARS

In the annual report of the board for 1895 will be found a discussion of street car fenders, including an exhaustive report by Prof. George F. Swain. The facts and opinions there stated have a pertinent value in connection with the investigation which we have been making during the past year, and should be taken into consideration with what is said in this report.

Following the report of 1895 the board issued a circular to street railway companies, under which various fenders have been in use upon different railways. From time to time since that circular was issued the board has inspected models, witnessed experiments and observed the working of fenders.



The Legislature of 1906, in order to enable the board to complete an investigation of safety devices, authorized an appropriation to meet the necessary expense. With the means thus furnished an inquiry has been conducted in this and in other states in foreign countries, records of experience have been consulted, opinions of experts obtained, public hearings given, and practical tests with fenders and wheelguards made.

There is to-day a very general skepticism among railway officials, employees and persons having no interest either in companies or patents, as to the value of any fender that projects in front of a car. The feeling is widespread that instances in which such projecting attachments injure persons who might otherwise escape, or introduce new perils by distracting the attention of motormen or by increasing chances of derailment, go a great way toward counterbalancing the instances in which they prevent injury. This feeling has led to a greater interest in wheelguards.

The remarkable record of the wheelguard used for several years in Liverpool affords a striking argument for the use of that device rather than a projecting fender. For two years this wheelguard has been used in connection with the vast traffic of that city without a single instance of failure to accomplish its purpose. Of course the freedom from snow and ice and the smooth street surface found there favor the working of such a wheelguard.

The use of reserved spaces for street railways and the recent progress in perfecting the surfaces of our streets tend to make an effective wheelguard more available. There is reason to believe that with such a wheelguard the safety of those who are exposed to moving cars will depend upon proper devices for controlling speed, proper rules for operating cars and the alertness and skill of motormen, rather than upon the adoption of any type of fender. However, experience proves that fenders do occasionally prevent loss of life or limb, and in view of this fact, and with the possibilities of better results from improved devices, companies ought to equip street cars with fenders. It is simply a question as to what fenders shall be used.

The practical tests made at Newton with dummies shaped like human bodies of different sizes, covered twenty-seven different devices, and showed the uselessness of some of them and excellent results in the use of others. Those designed to trip and catch a person standing or crossing a track were more generally successful than those which were designed to pick up prostrate bodies.

There has been much hostile criticism of the Pfingst fender. The record of that fender shows many instances when persons have been saved from injury. This of course happens when accidents are prevented and therefore when public attention is seldom drawn to the fact through newspaper paragraph and never through police report or inquest. On the other hand, this fender has frequently failed to do its work. One reason for failures, particularly upon suburban lines, is carelessness in attaching the fender to the car, especially in respect to the height at which it is carried. Upon a large percentage of the surface cars in Boston the fender is useless from the fact that projecting parts of the car so reduced the available area of the fender as to leave no room for catching or holding a person who falls or is thrown upon it.

Assuming that the Legislature had in view an investigation that will enable the board to require the use of such devices as shall seem to be suitable, no opinion is expressed at this time upon the comparative merits of different fenders. Street railway companies have been asked to present

for approval on or before the first day of May such type of fender and wheelguard as they may desire to use.

Experience shows that for safe and successful work with lifting jacks suitable for raising a modern street car there is need of expert knowledge; also of blocking and other apparatus. The use of wheelguards properly attached to the trucks and proper control over the car must tend to make accidents in which there is occasion to lift the car exceedingly rare, and to meet the cases which do arise we believe in the maintenance of wrecking crews within convenient call prepared to move at once to the place of accident with all necessary apparatus. One trouble in the past has been that too little attention has been given to wheelguards. Some in use are wholly inefficient, and others so carelessly attached as to be practically worthless in keeping bodies away from the wheels.

#### VENTILATION OF STREET CARS

Two public hearings have been given, at which methods of ventilating street cars were the subject of consideration. No report is presented, for the reason that the inquiry is not yet completed.

#### EXHIBITS AT THE ELECTRICAL SHOW AT CHICAGO

The first week of the electrical show at the Coliseum, Chicago, which closed Jan. 19, established a record for attendance, and presaged for this week a continuance of the large crowds. Unofficial reports are to the effect that the attendance one day established a record for the building. While the exhibits covered the whole range of the electrical industry, several of them were of such a character as to be of special interest to street railway and allied industries.

One of the most interesting of these was the exhibit of the Chicago City Railway Company, which had on show one of its latest type of passenger cars, one hundred of which are now being received. Attendants in uniform explained to the public the striking features of the car and distributed illustrated circulars which set forth briefly the company's reasons for changes in design. In the design of the new car the company has provided for the changeable Chicago weather, for the lessening of noises and for more sanitary conditions. The general design and dimensions of the car are practically the same as those of the car described in the *STREET RAILWAY JOURNAL* for Sept. 16, 1905. The later cars, however, have been provided with ventilators in both the front and the rear ends of the monitor. These are fitted with shutters to throw the air up against the ceiling and avoid draughts. Recent tests showed the inflow of air through the new ventilators averaged 370 ft. per minute. A decrease of 500 lbs. in the weight of the new car has been made possible by the use of standard steel seat pedestals instead of cast iron. The car exhibited was built by the J. G. Brill Company and is mounted on Brill 27-E-1 trucks provided with Schoen steel wheels. About 18,000 of the illustrated circulars dealing with the car were passed out during the first few days—striking evidence of the interest of the public in the new equipment.

Hardly any of the exhibits was without interest for street railway men, even though in cases the connection was remote. In a number of instances, however, there were many things of interest, as strikingly illustrated in the exhibits of the Westinghouse Company, the General Electric Company, Allis-Chalmers Company, Electric Service Supplies Company, and a number of others, of which brief mention is appended:



THE UNITED INDURATED FIBER COMPANY showed several applications of the specially treated fiber of its manufacture. Probably the most interesting feature of the exhibit were the samples of third-rail insulators, among which were those of the type made for the New York Central Railroad. Another interesting application was a fiber trolley-wire trough for railroad crossings. This trough is lined with a conducting material so that when the trolley jumps the wire it is caught by the trough and the current is not broken. The trough is designed particularly for service over railroad crossings where it is highly desirable that the car be not stopped for any reason whatever. Switch tanks for high-tension switches, insulating rings for various purposes, rail-end insulators and several other articles made from the fiber also were shown. Morris W. Sheldon represented the company.

THE ALLIS-CHALMERS COMPANY gave up the central portion of the exhibit space to generators and motors. Around a three-phase, 75-kw, a. c. motor were grouped several a. c. and d. c. machines of smaller capacity. In one corner of the space was shown a section of the stationary and movable blading of a 500-kw Allis-Chalmers turbine. Near by was a complete cylinder and valve gear of an Allis-Chalmers Corliss engine. The north end of the exhibit served as an office and reception room for visitors. Catalogs and other advertising matter were distributed to those interested. C. A. Tupper and S. R. Kerr were in charge of the exhibit. They were assisted by J. W. Gardner, manager of the Chicago office, and several of the company's salesmen, including C. H. Helvey, C. S. Buell, C. H. Lowe, H. I. Keen, P. C. Van Zandt, George Voight, A. W. Catlin, L. St. J. Smith, D. K. Chadbourne, E. R. Jacobs, J. M. Denniston, F. L. Webster and Ervin Dyer. W. H. Whiteside, president; L. M. Harvey, manager of the Milwaukee sales office, and W. S. Heger, assistant to the president, also were in attendance.

THE NATIONAL CARBON COMPANY was installed in a booth made of pure carbon. In it, on a central pyramid, was shown dry batteries of various types in the construction of which the company's products are used. Railway motor brushes, telephone parts, arc light carbons and other carbon products also were shown. The company was represented by M. C. Cotabesh, manager of sales; A. L. Haskell, Wallace O'Connor, A. B. Ward and C. W. Wilkins, salesmen.

THE ELECTRIC SERVICE SUPPLIES COMPANY exhibited a very extensive line of electric railway and lighting specialties, including Dossert solderless connections, Garton lightning arresters and Imperial arc headlights. Several types of Locke high-tension insulators and a complete line of railway overhead material also were shown. A very interesting feature of the exhibit was an apparatus for the comparison of the brilliancy of regular incandescent, metallized filament and tantalum lamps. Other features of the exhibit were Benjamin wireless clusters, Schwarze Electric Company's bells and G. & W. potheads, which are used where conduit wires are brought up on poles. W. J. Porter, M. A. Berg, E. R. Mason, P. E. Davenport, H. L. Adams and C. D. Willison represented the company.

THE ALBERT & J. M. ANDERSON MANUFACTURING COMPANY exhibited the Anderson time switch and remote-control oil switches. The main portion of the exhibit, however, consisted of trolley wheels and a complete line of Anderson overhead line material. The company was represented by Wm. W. Hincer, manager of the Chicago branch, and John M. Anderson, treasurer of the company.

THE SIMPLEX ELECTRIC HEATING COMPANY included in its exhibit of a complete line of heating apparatus glue pots for shop use. These pots are of the immersion-coil type. A one-quart pot consumes about 100 watts. This company also manufactures car heaters of various types. C. W. Richards and H. R. Hixon, Chicago representatives, were in attendance.

W. N. MATTHEWS & BROTHER showed the manner in which Stombaugh guy anchors are installed in the ground by means of an earth section placed in a large box in the rear of the booth with an anchor in position. Other features of the exhibit were the Kearney cable clamps, Hold-Fast lamp guards, Lima jack boxes, Harges cable splicing joints, O. K. sleet cutters and Callahan cable rollers. The company announces that it is getting up a ratchet wrench for the Stombaugh guy anchor which will facilitate the installation of anchors in close fence-corners and other places where the T wrench cannot be used.

Claud Matthews, W. N. Matthews and V. L. Crawford represented the company.

W. H. SCHOTT, the well-known central-station heating and power-plant engineer, of Chicago, had an artistic booth provided with seats and couches for the comfort of visitors.

THE WAGNER ELECTRIC COMPANY exhibited a very extensive line of its products. A Wagner variable-speed, single-phase, alternating-current motor was shown, operating a small-pressure blower. In this motor the speed variation is obtained by means of an auto-converter speed regulator. The motor operates with the brushes on the commutator as a repulsion type of motor, and the speed of the motor depends upon the voltage compressed and the load under which the motor is working. There was also on exhibition a new single-phase elevator motor. This motor has a very large torque at the instant of starting. If conditions of service require at starting it will develop 300 per cent to 400 per cent of normal full-load torque. Other single-phase motors shown were a 5-hp standard type and a 15-hp vertical motor. A 10-hp, three-phase induction motor created considerable interest. The construction of the Wagner type M standard lighting and power transformers was well shown by a transformer from which the front side of the case had been removed. Included in the exhibit was a complete line of switchboard and portable indicating instruments, both for a. c. and d. c. work. These were shown in several styles, including the round pattern, horizontal, edgewise, vertical edgewise and fan shape. One instrument shown was a three-phase, a. c. ammeter which answered the purpose of three a. c. ammeters. A combination voltmeter and frequency indicator was also exhibited. The exhibit was in charge of F. N. Jewett, Chicago district office manager, assisted by C. B. Richardson and C. C. Warner, of the Chicago office, and V. W. Bergenthal, assistant sales manager of the home office.

THE OHIO BRASS COMPANY was installed near the center of the building. The exhibit comprised samples of high-tension porcelain insulators made expressly for the company. Another feature of the exhibit was several sections of track rails showing the application of terminal and soldered bonds. The exhibit of third-rail insulators included a section of the underrunning third-rail used by the New York Central Railroad. Lima jack boxes for interurban railway telephone work and Hunter illuminated signs for street railway work also were shown. The company was represented by F. H. Jamieson, A. L. Havens, E. A. Hurlburt and G. W. Cooper, of the Chicago office.

THE GENERAL ELECTRIC COMPANY made the first public exhibit of the new tungsten lamp. These lamps have an efficiency of  $1\frac{1}{4}$  watts per candle-power, and were shown in 100 watt units of 85 cp. The exhibit was made by installing a row of the lamps in the roof of the booth with rows of tantalum and Gem incandescent lamps, all with Holophane globes on either side. The rows of different kinds of lamps were connected to flashers, so that they were lighted alternately. The main feature of the exhibit, however, was the display of cooking and heating devices. The exhibit was in charge of E. L. Callahan.

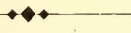
THE SCHWARZE ELECTRIC COMPANY was represented by J. Allen Haines, who exhibited a line of Schwarze Universal bells, which are particularly adapted for installation on electric cars.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY exhibited as "details and supplies" various types of electric instruments mounted upon marble switchboards. There were also shown a line of portable instruments, samples of low-voltage line material, catenary line material for high-voltage single-phase railway installations, and various types of lightning arresters, oil switches and circuit breakers. The company was represented by S. L. Nicholson, manager industrial and power sales, Pittsburg; C. S. Cook, manager railway and lighting sales, Pittsburg; T. P. Gaylord, manager Chicago office, and the following associates from his office: A. L. Millard, W. D. McDonald, Malcolm C. Carrington, R. H. Moore, Norman Stewart and Stephen Gardiner.

THE ELECTRIC STORAGE BATTERY COMPANY, of Philadelphia, exhibited a variety of batteries manufactured by it, ranging from the H-61 tank with a capacity of 4800 amps. for a hour down to the little BT cell with a capacity of  $2\frac{1}{2}$  amps. for 1 hour. All of these batteries are of the "Chloride Accumulator" type, and include the R-73 elements in R-85 tank, 2600 of which cells are now being installed by the New York Central Railroad



Company in its electrification. Cells of this type will be used at Gary, Ind., by the Indiana Steel Company in its plants now under construction. The G-51 tank is used by street railway companies throughout the country, and the other types shown are the F-21 for lighting and telephone work, both in wood tanks and in glass tanks, the F-15, E-13, D-7 and C-5, all in glass jars. This company makes a specialty of car lighting work, and the exhibit includes their two-compartment tank, containing ELS-11 elements and a variety of accessories for railway car lighting. In addition to the batteries a cell-filling device, with an automatic signaling hydrometer, was shown in operation. The company was represented by Chas. Blizzard, third vice-president; G. H. Atkin, manager of Chicago office, and Messrs. J. M. S. Waring, district engineer; W. F. Bauer, W. F. Rath, H. B. Marshall, F. W. Hyde and George Neth.



### AN ECONOMICAL AND EFFICIENT FORCE FOR CAR HOUSE AND SHOP OPERATORS \*

An economical and efficient force for car house and shop operation should be a force thoroughly systemized in every respect and separated into departments that are also systemized in every detail of their work. In the writer's mind the most important department for the good of the operation of a street railway company is the night force, when the inspection is done at night; and this is the case with most street railway properties. The night force should be under the supervision of a thoroughly competent and broad-minded man. To be a competent night foreman a man should be brought up to this position by practical experience by taking care of each class of work that is done at night. With this experience he will be able to judge the amount of work that should be done by each man under him.

To get the best results the night foreman should rate the positions in the shop according to their importance, and he should instil into each man the importance of the position he holds and the responsibility that is on him, and also that it is in his power, to an extent, to make the operation of the road a success. This should be carried on down the line from the best position to the one of the least importance. Any shortcomings of the workmen should be brought to their attention at once and he should get a report each night of the trouble that has shown up during the day on the cars for which he is responsible. Each man should know that he is performing the part for which he is held responsible, and that upon the efficiency of his work depends the successful operation of that part.

In employing new men for shop work they should be thoroughly instructed as to what they are to do. It should be explained to them that they will have to start at the bottom, in case they are inexperienced, and that they will gradually be promoted to better positions and better pay as they become familiar with the work, and that the rate of promotion will be governed by their interest and good work.

If the foreman should adopt this system and put all of his new men through the different classes of work that are done at night he will gradually be surrounded by a class of men who are termed as "all-around" street car men. This will enable the foreman to be more independent than if he should employ a man and keep him on one job indefinitely. The writer has known of cases of this kind, where a shop was operated by a so-called good lot of men but there were

no two men in the shop who could exchange places and give any degree of satisfaction until they had become familiar with the work of the other. This, as can be readily seen, will place the foreman in an embarrassing position in case he should have a man, or a number of men, off and have to arrange the force to suit the conditions. The particular job to be filled would not receive the proper attention in the absence of the regular man, even if it were possible to fill the vacancy.

To the writer's mind the best results can be obtained by classifying the men and encouraging them to take all the interest possible in the work and letting them know that they will be promoted to better positions and better pay. With these conditions the most reliable men can be selected for promotion. If a force of men are thoroughly familiar with all classes of work, and have had practical experience in each department, they may be of invaluable service to a new employee, as well as to the foreman and company.

In the writer's mind it is more necessary to have a good, competent night foreman than a good, competent day foreman, in case it is not possible to have both, as it is possible for the master mechanic to stay in closer touch with the operation of the day force.

To get the best results all operating cars should be put over the pits and thoroughly inspected every night (or day in case of all night cars). The pit inspectors should each have certain pits to work in and certain cars to inspect, and the same cars each night. They can be held responsible for their work in this manner, and it makes it possible to tell who is not keeping his work up to the standard. Where the pit room is limited, it is impracticable to hold the cars over the pit for any considerable length of time when the cars are coming in off their runs; in case more work is required than can be quickly disposed of, it is best to shift such cars to storage tracks and put them over the pits for such work as is necessary after the rush is over, or it may be necessary to hold it over for the day force.

The writer has under his supervision the care of 45 double-truck quadruple equipments and 109 double equipments handled and inspected in the above manner in one car house, having eight pits 200 ft. long. The inspecting and cleaning is done by thirty-three men. The average number of cars in the shop for repairs during the day does not exceed 5 per cent of the operating equipment. It may be added that a record of inspection of each part of each car is made by the several inspectors and filed in the master mechanic's office.

The method of educating and handling night men holds good for the day force in the same manner as it does for the night men. The day force should be divided into departments which should be governed by the number of cars operated. The machine shop and car house should be divided into departments, having a competent, economical and broad-minded foreman for each department, who should report to the general foreman. There should be a foreman for the carpenter shop and a foreman for the paint shop, who should report direct to the master mechanic. The number and class of men in these departments should be governed by the class and amount of work that is being done.

This system in a car shop, together with a wide-awake foreman in each department and a master mechanic who never ceases trying to bring his men up to a higher standard, will produce excellent results, but it cannot be kept up to what it should be by the master mechanic only putting in office hours with his men.

\* Paper read before the June, 1906, meeting of the Newman Properties Association by A. D. McWhorter, Master Mechanic of the Memphis Street Railway Company.



**TURBO UNITS OF 10,000 KW. FOR BROOKLYN**

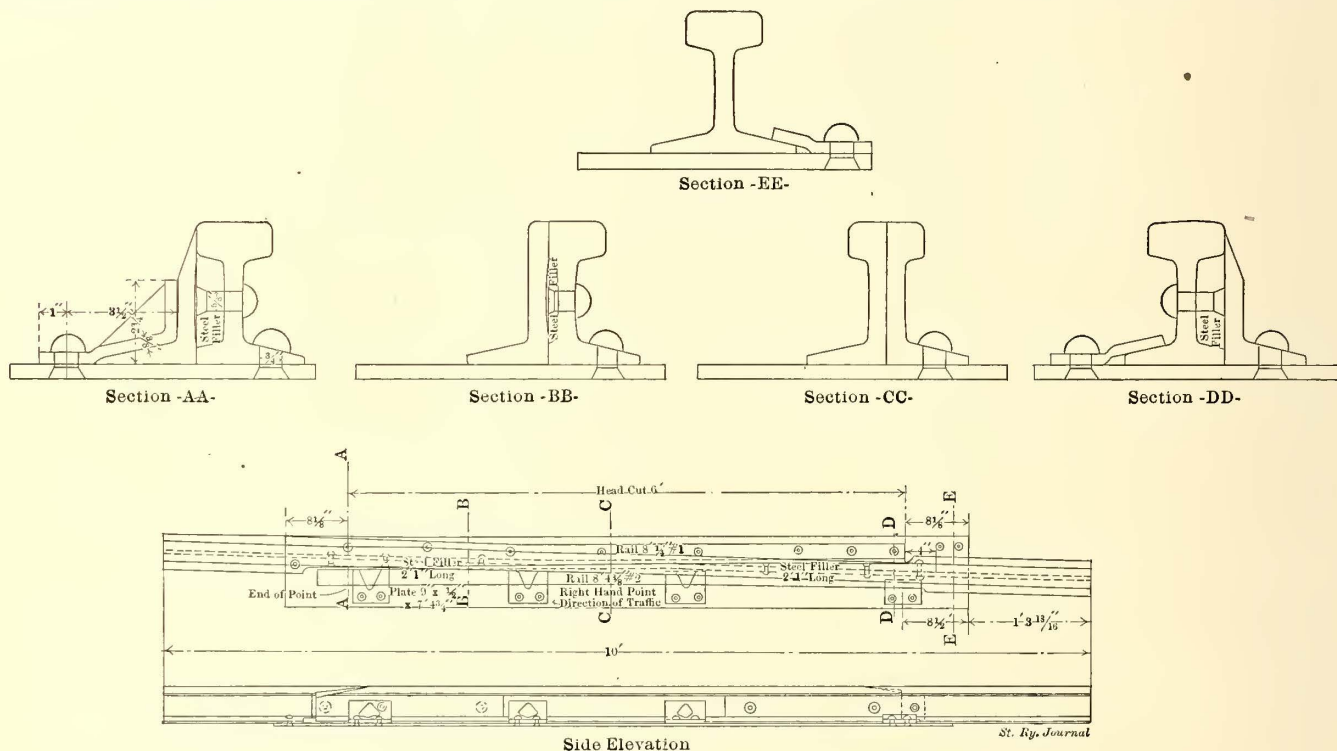
Details are now available of the contract placed by the Brooklyn Rapid Transit Company through the Transit Development Company for additional turbine units for installation in the addition to the company's Kent Avenue plant, as briefly mentioned in the STREET RAILWAY JOURNAL for Dec. 15, 1906. Not only is this the largest single order ever placed for turbines, but the units are the largest so far on record. Besides the five 10,000-kw units before mentioned the order includes a large amount of converting, transforming and controlling apparatus, all to be manufactured by the Westinghouse interests.

In compactness, the unit establishes a new standard. Over all the turbine measures 24½ ft. in length, 15 ft. in width, and 12¼ ft. in height above the floor level. This is equivalent to 3.8 bhp (rated) per square foot occupied, or

Speed variation may be adjusted to a nicety by a distant control mechanism attached to the governor and operated from the switchboard. Close regulation may be obtained if desired when running alone, and when running in parallel with other machines the regulation may be changed to 3 per cent or 4 per cent if found desirable.

In the construction of the generator the standard rotating field design will be employed with frame entirely enclosed so as to facilitate forced ventilation and incidentally obviate the noise emanating from high-speed turbines. Current may be delivered at 6600 or 11,000 volts according to the method of connecting the windings.

In spite of the compactness of these large units, the surface condenser will be located, as usual, directly beneath in the power house basement, together with all of the condensing auxiliaries, thus giving a clear engine room floor. This arrangement likewise permits of the most effective



EXPANSION RAIL FOR 70-LB. A. S. C. E. SECTION.

5.67 bhp maximum; conversely the turbine requires 0.026 sq. ft. per rated bhp, or 0.018 sq. ft. per maximum bhp. The combined unit measures approximately 48½ ft. in length, equivalent to 0.075 sq. ft. per kilowatt rated, or 0.049 sq. ft. per kilowatt maximum.

The turbine equipment is designed for a steam pressure of 175 lbs. at the throttle, 100 degs. superheat and 28 ins. vacuum. Under these operating conditions assumed, the units are capable of sustaining their full rated load continuously with a temperature rise of 35 degs. C. with power factor ranging from 90 to 100 per cent. In the event of loss of vacuum, accidental or otherwise, the turbines will automatically "go to high pressure," carrying their full rated load without the assistance of a condenser. This feature will be obtained through the use of a secondary admission valve of construction similar to the primary valve and operated by the governor in such a manner as automatically to come into operation when the overload upon the machine reaches a certain point. The action of this valve is to raise the pressures in the various stages and thus increase the capacity of the machine.

means of carrying out the "unit system" in power plant design which is so important in securing the best arrangement of boiler plant.

**T-RAIL WELDING WITH EXPANSION JOINTS**

In the paper on "Electrically-Welded Joints" presented by P. Ney Wilson at the Jan. 11 meeting of the Street Railway Association of the State of New York, he mentioned that the Lorain Steel Company had recently welded T-rails with expansion joints, and presented a blue print from which the accompanying cut was made. The first T-rail which the company welded, in which expansion joints were used, was in Brooklyn, on 1000 ft. of old 65-lb. rail on the West End Line to Coney Island, in October, 1905. Only one rail was welded, and ordinary split switch points were used at the ends of the 1000-ft. section. During the summer of 1906 the company welded about 2 miles of third rail on the Canarsie extension of the Brooklyn elevated lines. This was 85-lb. A. S. C. E. rail and was welded up in sec-



tions 1000 ft. long with nosings at the ends. The company also welded the new rail on the north and south roadways of the Brooklyn Bridge when the track was renewed last October. In this case five expansion joints, of a type similar to the Lorain, were used in each rail. The longest stretch of T-rail welded is about 6 miles on the River Point Line at Providence, R. I. In this expansion joints were furnished every 1000 ft.

The joint shown herewith is an improvement on the type used in Providence, which had a number of separate plates for holding the two rails together, instead of one plate extending the full length of the bevel cut. It is considered that this form of joint should give excellent satisfaction, in view of the fact that there is no thrust against the point rail as in the case of a split switch, so there will be no great amount of wear against the point.

So far the results on all the T-rail welded have been very satisfactory. In Brooklyn there have been no breaks at all and out of 1500 joints in Providence there have been but two breaks, which were plainly due to old fractures in the rails.

◆◆◆

### PROGRESS ON ELECTRIC ENGINEERING BUILDING OF THE WORCESTER POLYTECHNIC INSTITUTE

The construction of the new electrical engineering building of the Worcester Polytechnic Institute is well advanced and the building is expected to be ready for the accommodation of students during the spring of 1907. As previously noted in the STREET RAILWAY JOURNAL, the cost, exclusive of equipment, will be about \$125,000. The ground floor will contain recitation rooms, special high-potential laboratories, etc. The feature of the building is the general laboratory. This will be some 200 ft. in length and 55 ft. wide and will contain three galleries. This laboratory will be served by a 10-ton electric traveling crane covering the entire central portion of the laboratory between the galleries. The galleries will be served by an 8-ton trolley hoist covering their entire length. In the east wing on the main floor will be located the department offices and the library and reading room with a capacity of more than 3000 volumes. In the west wing will be located a lecture hall with a seating capacity of 300 persons. In the east wing above the department library and offices will be located the electrical engineering design room, blue print room, recitation room and offices. Power for the new building will be supplied at 220 volts from the power laboratory of the institute, where have recently been installed three series units which are in charge of the electrical engineering department.

Besides the general equipment of generators, motors, transformers and other apparatus there will be provided a complete equipment of electric railway apparatus, partly of standard equipment and partly of special design. Two tracks connecting with the local street way system and in that way with the suburban and interurban railways of New England will afford ample facilities for tests of electric railway apparatus. One of these tracks will in fact be fitted with a pit for its entire length, so as to offer facilities for inspection of motor equipments. The second track enters a test plant. Here will be provided facilities for dynamometer and other tests. There will be provided for the use of the student a complete double-truck

four-motor interurban car, fully equipped with special apparatus and available for test work either upon the stand in the laboratory or on the electric lines with which the laboratory tracks connect. Besides the equipment mounted on the car the laboratory will contain various types of motors, brakes, control and signal apparatus.

The building was planned by members of the department of electrical engineering at the Institute. Messrs. Peabody & Stearns, of Boston, are the architects, and Prof. A. W. French, of the department of civil engineering, the consulting engineer and superintendent of construction.

◆◆◆

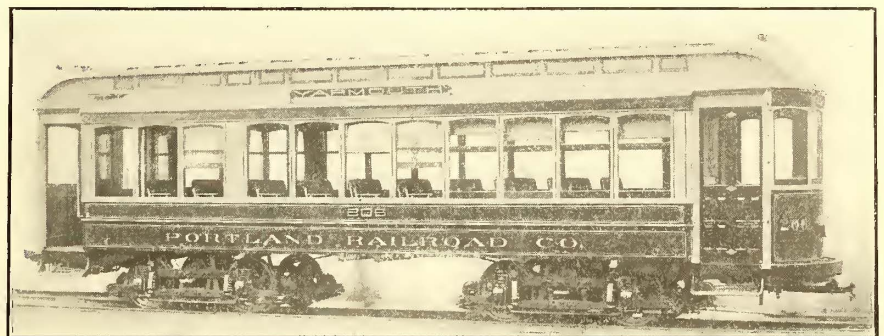
### NEW COMBINATION CARS FOR PORTLAND, MAINE

A notable addition to the rolling stock of the Portland Railroad Company is a number of combination passenger and smoking cars built by the J. G. Brill Company, and including that company's grooveless-post semi-convertible window system. This lot of cars follows closely on a con-



INTERIOR OF COMBINED PASSENGER AND SMOKING CAR FOR PORTLAND

signment of four double-truck closed cars which lately left the works of the John Stephenson Company. Brill semi-convertibles are largely used on the Portland Railway Company's system, and are found to be particularly well adapted for handling the big excursion travel to the many nearby resorts. The new combination cars will run over the Yarmouth division. They are mounted on No. 27-E1 trucks with a wheel base of 6 ft. The interiors are of mahogany;



EXTERIOR OF PORTLAND CAR

ceilings of quartered oak. The company is a large user of plush covering for seating purposes and the cars in the present instance were upholstered in this manner. Arm rests are provided. The chief dimensions are: Length over end panels, 31 ft. 8 ins., and over vestibules, 41 ft. 1 in.; width over sills, including sheathing, 7 ft. 8½ ins.; over posts at belt, 8 ft.; the side sills are 4 ins. x 7¾ ins.; end sills, 5¼ ins. x 6⅞ ins.; sill plates, ¾ in. x 12 ins.



## FINANCIAL INTELLIGENCE

WALL STREET, Jan. 23, 1907.

### The Money Market

Increasing ease characterized the local money market in all its branches during the past week. The unusually heavy inflow of money from all parts of the country was reflected in a much freer offering of funds for all maturities, and this, together with a much smaller demand resulting from the heavy liquidation in the securities market, caused rates for both call and time loans to recede sharply. Money on call was in abundant supply at from  $4\frac{1}{2}$  to 2 per cent, the latter figure being the lowest point reached in nearly a year. Time loan rates declined  $\frac{1}{2}$  per cent for all periods extending from sixty days to six months, accommodations for the short dates being obtainable at 5 per cent, while six months' money was offered in quantity at  $5\frac{1}{2}$  per cent. Mercantile paper reflected the lower rates for time money, sales of exceptionally good names being made as low as  $5\frac{1}{2}$  per cent. The general market quotation, however, was about  $5\frac{3}{4}$  and 6 per cent. Specialists in mercantile paper reported a better inquiry on the part of the New York banks and also at all of the leading interior points. The position of the banks has been materially strengthened by a further heavy return movement from the interior, the gain from this source and from the Government amounting to more than \$18,000,000 during the week ending Jan. 19. Since that time the local institutions have gained \$1,559,000 from the Sub-Treasury, not including \$1,000,000 transferred to this city from San Francisco. All indications point a continued heavy influx of money from the interior for some weeks to come, but at the same time the opinion prevails that no further reduction in rates will be made at this time. It is pointed out that on Feb. 1 the national banks will be called upon to repay to the Federal Treasury part of the special deposits made by Secretary Shaw several months ago, and in addition to this the demand for money from railroads and other corporations will be sufficiently large to maintain rates at the present level. On Feb. 1 the city of New York will offer for sale \$30,000,000 bonds, which also must be provided for. During the week announcements have been made of further borrowings by some of the larger railroads, the most important of which was that of the Southern Railway Company, which placed \$15,000,000 three-year 5 per cent notes, all of which were taken by a well-known banking house at 97 and interest. The European markets have improved considerably. Following the reduction in the Bank of England discount rate to 5 per cent the Imperial Bank of Germany announces a reduction in its discount rate from 7 to 6 per cent, the former rate having been in force since Dec. 18 last. The market for sterling exchange has ruled firm, owing to the ease in the local money market, but rates have not changed appreciably.

The bank statement published on last Saturday made an extremely favorable exhibit; loans increased \$15,148,600, due largely to the transfers of loans from Europe to New York. The increase in cash was \$18,198,000. The reserve required was \$8,378,000 larger than in the preceding week, which, deducted from the gain in cash, resulted in an increase in the surplus of \$9,820,000. The surplus now stands at \$18,460,700, and compares very favorably with the surplus reserves in the corresponding periods of former years. In 1906 the surplus was \$16,764,575; in 1905, \$23,733,800; in 1904, \$26,072,675; in 1903, \$26,414,975 and 1902, \$25,332,400; in 1901, \$27,256,600, and in 1900, \$24,185,675.

### The Stock Market

Transactions on the Stock Exchange assumed much larger proportions during the past week, but the increased activity was generally at the expense of values. Such favorable factors as a further pronounced relaxation in rates for money both here and abroad, the continued heavy earnings reported by the railroad companies, and a further advance in the price of copper metal, were entirely ignored. One of the principal influences working for lower prices was the apprehension in some quarters that the present easy condition of the money market would be only

temporary, and that the requirements of the railroads for new equipment, etc., might result in higher interest charges for all classes of accommodations in the near future. This, together with rumors of the serious illness of a prominent financier, resulted in heavy selling by the professional element and forced liquidation by some of the pools, which carried prices materially below those prevailing at the close of last week. The Erie issues were weak on reports that the company would enter the money market as a borrower, coupled with the statement that the underwriting syndicate of the Erie "B" bonds had been dissolved and that the members had been compelled to take the greater portion of the issue. The failure of the Amalgamated Copper directors to increase the dividend rate caused a sharp decline in the price of the Copper stocks, and rumors that the dividend on United States Steel common would not be changed influenced considerable selling of the iron and steel shares. Toward the close of the week prices recovered somewhat, but the market was in a very unsettled condition. The Hill stocks were well supported throughout the week, and St. Paul, Union and Southern Pacific were conspicuously strong. The announcement of the decision of Judge Harlan in restraining the Great Northern from issuing \$60,000,000 of new stock until such time as the company may secure the approval of the State Railway Commission, caused a decline of several points in the Great Northern and Northern Pacific stocks. The technical position of the market has been greatly improved by the heavy liquidations, and a recovery in prices is warranted, or short covering, if nothing else. Saturday's bank statement was a remarkably good one, showing an increase in cash of more than \$18,000,000, a record which has seldom been exceeded in any one week. The reductions in the official discount rates by the Bank of England and the Imperial Bank of Germany reflects the easier monetary conditions abroad, and will no doubt tend to partially offset whatever hardening there may be in money rates here.

The local traction stocks have been in line with the general market. Interborough and Brooklyn Rapid Transit were under pressure at times and yielded sharply, but in the late trading there were substantial recoveries. It is expected that the advertisements for the construction of the subway loop between the Brooklyn and Williamsburg Bridges will appear within two months. It is understood that the Brooklyn Rapid Transit has offered to pay 4 per cent for the privilege of running their cars through the loop; 3 per cent of which will go to pay the interest on the bonds, and the other 1 per cent to go to the Sinking Fund, as required by law.

### Philadelphia

Dealings in the local traction shares assumed much larger proportions during the past week, and were attended with sharp recovery in prices for all of the active issues. The weakness which characterized the market on the closing days of last week was still in evidence at the beginning of the current week, but at the close the announcement of a settlement of the traction controversy was the signal for general buying which advanced prices sharply. The plan, among other things, provides for an assessment of \$20 a share on Philadelphia Rapid Transit, thus making the stock full paid, payments to be extended over a period of two years. This will give the company about \$12,000,000 for completion of the Market Street subway and extensions. Philadelphia Rapid Transit stock was the overshadowing feature of the trading, about 35,000 shares changing hands. After a weak opening at  $19\frac{1}{2}$ , the price moved up to  $20\frac{7}{8}$ , but at the close there was a further advance to 24. The improvement was extended to Union Traction, which rose from  $54\frac{1}{2}$  to  $60\frac{3}{4}$  on the exchange of about 1400 shares. The other traction issues were extremely quiet and without important price changes. Transactions included Consolidated Traction of New Jersey at  $76\frac{1}{4}$  and 76, Indianapolis Street Railway at 115, Philadelphia Traction at 94 to 96, Philadelphia Company at  $46\frac{3}{4}$  and  $47\frac{1}{2}$ , Philadelphia Company preferred at  $47\frac{1}{2}$ , Frankfurt & Southwark Passenger at 420 and American Railways at  $50\frac{3}{4}$ .



**Baltimore**

Trading in the traction issues at Baltimore was rather quiet, but prices generally held firm. United Railway incomes furnished the principal feature in point of activity, upwards of \$75,000 changing hands at 58¾ and 58½. United Railways 4s sold at 89¾ and 90 for small amounts, and an odd lot of the free stock brought 13. Norfolk Railway & Light 5s were a shade firmer, \$10,000 selling at 98 and 98¼. Other sales included Baltimore City Passenger 5s at 103¾, Macon Railway & Light 5s at 95½, Knoxville Traction 5s at 106¾, and Richmond Traction 5s at 105¾.

**Other Traction Securities**

The most important development in the Chicago tractions was the action of the directors of the Metropolitan West Side Elevated in resuming dividend payments on the preferred stock. On Monday the board declared a regular quarterly dividend of three-quarters of 1 per cent on the preferred stock, payable on March 30. This is the first dividend declared by the company on the preferred stock since Feb. 28, 1903, when 1½ per cent was paid for the half-year. The annual meeting of the company will be held on April 4. The transfer books will close on March 21, and will reopen on April 5. Trading was extremely dull and uninteresting, the stocks of the various surface lines being entirely neglected. Metropolitan Elevated common brought 27 and 27½, while the preferred stock fluctuated between 71¾ and 70½. The extension bonds were active at 84 and 84½. South Side Elevated brought 89½. The Boston market was decidedly irregular. Boston & Worcester common, after selling at 26½, dropped to 25 and then recovered to 25½. About 1000 shares were traded in. Massachusetts Electric advanced from 19 to 20, but later lost all of the gain, while the preferred stock, after changing hands at 70, dropped to 68. West End common sold at prices ranging from 90½ to 92½, and the preferred sold at 108 and 107.

Cleveland Electric continued to be a feature of interest on the Cleveland Stock Exchange the past week. The figures varied several points at different times, but did not show any tendency to return to their place before the holding plan was suggested. Washington, Baltimore & Annapolis stands at about the same figure, with closing quotations Tuesday of 11 bid and 12 asked on the stock-pooling certificates. Syracuse Rapid Transit 5s had some inquiries during the week, closing at 96 bid and 101 asked; Cleveland Electric 68 bid, 70 asked.

**Security Quotations**

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

	Jan. 16	Jan. 23
American Railways .....	51	50½
Boston Elevated .....	a151	151
Brooklyn Rapid Transit .....	81	76¾
Chicago City .....	160	160
Chicago Union Traction (common).....	5½	5
Chicago Union Traction (preferred).....	17¼	17
Cleveland Electric .....	71	68
Consolidated Traction of New Jersey.....	75½	75½
Detroit United .....	80	80
Interborough-Metropolitan .....	36¼	36½
Interborough Metropolitan (preferred).....	73½	72½
International Traction (common).....	a62	a62
International Traction (preferred), 4s.....	82½	82
Manhattan Railway .....	142¾	142¾
Massachusetts Electric Cos. (common).....	19	19
Massachusetts Electric Cos. (preferred).....	69½	68¾
Metropolitan Elevated, Chicago (common).....	27	29
Metropolitan Elevated, Chicago (preferred).....	70	70
Metropolitan Street .....	105½	—
North American .....	89	85½
North Jersey Street Railway .....	40	40
Philadelphia Company (common) .....	46¾	46½
Philadelphia Rapid Transit .....	19¼	22¾
Philadelphia Traction .....	94	95¾
Public Service Corporation certificates .....	67	67
Public Service Corporation 5 per cent notes.....	96	96
South Side Elevated (Chicago) .....	89	85

	Jan. 16	Jan. 23
Third Avenue .....	121	116
Twin City, Minneapolis (common).....	107½	105
Union Traction (Philadelphia) .....	55¾	59½

a Asked.

**Metals**

The "Iron Age" says, there is distinct evidence, notably in the New York market, of eagerness on the part of some sellers of pig iron to secure business for spot and for early delivery, and the market is weaker, with lower prices accepted for what little business there is. Unless weather conditions prove adverse, there is the prospect that the famine is over. It appears, too, as though shipments from the Birmingham district are improving, at least to tidewater markets. Buying for delivery during the second half has continued on quite a good scale. Sales of steel rails aggregate about 75,000 tons during the week. The outlook for structural material is promising.

Copper metal continues strong, at a further advance of ¼c a pound for all grades. The new quotations are: Lake, 24¾c to 25c; electrolytic, 24½c to 24¾c; castings, 24¼c to 24½c.

**EMBARGO ON ELECTRICS RAISED BY STEAM LINES**

The statement was made in Chicago Jan. 19 that the steam railroads in the territory of the Central Passenger Association have decided to discontinue their boycott against their electric competitors, and that as a result of a conference with D. G. Edwards, vice-president of the Schoepf properties in Indiana and Ohio, having about 1200 miles of track, the passenger officials of the steam roads have decided to abrogate their agreement not to interchange traffic with electric lines. The electric lines had agreed to notify the Interstate Commerce Commission of the boycott declared against them by the steam roads, and ask that body to enforce that section of the act to regulate commerce which requires all carriers to interchange traffic.

**T. P. SHONTS ELECTED PRESIDENT OF THE METROPOLITAN-INTERBOROUGH COMPANY—OTHER CHANGES**

The Interborough-Metropolitan Company, of New York, announced Wednesday afternoon, Jan. 23, that it had secured, with the consent of President Roosevelt, the services of Theodore P. Shonts, chairman of the Isthmian Canal Commission, who will come to New York and take the presidency of the Interborough-Metropolitan Company, assuming charge of the whole subject of transportation now covered and to be covered by the constituent companies of the system. This has been accomplished by Mr. Belmont because he felt that the subject was one to which a man must give his entire time and undivided attention, his large business interests making that impossible. Mr. Belmont, however, will become the chairman of the board of directors, and the company will have the benefit of his general supervision and co-operation. Mr. Belmont in like manner and for the same reason has taken the chairmanship of the board of the Interborough Rapid Transit Company, and Mr. Bryan has been elected president, Mr. Bryan and Mr. Vreeland thus continuing to be the chief operating officers in charge of the two principal companies. John B. McDonald has been elected vice-president of the Interborough-Metropolitan Company, to have general supervision of the construction of new subways.

Mr. Shonts, when appointed to the position of chairman of the Canal Commission, was president of the Toledo, St. Louis & Western Railroad, a place he had taken only a year before. He had gone into the executive control of the Clover Leaf Railroad after more than twenty years of service with the Indiana, Illinois & Iowa Railroad, during which his reputation as a railroad man was established. When he became chairman of the Canal Commission he continued to hold his place as executive head of the Clover Leaf for some time. Mr. Shonts will, at present, give as much attention to the affairs of the Interborough Company as his time will permit, and after March 4, when the president will definitely release him, he will come to New York and enter actively upon his duties.



## PENNSYLVANIA'S GOVERNOR ON THE ELECTRIC RAILWAYS—SOME PROPOSED LEGISLATION

A number of the expected measures affecting electric railway interests in Pennsylvania have reached the Legislature. In connection with them, one thing is certain; this is, that all reasonable measures will receive the support of Governor Edwin S. Stuart, who was inaugurated Jan. 15. In his inaugural address, Governor Stuart went on record as favoring certain legislation for the electric companies, as evidenced in the following extracts:

"I most earnestly recommend the enactment of legislation to confer upon trolley companies, under proper supervision and control, the right to carry freight. The early passage of a bill to this effect is most desirable. Such a law will enable the farmer to market his products more cheaply, and will enhance the value of countless farms through reduced expenses and increases facilities."

Concerning the proposal to confer upon trolley companies right of eminent domain, the Governor says: "Properly guarded, the exercise of such power may be highly advantageous to the public. It has its dangers, which must be carefully looked into and avoided as far as possible. If by this means it is made more practicable for future trolley lines to avoid the public highway and build over private property, a double purpose will be served. It will protect and maintain free roads for the unrestricted use of the public, while making travel on such roads safer for the driving community. This subject is submitted for the thoughtful consideration of the Legislature."

On the subject of rate discrimination he says: "Another important question which confronts the Legislature is the propriety or necessity of creating a State Railway Commission, to prevent discrimination or favoritism by common carriers within the State, with powers similar to those conferred upon the Inter-State Commerce Commission for the regulation of inter-State transportation, or such other powers as the General Assembly may designate. This tribunal would be useful in promoting needed facilities, remedying abuses and adjudicating all State questions touching transportation."

"In the preparation of legislation upon this subject care should be exercised to keep within legitimate limits. I do not believe that it is the intention or desire of the people of the State unnecessarily to harass, annoy, or attempt to destroy corporations; for these have their rights under the law the same as individuals, and those rights must be respected."

"It should be our purpose not to attempt to destroy or tear down, but to regulate. In other words, corporations receiving rights and powers from the State should be compelled to exercise those rights and powers, not for their own benefit solely, but in the interest and for the accommodation of the public from whom they receive their charters."

The Governor "most earnestly recommends legislation that will secure a rate not exceeding 2 cents per mile upon all railroads within the Commonwealth, and such further legislation as will require the sale of mileage books at a rate not exceeding 2 cents a mile, without the requirement of a \$10 deposit, and without any other obnoxious regulation or restriction attached."

Measures affecting transportation corporations have already been introduced as follows:

Providing for a maximum charge of 2 cents per mile on all railroads of the State, the maximum charge for children under twelve years of age to be 1 cent per mile, and free transportation for children under six years of age, when accompanied by a person paying fare. All tickets must be good until used and on any train scheduled to stop at the station for which ticket has been purchased. Excursion tickets may be limited as to time of expiration.

Providing for the creation of a Board of State Railroad Commissioners, which shall have authority to supervise all carrying companies and to make thorough investigations into the acts of all such companies in the State.

Providing for the regulation of rates of transportation of freight on railroads and prohibiting discrimination in rates for long and short hauls. The State Grange (an agricultural organization) is backing this measure.

Providing for the proper sanitation of railway cars.

Providing that any street railway company or any traction

motor company, which has leased any street railways wholly or in part, shall be permitted to carry freight and to charge a reasonable compensation therefor. All limitations of charters on this subject are repealed in this bill, the only provision being that the act is subject to the regulations of municipal councils.

Requiring railroad companies to publish their train schedules in at least three newspapers in each county they traverse.

Providing for the enlargement of the powers of Common Pleas Courts or Courts of Equity, to decree the forfeiture of rights and privileges of any corporation occupying any highway whenever the company shall have "violated, neglected or failed to keep any of the conditions, stipulations or agreements imposed, or under, or upon which the consent of a municipality to occupy highways was given or obtained." The same course of action is provided by the measure if any public service corporation shall fail or refuse "to properly perform any of the corporation functions, obligations or duties for which it was incorporated, or the duties which are essential to the service for which it was organized." The court can either decree forfeiture or fix a time for corporations to comply with their obligations, the decree not to affect charter rights or franchises.

Providing for the taxation of corporations to the extent of 10 mills upon each dollar of the actual value of whole capital stock of all kinds, one-half the revenue obtained to be returned to the various counties for support of schools and the relief of local taxation.

Providing that corporations shall be held responsible in damages for personal injury to an employee, when such employee had exercised due care at the time of the accident, and when such accident is caused by any defect in machinery used. That all persons in control of signals, switches, locomotives, trains or telegraph offices at the time of accident shall be deemed "vice principals," and that where any fact of defect in arrangements or machinery is shown, it shall be taken as prima facie evidence of neglect.

Requiring transportation companies to equip their cars with enclosed vestibules for the better protection of employees in cold and inclement weather.

## THE PLANS FOR A FOUR-TRACK LINE BETWEEN BUFFALO AND NIAGARA

Henry J. Pierce, president of the International Railway Company, is quoted as follows regarding the Frontier Electric Railway, a subsidiary of the International Company.

"The Frontier Electric Railway Company has been organized as a subsidiary company of the International Railway Company, which will own all of its stock. The new company will construct a modern high-speed, double-track electric railway, mainly on its own right of way, from Buffalo to the entrance of the new bridge, for which charters have already been obtained from the State of New York and the Dominion of Canada, and which will be built over the Niagara River, the American approach of which will be at the foot of Niagara Street, in Niagara Falls, N. Y. It is proposed to double-track the existing line between Lockport and Tonawanda, not only to take care of the ever-increasing traffic from Lockport to Buffalo and Niagara Falls, but also to provide for the very large increase in traffic which will immediately follow the completion of the electric railway now being constructed between Rochester, Brockport, Medina, Albion, Middleport and Lockport.

"The new railway company will also make connection at the new bridge at Niagara Falls with the fast electric railroad owned by the Mackenzie-Mann-Nicholls syndicate, running from Toronto through Hamilton to Niagara Falls, the rights of way for which have been acquired and the contracts for the construction of which are now about to be let. Upon the completion of the new line between Buffalo and Niagara Falls, the International system will have the only four-track interurban electric railway in the world. It will only be a matter of months when passengers from Toronto and Hamilton and from Dunkirk and Erie will be brought without change of cars into the heart of the city of Buffalo."

The Trans-Niagara Bridge Company was incorporated at Albany early last year with \$1,000,000 authorized capital stock, to construct the aforesaid bridge across the river at Niagara Falls, 300 ft. below the present upper steel arch bridge. The bridge, it is said, will cost about \$800,000.



## RIGHTS SOUGHT TO OPERATE IN ST. LOUIS

The Central Interurban Traction Company was incorporated Friday, Jan. 18, and immediately asked the Municipal Assembly for a franchise to operate a 3-cent fare system in St. Louis. The capital stock of the company, as shown by the incorporation papers, is \$50,000. The incorporators are Charles A. Gutke, formerly a member of the House of Delegates, who owns 460 of the 500 shares; Lee A. Hall, an attorney, ten shares; John A. Laird, an engineer, formerly connected with the water department, ten shares; Samuel J. Will, of Jefferson Barracks Station, ten shares, and John G. Clark, of New York, ten shares. Mr. Laird, speaking for the company, said the railway for which a franchise was asked was expected to form a connection for the Hillsboro, Kimmswick & Northern Railway, of which Mr. Gutke is president, and which received a franchise Thursday, Jan. 17, from the St. Louis County Court to run an electric railway on the Lemay Ferry Road, south from the city limits.

The bill to grant the franchise was introduced by Andrew Gazzole, Jr. He declared that a man he had never seen before accosted him in the chamber of the House before the meeting, handed him the bill and asked him, as chairman of the railroad committee, to introduce it. Besides the clause providing for eight adults tickets for 25 cents it is stipulated that six children's tickets shall be sold for 10 cents.

The railroad agrees to build a new viaduct across the Mill Creek Valley at Ewing Avenue, and to turn it over to the city for public use, and to build a bridge over the River Des Peres, near the southern limits of the city, under similar conditions. After Jan. 1, 1935, the city can buy the road, if it wishes, on an agreed valuation by appraisers appointed for both sides. In addition the company offers \$250,000 for the franchise.

The route of the railroad as set forth in the bill brings it into St. Louis by the bridge over the River Des Peres. The road is to be confined to the southern end of the city, running no further north than Wash Street. It is to go no further west than Morganford Road in the South Side, or than Ewing Avenue in the central part of the city.

## CLEVELAND & SOUTHWESTERN MEETING—CHANGE OF NAME

At the annual meeting of the Cleveland & Southwestern Traction directors at Berea last week, action was taken resulting in a change of the name of the new merger company from the Cleveland & Southwestern Railway Company to the Cleveland, Southwestern & Columbus Railway Company, indicating that the intention is eventually to build the road into the Capital City or make such connections as will insure a through route. With the Cleveland, Ashland & Mansfield built, the company will be able to reach Bucyrus, to which an extension of Columbus, Delaware & Marion is now being constructed. It seems that this would probably be the best route that could be chosen, on account of the amount of building already done, but it is not known whether the two companies will be able to co-operate or not, or whether the Cleveland, Southwestern & Columbus could secure the line by lease or purchase. If the company should decide to build a line a shorter route would be from its southern terminus, Wooster, through Mt. Vernon to Newark, where some arrangement might be made with the Indiana, Columbus & Eastern, or from Mansfield or a point near there on the new line under construction through Mt. Vernon to Newark, or from Mansfield through Mt. Gilead and Delaware to Columbus. And one of the three would make a direct line for fast passenger and freight service.

In the organization of the new company provision was made for \$5,000,000 bonds more than needed for the consolidation. At the time it was said that these bonds would be retained in the treasury for future extension, but the directors probably had the plan just mentioned in view when the provision was made. President Pomeroy has refused to say anything in detail, more than the change in name would indicate, so the intentions of the officers and directors cannot be ascertained at this time.

The report of the president showed gross receipts of \$645,849.95, a gain of \$102,623.20 over 1905. The operating expenses were \$363,856.39, leaving net receipts of \$281,993.56, showing a gain of \$53,020.65. Deducting taxes and interest leaves \$102,741.86 for stock, a gain of \$26,461.64 over the previous year. In his report President Pomeroy referred to the reorganization and the fact that the company was about to enter upon a broader

field of activity, but did not say anything about the change of name.

The officers were re-elected as follows: President, F. T. Pomeroy; vice-president, A. E. Akins; second vice-president, S. C. Smith; secretary, E. F. Snyder; treasurer, J. O. Wilson; assistant secretary, H. B. Cavanaugh. C. N. Wilcoxon was continued as general manager of the road.

## B. R. T. COMPANY'S EMPLOYEES ENTERTAINMENT

The annual entertainment of the employees of the Brooklyn Rapid Transit Company, provided under the auspices of the Brooklyn Rapid Transit Benefit Association, was brought to a close this week, the last performance being given Saturday night. As heretofore, the performances were all given in the central club house at East New York, the features of which for such purposes have been described in the STREET RAILWAY JOURNAL before. This time, however, the scope of the entertainment was changed, and instead of extending over a week the performances were repeated every evening for two weeks, beginning Monday, Jan. 14, with special matinees in the afternoon. The entertainment, which was vaudeville in its nature, and included some of the best local New York talent, was absolutely free to the employees, transportation even being provided to and from the club house. The schedule of entertainment was so arranged that different departments were in attendance different nights, so as to avoid seriously taxing the accommodations. Despite inclement weather the attendance was very large, and Secretary Edwards, of the association, is well pleased with the working of the plan extending the program over two weeks. On Thursday evening of each week the regular uniformed band of employees was in attendance and rendered a program of classic and popular selections. Dancing also was a feature of these evenings, the band furnishing the dance music.

In this connection the association has announced a unique entertainment for Washington's Birthday, to be given at the East New York building. In it company talent only will appear, and, to enliven interest, prizes will be awarded to the performer who, in the eyes of competent judges, make the best showing.

## HOW THE OHIO LAW REQUIRING INTERURBAN COMPANIES TO PROVIDE STATIONS WILL BE INTERPRETED

O. P. Gothlin, member of the Ohio Railroad Commission, in an interview granted a representative of the STREET RAILWAY JOURNAL, informally outlined the position of the Commission, relative to the section of the new Ohio railroad law, requiring the erection and maintenance of suitable stations at all regular stops, as applied to the interurban roads of Ohio.

He said it would be manifestly unreasonable to expect interurban roads to erect and keep properly cleaned and heated stations at all the stops they make, and for this reason it is probable that a liberal interpretation of the law in this respect will be made, should the question ever be brought before the Commission. The ruling will probably define "regular stops" as meaning the principal stops in cities, towns and villages, and other stops, at street crossings, road crossings, farms, etc., to be designated as accommodation or flag stops. In this way the interurban roads will be obliged to maintain stations only in the towns through which they pass.

A literal interpretation of the law as regards interurbans, Mr. Gothlin said, would work a special hardship on roads that are required to make frequent stops at farms and road crossings by the terms of their franchises. Other interurban roads, that are not bound by such franchise requirements, would necessarily cut out a great many of the stops that they now make, and this would work a hardship and inconvenience to farmers and others who depend upon these roads to get to and from neighboring towns. Many of the interurban roads are voluntarily erecting small shelter houses at road crossings and other country stops.

Mr. Gothlin said the question of whether or not street railway companies, a portion of whose systems extend outside the municipal corporation lines, are legally under the jurisdiction of the State Railroad Commission, has not been decided. The Commission asked the Attorney-General of the State for an opinion on this subject some time ago, but has not received a reply.



## MR. ANDREWS AND MR. DUPONT CONFER ON CLEVELAND QUESTIONS

President Horace E. Andrews, of the Cleveland Electric Railway Company, and President A. B. Dupont, of the Municipal Traction Company, took up the consideration of the holding company plan at a meeting in Mr. Andrews' private office last Friday, and a few hours were spent Saturday by the two gentlemen also. While there is considerable anxiety upon the part of the city administration and the people that matters be brought to a focus as soon as possible, it is clear that but little was accomplished in the time they were at work, more than to map out a plan of operation. Secretary H. J. Davies, of the Cleveland Electric, was confined to his home all of last week by illness, and it was announced Saturday that not much could be done until he was able to return and furnish data for consideration.

The belief seems to prevail that the Cleveland Electric will refuse to consider a holding proposition on a stock valuation of less than 70. This, including interest on outstanding bonds, would bring the rental of the system to \$1,433,800 a year. With the rental on the Forest City line at \$120,000 a year would increase the amount to \$1,553,800. The bonds outstanding, \$9,026,000, draw 5 per cent interest. It is said that the holding company may propose to issue new stock and redeem the bonds, but if this should be done there would be no profit in the operation, as 6 per cent dividends would have to be paid on the stock.

According to the interviews of Mayor Johnson in the local papers at Cleveland, he adheres to the assertion that if the holding plan is adopted upon a 3-cent fare basis, it will never be any higher. He seems to have the greatest faith in the success of the low-fare plan financially, and always states that it will pay enough money to make fair dividends possible.

It is quite probable that little news will be made public regarding the progress of negotiations between Messrs. Andrews and Dupont until the work is completed. In fact, they both expressed the belief a few days ago that the publication of the matters discussed at their conferences might retard any progress they should make, or injure the success of any plans that should be adopted, until they are ready to report in detail.

## BENEFIT ORGANIZATION FOR INTERBOROUGH EMPLOYEES

The Interborough Rapid Transit Company, according to an announcement issued Monday, Jan. 21, has devised for the benefit of its employees a Mutual Benefit Association, which will bestow financial aid in case of accident, sickness or death. An important feature of the proposed association is an agreement under which the company will assume the payment of any deficiency in the relief fund which may develop. Thus, the corporation undertakes to care for the welfare of its employees and their families. Mr. Bryan has estimated that the fund will amount to about \$50,000 annually. The management of the association will be assumed by a superintendent and an advisory committee, in its choice of which the employees who are members of the fund and the board of directors of the company will have equal voice.

The statement sets forth that the rates of payment and the benefits are calculated upon a liberal scale. The employees are to be divided into three general classes, and their payments and benefits are to be graduated accordingly. The first class will be composed of men who receive less than \$35 a month. Those who receive a monthly salary of more than \$35 and less than \$75 will be included in the second class. The third class will be composed of all employees receiving more than \$75 a month. The monthly payments of the members will be 75 cents for the first class, \$1.50 for the second class and \$3 for the third class. The benefits will provide for cases of accident, sickness resulting from other causes, and for death of the members.

In the case of a motorman or conductor who is injured, the society will pay to him or to his accredited representative \$2 a day for the first fifty-two weeks. A benefit of 50 cents a day will be paid by the association in cases of sickness after the termination of the first six days, and not longer than fifty-two weeks, to members of the first class. Under the same arrangement, members of the second class will receive \$1 a day, and members of the third class \$2. The system includes a death-benefit plan, under the terms of which the members of the first

class may insure their lives to the extent of \$250, those of the second class \$500, and of the third \$1,000. The details concerning the distribution of the relief fund will be managed by the Interborough Company. There will be no charges against the fund for this work.

The inauguration of the relief department took place on Jan. 15. In order that old employees may enter the association under the most advantageous circumstances, persons who were in the service of the Interborough at the time of inauguration will be received as members without regard to age and without physical examination until July 1, 1907. After that time a system of examination will be introduced, and, in so far as death benefits are concerned, the age of the members will be taken into consideration upon a liberal basis.

## ELEVATED ROAD PROPOSED FOR RIO DE JANEIRO

One of the last acts of the retiring administration of Brazil was the granting of a seventy-year franchise to Carlos Schmidt and others, of Rio de Janeiro, for the construction of an elevated railroad to serve the city of Rio de Janeiro and its suburbs. Consul Anderson, of Rio de Janeiro, says the franchise was obtained for an American company, and represents a purely American enterprise, and present plans are that all the equipment will be purchased in the United States. The company, according to statements made by its projectors in Rio de Janeiro, was organized a short time ago in the State of South Dakota, and was capitalized at \$50,000,000. Charles E. Browne, of New York City, is its president. It is planned to send engineers and technical experts to Rio de Janeiro this month to commence the preliminary work. Within four years 13-5 miles must be in operation. Plans call for about 60 miles of right of way, which is to be double-tracked throughout. The third rail electric system will be used, motive power to be derived from the company's own plant or one of the two concerns now preparing to develop water power in the mountains near Rio de Janeiro. It is planned to establish a local and a through service for the benefit of the people living in the suburbs. For its privileges the company holding the concession must pay the municipality some \$16,000 per annum for the first year, \$20,000 per annum for the next thirty years, and \$23,000 per annum for the following thirty years.

## ROUTES APPROVED FOR SUBWAY IN PITTSBURG

Upon the condition that the Pittsburg Subway Company build its entire line from downtown to the East End, the committee on routes of the Rapid Transit Commission of Pittsburg Councils has approved the original route of the company, including the downtown loop from Grant Street and Oliver Avenue, down Oliver Avenue, along Liberty Avenue, Ferry Street, Third Avenue and Grant Street, to the place of beginning.

The ordinance presented by the company to Councils and referred to the Rapid Transit Commission, provided that the company should have the right to decide whether it should build the subway beyond Center Avenue and Neville Street extension. The company, in its ordinance, also reserved the right to decide whether it should build the branch line from the main tunnel at right angles to Forbes and Brady Streets and thence to the Twenty-Second Street Bridge.

The plans adopted by the routes committee provides that the company shall be required to build not only to Center Avenue and Neville Street extension, but to the far eastern terminus at Kelly Street and the Beechwood Boulevard in the Twenty-First Ward. It also provides that the branch to the Twenty-Second Street Bridge must be built in order to provide relief for the South Side. It gives the company the option of building or not building the branch to Bouquet and Bayard Streets in the Fourteenth Ward.

The subway to the East End, according to the route laid out by the committee of the Rapid Transit Commission, will circle the downtown section, and beginning at Grant Street and Oliver Avenue, will run eastwardly almost in an air line to a point in Neville Street extension, about 130 ft. north of the north line of Center Avenue. It will run thence across intervening properties to the intersection of Center Avenue and Enfield Street; thence underground along Center Avenue clear to Frankstown Avenue; along Frankstown Avenue to the first angle east of Finley Street, and thence in a straight line to Kelley Street and the Beechwood Boulevard.



## B. R. T. CONSIDERS SUBWAY LOOP IN NEW YORK

President E. W. Winter, of the Brooklyn Rapid Transit Company, had a long conference with Mayor McClellan on Monday, Jan. 21, regarding transit matters. It is understood that Mr. Winter told the Mayor that he was perfectly satisfied with the proposal to allow the Brooklyn Rapid Transit to operate its cars in the subway loop, to be built according to the McDonald plan, and stated that the only thing that was puzzling him in that regard was whether the engineers could arrange the grades so that it would be possible to run the cars off the elevated structure and into the subway. If this difficulty could be overcome, he intimated, everything would be all right, and the question of the inflammability of the company's present supply of cars, could be discussed later. It is also understood that the possible terms to be made for the franchise were discussed. The Brooklyn Rapid Transit Company hoped that the elevated loop would be built down Center Street. The opposition to the Center Street plan has been general on the New York side of the river, however.

The Board of Estimate, on Friday, Nov. 18, gave its final approval to the application made by the Nassau Railroad Company (controlled by the Brooklyn Rapid Transit) for a surface trolley system in Livingston Street, Brooklyn. The terms of the contract were referred to the Corporation Counsel for formal approval. The company agrees to pay the city 3 per cent of its gross receipts, with a surety deposit of \$10,000. The tracks in Livingston Street are designed to relieve the congestion in Fulton Street, which since the beginning of construction on the subway extension has been almost unbearable. The Board authorized the issue of corporate stock to the amount of \$49,000 for improvements in Livingston Street.

## PROPOSED TERMINAL CHANGES IN BOSTON

Advices from Boston received last week indicate that an important project is afoot in steam railroad circles with respect to the rehabilitation of the time-honored "Providence Station" in Park Square. It is proposed to remove the New York Central and Boston & Albany trains from the present South Terminal Station, and to bring them into the Park Square property, leaving the former terminal free for the New York, New Haven & Hartford service. Legislative authority will, of course, be necessary to enable such a plan to be carried out, and the advantages and disadvantages can be thoroughly threshed over only at the public hearings which will surely follow any formal steps in the direction indicated above.

These problems of urban terminal location and operation are of no little interest to the electric railway engineer, and chiefly for two reasons. The first is the possible redistribution of local trolley and third-rail traffic in the city itself, following the creation of new steam railroad terminal facilities in any section; and the second, the possibilities of solving existing terminal problems by recourse to electrification of present steam railroad suburban service.

It is too early to balance the arguments for and against the specific proposition outlined above, for much fuller information will certainly be forthcoming if the matter is seriously pushed by the interested railroads at the present session of the Massachusetts Legislature. At the same time it is certainly the tendency of these days to consolidate rather than to separate terminal stations, and in the light of what is being done in New York, it is difficult to call to mind any suburban service problem in Boston which cannot be better solved by electrification than by adherence to the steam locomotive regime. It has long been realized by electrical engineers that the Newton-Brookline circuit of the Boston & Albany Railroad offers one of the most attractive propositions in the country for electrification. Given a double-track loop about 20 miles in length, with stations approximately a mile apart, and a dense passenger traffic through one of the most beautiful residential regions in this country, a terminal station with an underground loop specially designed and completed for suburban service, and a river paralleling nearly half the trackage, with plenty of power house sites and ample condensing water, it would seem as though electrification would have a pretty strong case. At all events, it is to be hoped that the electrical side of the question will be thoroughly aired before any decision is reached which tends to perpetuate the reign of that anachronism of the highest urban civilization—the steam locomotive.

## KINGSTON PLANTS REPORTED DESTROYED

Cable despatches indicate that the power houses and lighting plants of the West India Electric Company, operating the street railway and lighting service at Kingston, have been entirely destroyed, and that the other physical property has suffered severely as a result of the disaster to the city. The company is owned almost entirely in Montreal. It has a capital of \$800,000 and \$600,000 of bonds. James Hutchison, of the Montreal Stock Exchange, is president.

## ADDITIONAL ELECTRICAL EQUIPMENT FOR THE WEST JERSEY & SEASHORE RAILROAD

Because of the increased traffic on the Camden-Atlantic City electric trunk line it has become necessary to add to the present rolling stock some twenty-one cars. Both the new cars and the generating apparatus to care for the extra load are similar to the present equipment. Each of the cars will be driven by a GE-69 (200 hp) double-motor equipment, and will be fitted with the Sprague-General Electric type M control.

At the Westville power house a fourth 2000-kw, 6600-volt, 25 cycle, three-phase Curtis steam turbo-generator will be installed. Additional boiler capacity with the necessary condenser and feed pumps, switchboards, etc., will also form a part of the new equipment, as well as a 75-kw, 125-volt, horizontal Curtis steam turbo-generator for excitation purposes. Three extra 700-kw, air-blast transformers will step-up the generator voltage to 33,000 volts for transmission.

Six 1000-kw rotary converters will be distributed in the substations; one each at South Camden, Glassboro, Newfield, Mizpah, Atlantic City and one at the Westville power house. The accompanying air-blast transformers for these machines have a capacity of 370 kw each, three being installed with each of these rotaries. The Pennsylvania Railroad has ordered all the additional apparatus, as outlined, from the General Electric Company, which also furnished and installed the initial equipment.

## NEW YORK SUBWAY CONTRACTS

The committee on plans and contracts of the Rapid Transit Commission has submitted, for the action by the full Board, a draft of the contract for the construction of the Lexington Avenue subway. This contract is drawn so as to provide two alternatives: for construction alone, and for construction, equipment and operation. The contract is prepared in accordance with the provisions of the Elsberg bill, and if approved by the corporation counsel and the Board of Estimate, will be adopted for all future routes.

The contractor is required to deposit \$1,080,000 if he bids for the construction of the entire route. This is about 3½ per cent of the contract price. For part of the road the deposit will be proportionate. This deposit will be returned when the road is accepted. A bond for an amount equal to the deposit will be required, to be canceled when the contract is completed, if the contract be for construction only. If the contract be for construction, operation and equipment, the bond will be continued to secure payment of rentals. Ten per cent of all payments will be held up until the work is accepted. This means that the city will have 17 per cent of the cost of construction as security for the proper performance of the contract.

The work will be divided into seven sections, and contractors may bid for one or more sections. Adequate pipe galleries will be installed throughout the route, with the exception of two short spurs. Owing to recent legislation it will be necessary to incorporate provisions for an 8-hour day and payment of the prevailing rate of wages to employees engaged in the construction work.

The operating rental will be the interest paid by the city on its bonds issued for construction purposes, plus 1 per cent. All bonds used in acquiring rights, purchasing land, etc., will be included in making the computation for rental purposes.

The equipment will include rolling stock, power houses, electrical devices, rails, ties and ballast. The city will have a lien on this equipment in case it should decide to declare the contract forfeited.

A clause is inserted in the contract which provides that the commission may order the operating company to add rolling stock and equipment when necessary, and change methods of operation.



## ST. LOUIS CAR COMPANY ORDERS IN 1906

No better index can be found to the output of a company for a year than a list of the more important contracts executed for that period. Such a summary of the work of the St. Louis Car Company of cars built for street railway and interurban use during the year just ended has been made available for the STREET RAILWAY JOURNAL, and is necessarily indicative of a large output in other branches of the industry. The summary follows:

American Railways Company, six 20-ft. closed-motor car bodies; twenty 20-ft. closed-motor car bodies; ten 30-ft. closed-motor car bodies.

Allegheny Valley Street Railway Company, Pittsburg, Pa., nine semi-convertible car bodies.

Fort Wayne & Wabash Valley Railway Company, two cars 40 ft. 6 ins.

Boston & Northern Street Railway Company, one sample car 33 ft. 11 ins., semi-convertible.

Birmingham Railway Light & Power Company, twelve fourteen-bench open trailer cars, ten motor cars, nine double-truck closed trailer cars.

Boston Elevated Railroad Company, one hundred cars 46 ft. 2 ins.

Columbus Railway & Light Columbus, Ohio, ten twelve-bench, open-motor car bodies.

Campania Nacional de Tranvias Elctrico, Lima, Peru, seven 34-ft. cars, one work car, one tank car.

Campania Tranvia Elctrico Lima A'Callao, Lima, Peru, one vestibule car body, two car bodies.

Campania de Tramways Elctrico Del Sud, Buenos-Aires, S. A., two vestibule passenger coaches.

Central Illinois Traction Company, ten 45-ft. interurban cars.

Coal Belt Electric Railway Company, Marion, Ill., two semi-convertible car bodies.

Central California Traction Company, four motor car bodies.

Chicago Union Traction Company, one hundred closed cars.

City & Elm Grove Railroad Company, five 34-ft. cars.

Centralia & Central City Traction Company, one car.

Dallas Consolidated Electric Railway Company, five thirteen-bench open car bodies, six 20-ft. cars.

Deka Development Company, Shawnee, Oklahoma, three 29-ft. car bodies, four twelve-bench open car bodies.

Detroit United Railways Company, three cars 41 ft. 2 ins.

Elgin & Belvidere Electric Railroad Company, six interurban passenger cars.

Evansville Suburban & Newburgh Railway Company, two combination passenger and baggage.

East Shore & Suburban Railway Company, Richmond, Cal., three Los Angeles type cars.

El Paso Electric Railway Company, four California type cars.

Horatio Valdez, five double-deck cars.

Illinois Traction System, Danville, Ill., five freight and express cars, twelve cars 40 feet 6 ins., three cars 61 ft. 6 ins.

Illinois Valley Railway, La Salle, Ill., one 50-ft. baggage and express.

Knoxville Railway & Light Company, ten cars 30 ft. 5 ins.

Los Angeles Railway Company, one hundred city cars.

Los Angeles Pacific Company, twenty-five motor cars, twenty-five trailer cars.

Louisville Railway Company, fifty cars.

Metropolitan Street Railway Company, Kansas City, Mo., twenty-five cars, twenty cars 33 ft. 3½ ins.

Milwaukee Electric Railway & Light Company, twenty-five double-truck closed car bodies, thirty double-truck trail cars, ten cars.

Mexico Electric Tramway Company, four first-class funeral cars, six second-class funeral car bodies.

Metropolitan Street Railway Company, Dallas, Tex., three 36-ft. cars, six thirteen-bench open car bodies.

Michigan Traction Company, Kalamazoo, Mich., ten fourteen-bench open car bodies.

Michigan United Railways Company, ten 21 ft. semi-convertible.

Northern Texas Traction Company, three single-end car bodies, ten 22-ft. semi-convertible cars.

Northern Indiana Railway Company, South Bend, Ind., one baggage and express car body.

New Jersey & Pennsylvania Traction Company, one car body.

Ontario Construction Company, six fifteen-bench open cars.

Omaha, Lincoln & Beatrice Railway Company, one combination passenger and baggage car, one car 33 ft. 11 ins., one 20-ft. vestibule car.

Oklahoma City Railway Company, four cars.

Oriental Tramways Company, Montevideo, seventy 21-ft. cars, ten 29-ft. cars.

Puget Sound Electric Railway Company, Tacoma, Wash., two 31-ft. closed car bodies.

Pacific Electric Railway Company, Los Angeles, Cal., fifty-two interurban cars.

Philadelphia & Western Railway Company, twenty-two interurban cars.

Pittsburg Railway Company, Pittsburg, Kan., six 28-ft. cars.

Rio de Janeiro Tramway, Light & Power Company, thirty-five ten-bench open cars.

Rockford & Interurban Railway Company, Rockford, Ill., six ten-bench open cars.

Richmond & Chesapeake Bay Railroad Company, Richmond, Va., four cars, combination baggage and smoker.

Rockford & Interurban Railway Company, four 21-ft. semi-convertible cars.

Rapid Transit Company, Dallas, Tex., two 26-ft. cars.

Seattle Electric Company, Seattle, Wash., twenty-five 30-ft. closed-motor car bodies.

St. Joseph Railway Light, Heat & Power Company, six eleven-bench open car bodies.

Stockton Electric Railroad Company, Stockton, Cal., six car bodies.

South Covington & Cincinnati Street Railway Company, ten 21-ft. semi-convertible cars.

Spokane Traction Company, seven cars 29 ft. 6 ins.

Santiago & San Bernardino Electric Railway Company, ten cars.

Schenectady Railway Company, six cars, six cars 29 ft. 6 ins.

Seattle Electric Company, fifty-two cars 43 ft. St. Clair Land & Improvement Company, one 20-ft. car.

Tacoma Railway Light & Power Company, nine semi-convertible, eight California type car bodies.

Tampa & Sulphur Springs Tramway Company, eight fifteen-bench cars.

Utah Light, Railway & Power Company, five 28-ft. cars.

United Railways of San Francisco, 250 cars, twelve interurban cars.

Whatcom County Railway & Light Company, Bellingham, Wash., two 25-ft. cars.

Washington Railway & Electric Company, Washington, D. C., forty cars.

Evansville & Mt. Vernon Electric Company, one baggage.

Erie Railroad Company, four passenger (electric); two combination passenger and baggage (electric).

## PRESIDENT BEGGS OF ST. LOUIS COMPANY FAVORS A SUBWAY FOR ST. LOUIS

John I. Beggs, president of the United Railways Company, in an address before the Engineers' Club of St. Louis, on Wednesday, Jan. 15, aired his theories upon the rapid transit problem confronting the city, recommended the subway as the solution of the matter, and pointed out the physical and financial difficulties to be overcome in order to get the system. Mr. Beggs said that it is a mistaken idea to think that construction of subways is only trifling, to be settled in a few months. Mr. Beggs is quoted unofficially as having said: "If St. Louis gets a system of subways in ten years the people may be thankful. The problem is a gigantic one. As Mr. Perkins has pointed out to you, the subways of New York cost over \$2,000,000 a mile, and the financing of the proposition is something that will take time. The restrictions thrown about corporate interests by the laws of your State, forbidding capitalization beyond a certain figure, make the problem still more difficult. Then there are physical problems to be overcome which will take the best engineers years to solve."

Among the present remedies suggested was a system of loops enabling part of the cars on a line to turn back without making a full trip. Mr. Beggs favored this idea, and said that it would be put in operation probably by the company.



## DISTRICT COMMISSIONERS REPORT ON BILLS AFFECTING STREET RAILWAYS IN WASHINGTON

In an official report Wednesday, Jan. 16, to Chairman Babcock, of the District committee of the House, on the Wiley and Madden universal transfer bills, the District Commissioners recommended favorable action as far as transfers were concerned, but where the Madden bill provided other changes in the control of the street railways the Commissioners offered amendments. The Madden bill, aside from the universal transfers, provided a 5-minute schedule for the running of all cars within the District and the paying of 20 per cent of the gross earnings of the companies to the District in lieu of personal taxes, and the selling of twenty-five tickets for \$1.

In their report the Commissioners recommended that the bill be amended so as to provide the paying of 6 per cent of the gross earnings of the companies to the District and the adoption of a 15-minute schedule throughout the District between the hours of 6 a. m. and 1 a. m., and between the hours of 1 a. m. and 6 a. m., every 60 minutes. In regard to the twenty-five tickets for \$1, the Commissioners say that the present method of six tickets for 25 cents is satisfactory.

The report of the Commissioners is based principally upon a large public hearing at the District Building two weeks ago, at which the various arguments for and against the proposed measures were thoroughly discussed. They reported upon the two bills separately. The Wiley bill simply provides universal transfers, and the Commissioners, without much comment, put their stamp of approval upon it. The Madden bill was commented upon at some length by them.

## EXPOSITION OF SAFETY DEVICES IN NEW YORK

The exposition of safety devices and industrial hygiene, to which reference was made in the STREET RAILWAY JOURNAL of Jan. 12, 1907, will be held at the American Museum of Natural History, New York, in the west hall, Jan. 29 to Feb. 12, 1907, between the hours of 10 a. m. and 10 p. m. each day, under the auspices of the American Institute of Social Service of New York. The exhibits will consist of devices for safeguarding the lives and limbs of workmen and preventing accidents under the ordinary conditions of life and labor to which the general public is exposed. The exposition will consist as much as possible of "live exhibits," that is machines or devices in operation; models of actual or reduced size, and photographs. Wood and metal-working machinery; stamping, grinding, and polishing machines; presses; textiles; the building trades; safeguarded elevators, windlasses, cranes and hoisting machinery; transportation security by sea and land; safety lamps and explosives; quarrying, agricultural and chemical industries; safety from fire. The section of industrial hygiene will include improved dwellings; first aid to the injured; prevention of tuberculosis and other dread diseases harmful to the life of workmen; respirators and devices for supplying and maintaining pure air and industrial betterment. The object of the exposition is to direct the attention of American public opinion to the necessity of doing something to lessen the causes of accidents to American life and labor, by means of a permanent museum of safety devices, where all problems of safeguarding life and limb can be studied in their working details. Admission and exhibit space will be free. W. H. Tolman, 287 Fourth Avenue, New York, is director of the exposition.

## A RAILWAY AND LIGHTING ASSOCIATION FOR SOUTH CAROLINA

At a meeting of the electric railway and lighting interests of South Carolina, held in Columbia last week, it was decided to organize an association to be known as the South Carolina Railway & Lighting Association, to include among its members representatives of electric railway and lighting companies throughout the State. P. H. Gadsen, of Charleston, president of the Charleston Consolidated Railway, Gas & Electric Company, was elected president of the association and instructed to prepare a constitution and by-laws. None of the other offices has as yet been filled. It is expected that a permanent organization will be effected shortly.

## NEW ENGLAND STREET RAILWAY CLUB TO MEET JAN. 31

The January meeting of the New England Street Railway Club will be held at the American House, Boston, on Thursday evening, Jan. 31. A paper will be presented by Dr. C. J. H. Woodbury, of the American Telephone & Telegraph Company, entitled "The Development of the Telephone and Its Application to Railway Service." The meeting was originally arranged for last week.

## UTICA & MOHAWK COMPANY SUBSIDIARIES HOLD MEETINGS

The Rochester Railway & Light Company and the associated local and suburban lines held their annual meetings last week. The stockholders' meeting of the Rochester Railway & Light Company resulted in the election of the following board of directors: Horace E. Andrews, Edward Bausch, W. C. Brown, John Carstensen, T. W. Fiucano, A. H. Harris, G. A. Hollister, A. M. Lindsay, E. V. W. Lindsay, Eugene Satterlee, John J. Stanley, Henry A. Strong, W. K. Vanderbilt, Jr., W. J. Wilgus and Charles T. Chaplin, who succeeds H. D. Walbridge. In the election of officers, J. C. Collins was changed from treasurer to secretary; E. L. Rossiter was advanced from assistant treasurer to treasurer; C. A. Tucker, secretary, to assistant treasurer, and James T. Hutchings, formerly superintendent of the electrical department, was made assistant general manager. The complete list of new officers is as follows: Horace E. Andrews, president; George A. Hollister and W. G. Vanderbilt, Jr., vice-presidents; J. C. Collins, secretary and auditor; E. L. Rossiter, treasurer; C. A. Tucker, assistant treasurer; A. L. Linn, Jr., general auditor and assistant secretary; R. M. Searle, general manager; James T. Hutchings, assistant general manager; John Carstensen, W. C. Brown, G. A. Hollister, W. K. Vanderbilt, Jr., and John J. Stanley, members of executive committee.

The Rochester Railway Company stockholders elected the following directors: John J. Stanley, who succeeds C. J. Bissell, and W. N. Kernan, who succeeds A. G. Hodenpyle being the new members; H. E. Andrews, W. K. Vanderbilt, Jr., E. V. W. Rossiter, John Carstensen, W. J. Wilgus, W. C. Brown, J. J. Stanley, W. N. Kernan, A. H. Harris, Y. W. Archer, C. T. Chapin, George F. Roth. The officers elected by the directors at their meeting were as follows: Horace E. Andrews, President; William K. Vanderbilt, Jr., John J. Stanley, R. E. Danforth, vice-presidents; J. C. Collins, secretary and auditor; E. L. Rossiter, treasurer; C. A. Tucker, assistant treasurer; A. L. Linn, Jr., assistant secretary and general auditor; R. E. Danforth, general manager.

The Rochester & Sodus Bay Railway Company elected the following directors and officers: Horace E. Andrews, President; Granger A. Hollister, vice-president; J. C. Collins, secretary and auditor; E. L. Rossiter, treasurer; A. L. Linn, Jr., assistant secretary and general auditor; C. A. Tucker, assistant treasurer; R. E. Danforth, general manager; H. E. Andrews, W. K. Vanderbilt, E. V. W. Rossiter, John Carstensen, W. J. Wilgus, W. C. Brown, Benjamin Strong, Y. A. Hollister, R. E. Danforth, directors.

The Rochester & Suburban Company, which held its election of directors December 11, elected these officers: H. E. Andrews, president; W. K. Vanderbilt, Jr., C. J. Bissell, vice-presidents; J. C. Collins, secretary and auditor; E. L. Rossiter, treasurer; C. A. Tucker, assistant treasurer; A. L. Linn, assistant secretary and general auditor; R. E. Danforth, general manager. The directors are: Horace E. Andrews, William K. Vanderbilt, Jr., E. V. W. Rossiter, W. J. Wilgus, John Carstensen, W. C. Brown, George W. Archer, C. J. Bissell, Charles T. Chapin.

The Rochester & Eastern Rapid Railway Company held its annual directors' meeting in New York City, at which time it was decided to move the auditing and accounting department offices from Canandaigua to Rochester, where J. C. Collins will be placed in charge. The officers elected are as follows: Horace E. Andrews, president; W. K. Vanderbilt, Jr., vice-president; J. C. Collins, secretary; A. L. Linn, Jr., assistant secretary and auditor; F. L. Rossiter, treasurer; C. A. Tucker, assistant treasurer.



**THE RECORD OF INDIANAPOLIS SUBURBAN BUSINESS**

The Indianapolis Traction & Terminal Company has made its annual settlement with the city for the use of the streets by the interurban traction cars. The round trips made by the various companies were as follows:

**THE YEAR'S FIGURES**

Union Traction Company—	
Muncie division .....	8,640
Logansport division .....	7,894
Broad Ripple division .....	13,539
Army Post division .....	2,557
Indianapolis & Cincinnati Traction Company—	
Shelbyville division .....	7,460
Rushville division .....	7,306½
Indianapolis & Northwestern .....	8,405
Indianapolis & Eastern .....	7,549½
Indianapolis, Columbus & Southern .....	9,089½
Indianapolis & Martinsville .....	6,943½
Indianapolis Coal Traction Company.....	6,557½
Indianapolis & Western .....	889
Total .....	
	87,730½

The Indianapolis & Western is a new road and did not operate through the entire year.

The total number of round trips for 1906 exceeded those for 1905 by more than 7000. The number of trips in 1905, as stated in the annual report to the city controller, was 80,150.

Upon the basis of an average of thirty passengers per car it will be seen, the various lines carried 2,631,900 passengers into Indianapolis and carried that number out again during 1906. Upon the same basis the number of passengers in 1905 was 2,404,510, and the gain for the year was more than a quarter of a million round-trip passengers, or over half a million one-way passengers.

**ANNUAL MEETING AND REPORT OF TOLEDO COMPANY**

Reports of the officers of the Toledo Railways & Light Company, at the annual meeting Thursday, show that 1906 was one of the most prosperous years the company has ever enjoyed. Not only were the receipts larger, but the net surplus at the end of the year showed a gratifying increase. The report of President Henry A. Everett showed that the gross receipts were \$2,047,610.75, an increase of \$134,154.69 over the preceding year, while the operating expenses were \$1,071,733.33, or 52.34 per cent. Interest charges on the funded and floating debt were \$509,607.12, leaving a net income of \$466,230.30, or 3.89 per cent of the capital stock.

Besides building a small amount of new track and reconstructing a little over 3½ miles of track, the company installed a lot of new machinery to put the road in position to take care of its business. Two 3000-kw turbines were ordered from the General Electric Company last year, but they have not been delivered. Instead, the company put in two 2000-kw turbines until the others can be built. Two 1000-kw rotary converters for the system in the city and two 500-kw rotaries for a point near the Casino, with necessary switchboards and other appurtenances, with a 1000-kw motor generator set for the D. C. lighting system, and a 125-kw exciter set and four 700-hp Sterling water-tube boilers fitted with Green traveling chain grates have been put in. A three-phase 40000-volt line has been built to supply the sub-station at the Casino. This is partly underground and partly overhead. In other respects the report of the president was interesting, as showing the progress that has been made in that city.

The stockholders voted to authorize the company to lease the Toledo, Ottawa Beach & Northern and to operate it as part of the system. This is intended as a feeder for the company's new resort, to be known as Toledo Beach.

Louis E. Beilstein and Albion E. Lang, of Toledo; Henry A. Everett, E. W. Moore and Charles W. Wason, of Cleveland, and William L. McKenna and Robert Van Cortland, of New York, were chosen as directors. They organized by the election of the following officers: Chairman of the Board, Albion E. Lang; president, Henry A. Everett; vice-president, Louis E. Beilstein; secretary, Herman S. Swift; treasurer, Spencer D. Carr.

Briefly summarized the operating figures for 1906 and 1905 compare as follows:

	1906		1905	
	Amount	Per Cent	Amount	Per Cent.
Gross earnings .....	\$2,047,610	.....	\$1,913,456	.....
Operating expenses..	1,071,773	52.34	972,994	50.85
Net earnings .....	975,837	47.66	940,462	49.15
Charges .....	509,607	24.88	510,307	26.67
Surplus .....	466,230	22.78	430,155	22.48

The percentage earnings on the \$12,000,000 capital stock during the last six years compare as follows:

	Per Cent		Per Cent	
1906.....	3.89	1905.....	3.58	
1904.....	2.75	1903.....	2.66	
1902.....	2.27	1901.....	2.16	

**CONNECTICUT RAILWAY & LIGHTING IMPROVEMENTS**

It has been announced that \$2,000,000 will be spent by the Consolidated Railway Company of New Haven in improving the various properties recently acquired from the Connecticut Railway & Lighting Company. These betterments will extend to all branches of the service, but have not yet been outlined fully. It is understood they include the double tracking of the Waterbury system, general electric lighting work, improvements to the company's Bull Bridge plant and new work in New Milford.

**ANNUAL REPORT OF AMERICAN LIGHT & TRACTION COMPANY**

The annual report of the American Light & Traction Company for the year ended Dec. 31, 1906, which has just been made public, shows gross earnings of \$2,263,735, an increase of \$890,115, and net earnings of \$2,215,735, an increase of \$879,567. The surplus, after deducting the \$680,500 placed in the reconstruction reserve, is given as \$361,266, a decrease of \$224,499. The gain for the year in the surplus account before deducting the reconstruction reserve was about 48 per cent, and after deducting the account the increase was equal to something like 16 per cent, as compared with the preceding year. The income account is as follows, with comparisons:

	1906	* 1905
Gross earnings .....	\$2,263,735	\$1,373,620
Expenses .....	48,000	37,452
Net earnings .....	\$2,215,735	\$1,336,168
Dividend, preferred .....	853,068	570,822
Dividend, common .....	320,901	179,581
Total dividends .....	\$1,173,969	\$750,403
Balance .....	\$1,041,766	\$585,765
Reconstruction reserve .....	680,500	.....
Surplus .....	\$361,266	\$585,765

The total profit and loss surplus on Dec. 31, 1906, was \$2,490,145.

The condensed balance sheet shows the following changes:

	1906	1905
<b>Assets—</b>		
Investment account .....	\$26,739,735	\$24,103,177
Furniture .....	.....	1,299
Treasury stock .....	I	I
Undivided profits sub. companies....	2,385,333	1,468,155
Bills received subsidiary companies..	1,575,537	1,625,904
Certificates indtdns sub. companies..	1,708,184	.....
Accounts received .....	63,559	24,414
Mgrs.' stock con's.....	227,500	.....
Temporary investment .....	26,155	2,976
Cash .....	494,455	409,738
Total .....	\$33,220,459	\$27,635,664
<b>Liabilities—</b>		
Preferred stock .....	\$14,236,200	\$9,633,200
Common stock .....	15,000,000	15,000,000
Bills payable .....	500,000	500,000
Reconstruction reserve .....	680,500	180,204
Deps. mgrs.' stock certificate.....	7,061	.....
Taxes and miscellaneous.....	8,502	.....
Dividends .....	298,051	192,029
Undivided earnings .....	2,490,145	2,130,231
Total .....	\$33,220,459	\$27,635,664



**TRIAL TRIP ON ROCHESTER BRANCH OF ERIE**

The first official trip by electric car over the electrified division of the Erie Railroad between Avon and Rochester was made Tuesday, Jan. 22. The distance between the cities is 19 miles, and the run from Avon to Rochester was made by the motor car in 39 minutes. On the return trip the private car of Superintendent Graham was attached to the motor car, and a speed of 35 m. p. h. was attained. This was considered an excellent showing, considering the physical condition of the new line and apparatus. This is the first 11,000-volt line to be operated in the United States. It will include, besides the main line of the Erie Railroad before mentioned, between Rochester and Avon, the branch between Avon and Mt. Morris, making a total of 34 miles of single track, besides sidings. Power is received at 60,000 volts from Niagara Falls. It is expected that by Feb. 15, the line will be ready to be put into permanent operation by electricity. The party that made the trip included the following representatives of the Erie Railroad: J. M. Graham, vice-president of the Erie Railroad, B. J. Arnold and L. B. Stillwell, composing the Electrical Commission; R. H. Bowron, division superintendent; J. H. Maddy, special representative; J. C. Tucker, superintendent of the Rochester division; G. W. Dowe, formerly superintendent of the Rochester division, and James Burke, engineer maintenance of way. There were also present from Westinghouse, Church, Kerr & Company, the contractors: O. S. Lyford, Jr., chief electrical engineer of Westinghouse, Church, Kerr & Company; W. N. Smith, chief engineer in charge of the design and construction of the work; Wm. McClellan, engineer in charge of the sub-station and car equipment; H. H. Esselstein, superintendent of construction, and E. J. Griffith. Mr. Graham operated the car from Avon to Rochester, and Mr. Griffin on the return trip.

**UNITED RAILWAYS OF ST. LOUIS EARNINGS**

The United Railways Company made a large gain last year over 1905. The increase in earnings was \$686,000 in a total of over \$9,146,000 receipts. Even the record of the World's Fair year, with its heavy street car traffic and earnings of \$9,950,000, was almost equalled. The company almost doubled its net income. A summary of the financial statement is contained in the following statement, issued Friday, Jan. 18:

	1906	1905
Gross earnings and other income....	\$9,146,348	\$8,460,016
Expenses, taxes and depreciation....	5,567,412	5,318,369
Net earnings .....	\$3,578,936	\$3,141,647
Charges .....	2,377,476	2,387,915
Net income .....	\$1,201,460	\$753,732

The December statement shows gross earnings of \$782,555, net earnings of \$318,924 and net income of \$120,898.

**HARRIMAN AND THE SOUTHERN PACIFIC**

The Los Angeles "Examiner" prints the following story: Instead of declaring a dividend for the stockholders of the Southern Pacific Railroad in 1905, President E. H. Harriman ordered an appropriation of \$5,000,000 for the purpose of electrifying the western division of the system, which is the old narrow-gage route from Oakland by the way of Haywards and the Niles Canyon, through Alviso and San Jose to Santa Cruz. In addition to this, \$800,000 was appropriated to tunnel the Potrero of South San Francisco, and another \$1,000,000 was taken to build a bridge across the Bay of San Francisco at Dumbarton Point. All of this work is now under way, and is the starting point of the gigantic enterprise by which Mr. Harriman proposes to combine the electric road and power companies of Southern California and finally to give the Southern Pacific Company an electric line from Los Angeles to San Francisco.

To accomplish this Mr. Harriman, in addition to changing his narrow-gage line to Santa Cruz into an electric line, secured control of the Santa Cruz & Watsonville Railroad, and the Watsonville, Salinas & Spreckels Railroad Company, and consequently came into ownership of a direct line from Oakland and San Francisco to Salinas, a distance of 128 miles, which is all to be electrified. The next move is the combination of the entire electric railroad systems and small steam railroads of this section and the extension of a line by this combination to Santa Barbara.

**STREET RAILWAY PATENTS**

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

UNITED STATES PATENTS ISSUED JAN. 15, 1907

841,105. Recording Signal Transmitter; Rollin A. Baldwin, New Haven, Conn. App. filed Nov. 10, 1905. Relates to signals for single-track trolley roads in which a plurality of cars are frequently run in one direction over a block before permitting of cars to pass in the other direction. The signals are transmitted by a device which makes a record of the number of cars so as to prevent a clear signal being shown until all of the cars have again left the block.

841,119. Metallic Railroad Tie; Francis M. Cain, Wesner, Okla. Ter. App. filed April 11, 1906. One side of the base flange of the rail is engaged by an integral jaw, while the other side is engaged by an adjustable jaw adapted to be keyed to the tie.

841,144. Track-Sanding Device; John H. Hanlon, Somerville, Mass. App. filed May 16, 1906. To obviate the rapid wearing away of the sand nozzle, a pocket is provided opposite the sand blast in which sand collects to act as a buffer.

841,231. Air Brake System; Fred. B. Corey, Schenectady, N. Y. App. filed May 26, 1906. Has a reservoir on each car, a train pipe, a valve for connecting brake cylinder to reservoir or to atmosphere controlled by the differential action of train pipe and brake cylinder pressures, and means for producing an emergency application of the brakes upon a breaking apart of the train.

841,242. Railroad Tie; Daniel C. Graham, Pulaski, Va. App. filed Oct. 16, 1906. The tie is made of plastic material and molded with a vertically-extending opening in which is seated a bolt, which extends through the base of the rail and is engaged by a nut, the web of the rail being cut away to admit the nut.

841,286. Automatic Switch; Andrew Underdahl, Hoffmann, Minn. App. filed Aug. 31, 1906. A movable switch-piece comprising a rotary cylinder having grooves therein for connecting one line of rails with another, and means on opposite sides of the switch for rotating the cylinder.

841,337. Switch; Edward L. Nugent, Charleston W. Va. App. filed April 21, 1906. The switch point is connected with a disc, a rod connected to the disc intermediate its center, said rod being connected with a crank shaft having a tappet in the path of the locomotive.

841,367. Railway Roadbed; Luther R. Zollinger, Philadelphia, Pa. App. filed March 28, 1906. A solid concrete bed forming a complete floor under the rails and extending below the frost line, having iron stringers embedded therein beneath the rails without disturbing the bed.

841,397. Trolley Head; Otto Hoffmann, Berlin, Germany. App. filed Aug. 22, 1905. A pair of spring-actuated guard plates adapted to close over the wire.

841,435. Swivel Truck for Electrically-Propelled Cars; Daniel M. Pfautz, Germantown, Pa. App. filed June 1, 1906. Relates to a swivel truck for attachment to the roof of a suspended car.

841,436. Switch for Elevated Railway Structures with Suspended Cars; Daniel M. Pfautz, Germantown, Pa. Two parallel girders connected with each other and swinging at one end upon girders of the main line structure, a single swinging girder pivoted at one end at a point where adjacent main and branch line girders meet, and extending therefrom to the free ends of the parallel swinging girders, the remaining girders of the main and branch line structures projecting beyond said point to the free end of the swinging parallel girders.

841,437. Crossing for Elevated Railway Structures with Suspended Cars; Daniel M. Pfautz, Germantown, Pa. App. filed June 6, 1906. The girders of the intersecting tracks do not cross each other, but are provided with doors or wings, so arranged as to form a continuation of one or the other of the crossing tracks, the cars having buffers adapted to control the movement of the doors or wings.

841,451. Railway Block System; William L. Rummel, South Sioux City, Neb. App. filed Aug. 16, 1905. Tappets along the roadway are actuated by a passing train to electrically set train stops in the path of a following train.

841,470. Air Brake Mechanism; Walter V. Turner, Wilmerding, Pa. App. filed April 23, 1906. Means for maintaining

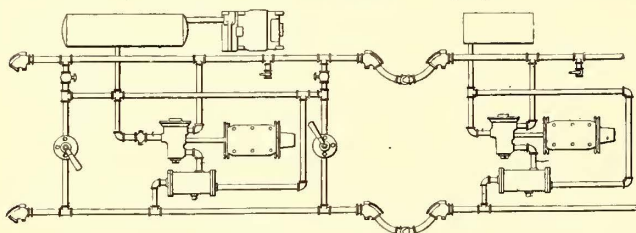


different pressures in a plurality of reservoirs, a train pipe and an engineer's valve provided with service exhaust means and having connections with the reservoirs and the train pipe, and adapted to connect the different reservoirs with the train pipe, and to connect a high-pressure reservoir with the service exhaust means, whereby such means are operated.

841,575. Rail-Joint; Louis M. Sartain, Tracy City, Tenn. App. filed Sept. 8, 1906. The rail-joint is cast in one piece, and is provided intermediate its length with a section having beveled rail-meeting sides corresponding in contour at the top with the head of the rail. Has flanges engaging the web of the rail and flanges engaging the base flanges of the rail and spiked to the ties.

841,607. Railway Signaling Mechanism; Edwin J. Adams, Waco, Tex. App. filed May 3, 1906. A block signal system having a special track rail to complete circuits to the locomotive cab, and by which alarm signals are displayed on the engine in case a semaphore at danger is passed.

841,636. Automatic Air Brake for Cars; William J. Dankel, Pittsburg, Kan. App. filed March 24, 1906. An air inlet and discharge valve for air brakes, comprising a casing having one end provided with a connection for the brake cylinder, and the other end provided with a connection for the train pipe, and a passageway with check valve opening into the opposite ends of the casing, a piston within the casing having a central stem forming a valve, a concentric projection from the casing having a valve seat receiving the said stem, and an outlet passageway to the atmosphere formed in the concentric projection.



PATENT NO. 841,231

841,651. Guard or Fender for Cars; William T. Lane, Fostoria, Ohio. App. filed Oct. 27, 1906. A hood covering one side of the periphery of the car wheel and conforming to the curvature thereof, and having a frangible shoe at its lower end.

841,653. Adjustable Stairway for Suspended Railway Cars; Daniel M. Pfautz, Germantown, Pa. App. filed May 19, 1906. The stairway is pivoted at one end of the car and means for raising and lowering the stairway are provided at the other end of the car. When the car is running the stairway is raised parallel with the car body.

## PERSONAL MENTION

MR. T. COMMERFORD MARTIN, editor of the "Electrical World," was elected president of the Engineers' Club, of New York, on Jan. 22.

MR. ARTHUR TOMALIN, news editor of the "Newark Evening News," has been appointed general advertising manager of the Central Railroad of New Jersey and editor of its monthly magazine, "The Suburbanite."

MR. ARTHUR B. SMITH has been appointed by President Mellen, of the New York, New Haven & Hartford Railroad, as general traffic manager of the Consolidated Railway Company. The appointment becomes effective Feb. 1. Mr. Smith will have his headquarters in New Haven.

MR. E. L. BROOME, steam engineer of the New York Central & Hudson River Railroad Company, has resigned to join the forces of the Stone & Webster Engineering Corporation, of Boston, Mass. Mr. Broome will be succeeded by Mr. W. C. Miller, Jr., formerly assistant steam engineer.

MR. P. NEY WILSON, formerly supervisor of the South Jersey division of the Public Service Corporation of New Jersey, has been appointed road master of the Rochester Railway Company. Mr. Wilson has just returned from a trip to South America, which he took in the interests of J. G. White & Company.

MR. F. F. BODLER, who resigned his position as master mechanic of the United Railroads of San Francisco some time ago, to engage in private business, was tendered a complimentary banquet on the evening of Jan. 7, by 300 employees of the

mechanical department of the company at the Geneva Avenue car house. Mr. Bodler was presented with a handsome gold watch and a diamond pin.

MR. C. S. BIDWELL, purchasing agent of the Indiana, Columbus & Eastern at Columbus, has been appointed chief clerk to General Manager J. L. Adams, whose headquarters are at Dayton. The office of purchasing agent at Columbus will be abolished and the buying will hereafter be done from Cincinnati. Mr. C. T. Moon, who has been clerk to Mr. Bidwell, will hereafter have charge of the stores in Columbus.

MR. GEORGE MAC LEOD, of Versailles, Ky., formerly of Louisville, who has been assistant engineer of the Central Kentucky Traction Company, has been appointed chief engineer and assistant general manager of the Lexington Interurban Railways Company, succeeding Mr. William R. Allen, of Lexington, who resigned to accept a position at Norfolk, Va. Mr. MacLeod will have charge of all the track and the construction work of the interurban lines of Central Kentucky. His headquarters will be at Lexington.

MR. HARRY G. AULT, who has been in the service of the Big Four Railroad at St. Louis, has been appointed soliciting passenger and freight agent of the Indiana, Columbus & Eastern Traction Company, with headquarters in Columbus. His jurisdiction extends over the Columbus field, the Columbus & Springfield division and the Grove City division. Mr. Ault was formerly associated with General Passenger and Freight Agent Whitney in the service of the Chicago & Eastern Illinois Railroad at Muncie, Ind.

MR. S. E. WILLIAMS, manager of the Jacksonville Electric Company, of Jacksonville, Fla., since Feb. 1, 1906, is dead. Mr. Williams was born at Eastchester, N. Y., and was 31 years of age. He was graduated from Harvard, after which he entered the service of Stone & Webster, of Boston, with whom he remained in that city two years. Then he accepted, at the call of Stone & Webster, the position of assistant manager of their street railway property at Dallas, and later was appointed by them to the position of manager of the Jacksonville company.

MR. CHARLES L. FURBAY has just resigned as general superintendent of the Augusta Railway & Electric Company and the Augusta & Aiken Railway Company, of Augusta, Ga. The former conducts the city railway system in Augusta and also the commercial and municipal lighting of that city, and the latter is a 25-mile interurban line connecting Augusta with Aiken, S. C. The company also owns Hampton Terrace Hotel, a high-class modern resort near Augusta. Mr. Furbay has been engaged in electric railway construction and operation since soon after his graduation from Princeton, about ten years ago. He is a native of Ohio, and commenced electric railroading with the Brunswick Traction Company, of Bound Brook, N. J., now a part of the Public Service Corporation of New Jersey. From that road he was sent to Elmira by the MacAfee interests, to construct the Elmira & Seneca Lake Railway, an 18-mile line, and afterwards acted as superintendent of this road for a year. He was then transferred to Pomeroy, Ohio, as superintendent of the Ohio River Railway & Power Company, and then to Augusta, all of these roads being controlled by the MacAfee interests. He is at present on a short visit to New York.

MR. FREDERICK BUSHNELL will sever his connection with the Rhode Island Company, of Providence, R. I., as chief engineer, on Feb. 1, to enter the employ of Stone & Webster, of Boston. Mr. Bushnell settled in Providence twenty-four years ago, and received his early mechanical training at the Providence Steam Engine Company, filling various positions in the shop and drawing room until he became designing engineer in 1889. He then spent a year in Chester, Pa., returning to the Providence Engineering Works as general superintendent in 1891. In 1893 he left the company to take up the building of the improved Greene engine at the Fuller Iron Works in Providence, but owing to the financial troubles which occurred in the spring of that year, this project had to be abandoned. Mr. Bushnell then became chief engineer for the Narragansett Electric Lighting Company, which position he has held since that time. In 1901 he also became chief mechanical engineer for the United Traction & Electric Company, which controlled all the electric roads in Providence, Pawtucket and the surrounding towns, and in 1902, when these street railway properties were purchased by the United Gas Improvement Company, of Philadelphia, Mr. Bushnell was appointed chief engineer of the system.