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## The New York Central Accident

The testimony presented in connection with the accident to an electric train on the New York Central Railroad on Feb. 16, as developed in the inquiries during the past three weeks, indicates that the derailment was caused by a speed in excess of that for which the curve was constructed, aggravated by a local defect in the track at that point. It

is gratifying to learn that the electrical equipment itself was not at fault; indeed some computations which are published elsewhere in this issue show that the electric locomotive is less severe on curves than the steam locomotive, in spite of its lower center of gravity. We doubt whether any engineering installation of anywhere near the same magnitude has ever been made in which greater care was taken to provide against the unexpected. Outside engineering advice was freely sought early in the plan of electrification by those in charge of the work, and this policy was continued by the establishment of an electric commission during the construction and testing of the locomotives. The first completed locomotive was run on a 6-mile experimental track for over two years, covering 50,000 miles of actual service under the constant supervision of the commission and the engineering department of the company. Other tests were conducted with regular trains on the tracks near New York. With such a novel installation, it might not have been surprising if serious troubles should have developed, and that they did not is remarkable evidence of the skill with which all of the details had been worked out. While the accident has taught certain lessons they have not reflected in any way upon the electrical equipment.

## Master Mechanics Visiting and Getting Ideas from Other Shops

Master mechanics frequently get so much absorbed in work at their own shops that they do not take advantage of the many opportunities open to them to visit those of neighboring systems and get ideas. In the Eastern and Middle Western States particularly there is every opportunity to make such visits. Shops are not very far distant from each other, and the fraternal feeling existing between master mechanics makes all of them anxious to show the other fellow what they have in their shops.

That time given to the inspection of shops would be well repaid is hardly questioned. No matter how bright a man may be or what originality he may have in meeting problems, he can still absorb something from the other shop. In fact, it is often the case that a master mechanic who does not think he can be taught anything is usually so narrow minded that he does not realize how far behind general progress he really is. The inspection of a few shops would soon show that it is not in the larger shops alone that ideas can be obtained. Of course the large shops are the ones most apt to have unique devices and methods of doing things because the master mechanics of these have the men and can get the money to carry out new ideas. But wherever an ingenious man or one with original ideas is found, whether in charge of the shops or simply a

workman, interesting devices and methods will usually be in use.

There is, however, a knack in discovering the out-of-the-ordinary devices in a shop. Some men can go through a shop filled with them and see nothing unusual. Even an alert man will often miss many interesting things unless he has the assistance of some one familiar with the shop or enlists the help of those who are responsible for the devices and the practice used. Even these men, either through modesty or because they do not realize the value of their own devices, sometimes fail to point them out.

In regions where many shops are interconnected by inter-urban railways as in the Middle West, shop inspection might be carried on in a systematic manner. Several master mechanics might meet at certain intervals for the sole purpose of making trips of this kind. They could then go in a special car to several shops where preparations for them had previously been made. The master mechanic of each shop visited might, and probably would, have his shop pretty well cleaned up, but his greatest preparation ought to be in doing a little thinking about what the interesting features of his shop are and how to show them to the visitors.

It would be both a selfish and a narrow policy to leave at home on such visits the shop foreman and the more energetic heads of departments. These men frequently have no opportunity of observing the practice in other shops, and as a consequence they are often much hampered in developing ideas for the improvement of work at home. A few visits of this kind combined with an opportunity to talk with men interested in the same line of work elsewhere would not only broaden them but would result in their becoming more efficient in their own shops.

### Reserve Equipment in Sub-Stations

Continuous service is so important a factor in the commercial success of any power transmission system that the designers of generating plants and sub-stations are justified in spending money liberally to insure it. At the same time, a wise policy will always endeavor to limit the complications of controlling mechanisms and to reduce investment in duplicate equipment to the lowest point consistent with reliable operation. It is particularly difficult in sub-stations of railway, lighting and power companies to feel always sure of the extent to which reserve capacity should be installed. The railway power station is supposed to be prepared for any emergency and the same principle applies to a large extent in the plant designed for supplying power for commercial purposes. In some cases the railway and central station services are consolidated so that it might be worth while to consider this subject.

The amount of business handled by a power plant is an important influence in determining how much money should be put into spare apparatus. If an hour's shut-down in a station selling electric power means the loss of thousands of dollars to a large number of industrial plants depending on the sub-station for energy, it is unquestionably wise to install enough reserve capacity in separate units to enable such concerns to operate at least in part, even if it is necessary to notify them by telephone to cut down their power

consumption, say by 50 per cent, for a few hours. Interrupted service is bad enough in any case, but there are many industrial plants which can keep a large percentage of their men at work on preparatory processes requiring but little power, although the main production equipment may have to be shut down temporarily. The average manufacturer resents a sudden failure of his entire power supply, if it lasts more than two or three minutes, much more than a partial failure which enables him to avoid the heavy losses of stand-by labor charges throughout the entire establishment. It is fortunate that the machines consuming the largest amount of power do not always require the maximum attendance. In providing reserve capacity for power supplying sub-stations it must not be forgotten that interrupted service frequently occurring is a strong encouragement to consumers to cast about for other sources of current, and possibly to put in isolated plants.

The minimum reserve capacity for a power sub-station equipped with three-phase transformers in single units would seem to be an extra unit of standard size which can be immediately switched into service in case of trouble. If a three-phase transformer becomes damaged, its place must be taken by an equivalent unit, for there is no chance of partial operation as in the case of three single-phase units. A small sub-station equipped with three single-phase transformers can often get along very well temporarily if one burns out, by reconnecting the other two, provided that the interests depending on it are not too closely bunched. Operation on partial capacity is better effected when the consumers' motors are numerous and scattered than when the demand for power is concentrated. When only three transformers are to be installed for power service in a territory where a steady increase of business is anticipated, one cannot go far astray in providing, say, from 10 to 25 per cent reserve capacity in each unit over and above the immediate estimated needs. A large sub-station can better afford additional reserve capacity than a small one, either in the shape of an extra full-sized single-phase unit or in an increase of from 25 to 50 per cent in the rating of the original transformers. Careful engineering judgment is essential if reserve power and prospective business increase are to be given due weight.

In purely electric railway sub-stations the provision of a duplicate rotary converter or motor-generator set for purely reserve purposes is generally such an expense in proportion to the total sub-station cost that it is seldom a feasible scheme to include it in the layout. Few designers would care to recommend less than two rotaries in any railway sub-station of a permanent character unless a portable equipment is available for rapid transportation to the spot in time of trouble or serious overload. The better plan seems to be to include sufficient overload capacity in each machine to tide over any temporary shut-down and to employ first-class attendance in the sub-stations themselves. Reserve capacity is obviously more important in an urban sub-station than in one which operates cars in thinly-settled territory; in the former case, however, there is usually some chance of securing help by tie lines from some other sub-station, or directly through the trolley and feeders, and in the latter case a temporary stoppage of machinery seldom

affects as many people seriously at one time as does the industrial sub-station which goes to the wall. An extra transformer, however, is a pretty good investment for the majority of railway sub-stations.

Lighting sub-stations usually need reserve capacity in regular equipment rather than extra machines kept idle against time of need. The comparatively short duration of the peak load in the lighting sub-station favors the provision of little extra equipment, for the reason that if anything goes wrong the balance of the machinery can be overloaded enough to finish out the run, leaving the entire daylight hours for repairs. It usually happens that the lighting load in a new sub-station is for a considerable period much below the rated capacity of the equipment, for it takes months and some times several years to develop fresh territory.

Whatever may be the decision followed in regard to reserve capacity, it is hazardous practice in any sub-station to be without a liberal supply of spare parts. The cost of attendance ought to be in some degree proportional to the value of the sub-station equipment. Interchangeability is a feature of cardinal importance, especially in combined power, railway and lighting sub-stations. In the last analysis the reserve equipment provided may be modified by local circumstances, but it should never be entirely left out and should always be supplemented by skilful maintenance.

### The Coal Supply

A very interesting paper upon this important subject was recently read by Mr. Campbell, of the Geological Survey, before the National Geographical Society. In some respects his conclusions were encouraging, especially as to the gross aggregate of fuel, but upon the whole the paper conveys a grave and sinister warning that should be seriously taken to heart. To begin with, the three chief coal areas of the United States have been pretty well explored and have been very heavily raided already. One can cherish few illusions regarding them. The Appalachian coal belt of anthracite and good bituminous coal is the oldest of our fields. The anthracite has already been drawn upon so heavily that the end is almost in sight. Outside of this single area anthracite exists only in very limited spots, and in relatively inconsiderable amounts. By far the larger part of the high-grade bituminous coal, including nearly all the good coking coal reasonably free from sulphur, comes from this same belt, upon which the commercial attack has been centered on account of its favorable location. The Western bituminous coals are with rare exceptions of rather inferior quality and either coke very badly or carry too much sulphur to be useful in the iron industry. A generation or two will practically make an end of the Appalachian field or at least reduce it to deep mining in undesirable veins. The two great areas of the Middle West, one mainly in Indiana and Illinois, the other in Iowa, Missouri and Kansas, are both of bituminous coal of only fair grade. Both are being worked very energetically, so that the easily worked deposits are on the way to rapid depletion.

Outside of these three areas the coal supply, while abundant, is generally of poor quality. In Montana, Colorado and New Mexico there are extensive fields, in spots

producing a good grade of coal, even small amounts of anthracite. As a rule, however, the coal in these Rocky Mountain beds is not promising, grading as it does mostly from a medium quality of bituminous down to the meanest lignite. Most of the coal lands still in the hands of the Government produce only lignite, which, like the poorer bituminous coals, slacks so readily on exposure to the air that it has small value for transportation. There are huge beds of this in North Dakota and in Texas. These Western fields are, however, 2000 miles from the Atlantic seaboard, where the need of fuel will be soonest felt. On the Coast there are a few fields, mostly of rather poor coal, and far beyond in Alaska are still other beds, somewhat better but very distant from the center of manufacture. The estimate of the total coal in the United States runs to 2,200,000,000,000 short tons, a quantity apparently prodigious and capable of supplying the amount mined last year for several thousand years. But so far as exploration has gone by far the larger part of this coal is poor, including as it does vast amounts of low-grade bituminous coal and lignite, and much even of this is at a very great distance from our present centers of activity. There are no indications anywhere of deposits at all comparable in quality with those of the Appalachian field now rapidly being exhausted. And in twenty-five years the rate of consumption of coal has quadrupled and is now increasing with great rapidity.

Mr. Campbell sees no reason to expect a lessened rate of increase for many years to come, and in spite of the immense stores which he describes he estimates that the real life of our coal fields may be about 200 years. Against this we may set, on the one hand the possibilities of checking the increased consumption by more efficient utilization, and on the other we must face the still nearer exhaustion of the relatively good and cheap supply. The testing plant of the United States Geological Survey has shown that, taking the coals as they come, they are nearly three times more efficient as power producers in the form of producer gas than merely as coal to be burned under a boiler. This is particularly true of the poorer coals and lignite. A possibility is therefore opened of large saving which may stave off the day of complete exhaustion. From another standpoint this is meager comfort, since the cost of transportation bears heavily on poor coal, and while it can be converted into gas or into electrical energy at the mines it is still very far away from present manufacturing centers. There seems to be no escaping the conclusion that long, very long before the coal supply actually nears exhaustion the conditions of cost and of supply will be such as will shift the centers of industry very far from their present locations. This process is beginning even now in the moving of the cotton and pig iron industries southward toward regions of cheaper power and more genial climate. Another generation will see vast industrial changes impending from this very cause. It will be an evil day for the Atlantic seaboard when the Appalachian coal field is done for, and this will take nothing like the 200 years which Mr. Campbell considers. It is high time that every effort should be made to lessen the waste of utilization and to render available even the poorest fuels, lignite and peat, to put off the evil day when Nature's storehouse shall have been emptied.

## THE EVANSVILLE, SUBURBAN & NEWBURGH RAILWAY

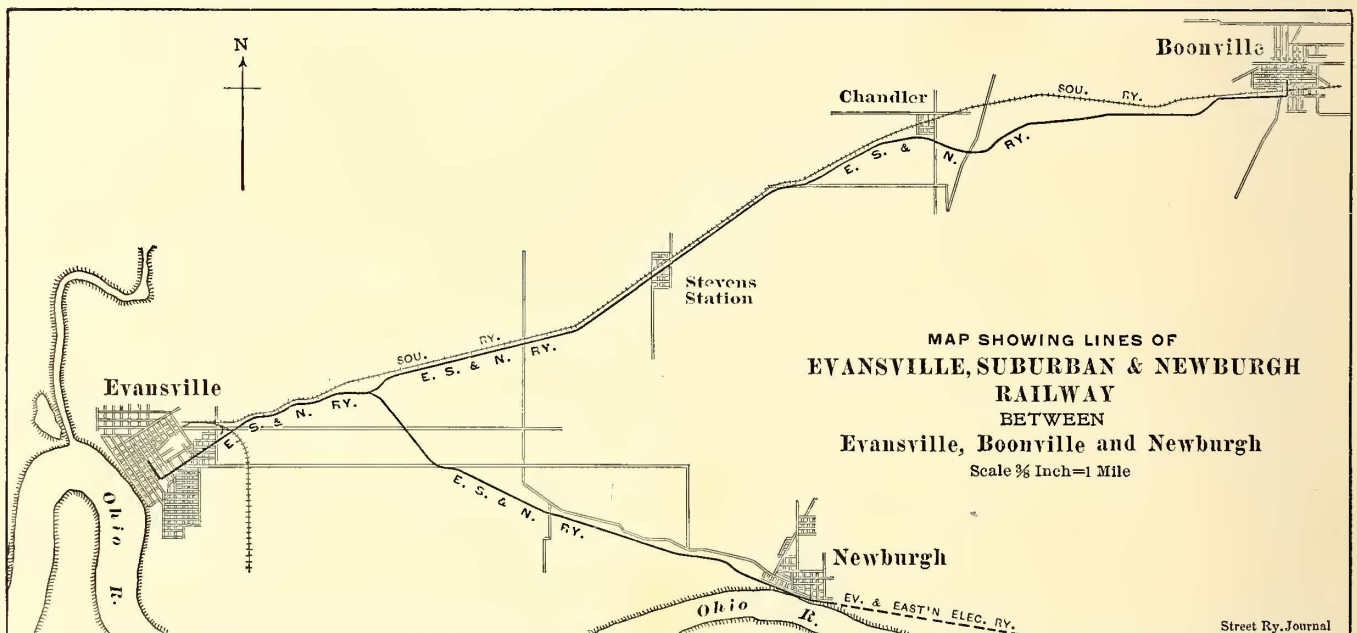
The Evansville, Suburban & Newburgh Railway, which operates separate electrically-equipped lines east out of Evansville, Ind., to Newburgh and to Boonville, has several features in its organization, operation and construction not often encountered in electric railway work. The road does not depend on passenger traffic alone. Steam freight service is now given on the Newburgh division, and within a short time similar service will be established on the Boonville branch.

The railway company was organized in 1888 when the Newburgh division of the road was built. This line was operated as a freight and passenger road with dummy steam engines until May, 1905, when electrical operation of passenger trains was begun. The change in the motive power of the road was made under an act of the Indiana State Legislature passed March 9, 1903, which permitted steam roads to be changed for electrical operation, and it has taken

ing about 700 patients, and the travel of the attendants and of visitors between Evansville and the hospital is such as would be occasioned by a town of about 700 people.

From Newburgh east to Rockport, 24 miles, the Evansville & Eastern Electric Railway is being constructed. The Evansville, Suburban & Newburgh system has a thirty-five-year contract with this company whereby the cars of the new company will be brought into Evansville over its tracks. The cars, both freight and passenger, will be turned over to the old company at Newburgh and will be handled by the old company's trainmen.

Boonville, at the terminus of the north division, is the county seat of Warwick County, and has a population of about 4500 people. It is surrounded by coal fields, and the development of these alone assures of a substantial future growth. Mining on an extensive scale, however, was only begun within the last six years, and previous to this time the town was supported largely by the farming community around it. The only other town on this division is Chand-



ROUTE OF THE EVANSVILLE, SUBURBAN & NEWBURGH RAILWAY, BETWEEN EVANSVILLE, BOONVILLE AND NEWBURGH

advantage of an act approved Feb. 25, 1905, which permitted roads changed under the previous act to continue to use steam as a motive power in addition to electricity. The system is the only one that could take advantage of the later law, and it is therefore the only line in the State that has the right to operate both with steam and electricity.

After the electrification of the Newburgh line, construction work on the Boonville division was begun, and this was opened for traffic July 3, 1906. The tracks of the system form a Y. The main line continues out of Evansville to a junction about 4 miles west of the city, where one branch takes off south of east to Newburgh, 10 miles from Evansville, and another continues north of east to Boonville, 18 miles from Evansville and 10 miles northeast of Newburgh. There is a total of 28 miles of main-line tracks. The region traversed by both lines is good farming country with an average density of population. Newburgh is an old river town which, after a lethargic period of a decade or more, due to the falling off of river traffic, has begun to build up again. At present it has a population of about 1500. About midway between Newburgh and Evansville is located the Southern Indiana Insane Hospital, a State institution hav-

ing about 700 patients, and which lies 7 miles west of Boonville. Several large coal mines are located near the line in the vicinity of Chandler. These are worked both by miners living in Chandler and by others making their homes in Boonville, who use the electric line in going to and from their work.

### TRACK AND ROADWAY

At the time the Newburgh line was electrified, the track and roadway was entirely rebuilt. The track was originally constructed with a 40-lb. T-rail. New ties and rails were laid and all the trestles and crossings were replaced with new work. All of this work was carried on without interfering with the regular schedule of trains, which consisted of five trains in each direction daily. In fact, during the whole work, with the exception of occasional trains being delayed a few minutes by ballast trains, no inconvenience whatever was caused.

As rebuilt, the Newburgh line now conforms with the best practice in interurban work, as does also the newly constructed Boonville line. The reconstruction of the Newburgh line, as well as the construction of the line to Boonville, was done by the railway company under the super-

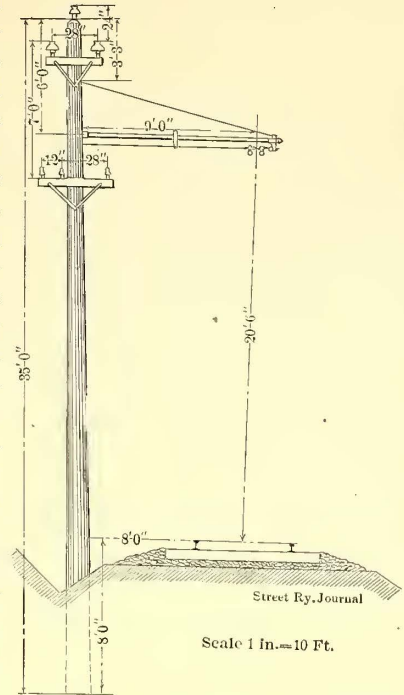
vision of the Tennis Company, of Cincinnati, C. H. Battin, vice-president of the construction company, being in immediate charge of the work. Both lines are built on private right of way varying in width from 50 ft. to 100 ft. The Boonville line has a maximum grade of 0.1 of per cent, and the Newburgh line 0.7 of one per cent. The character of the country between Chandler and Boonville necessitated considerable grading. The heaviest cut is 14 ft. in depth, and fills 20 ft. high were made. Practically all the curves outside city limits can be taken at full speed. No large streams are crossed by either line, and only one steel bridge span was employed. The waterways are crossed over 14-ft. timber bridge spans having double lines of chords measuring 8 ins. x 16 ins. At the bottom of cuts the roadbed is 19 ft. wide and at top of fills 14 ft. Notwithstanding the fact that gravel could have been obtained at much less expense, broken limestone was used for ballast because of its superior qualities. About 2200 cu. yds. per mile were used. The rails are 70 lbs. and the ties are of white oak, laid 17 to a 33-ft. rail. Through style sidings 500 ft. long in the clear are located at intervals of about 4 miles, and are provided with switch stands of the low target type and automatic spring switches and frogs.

TROLLEY AND POLE LINE

Bracket overhead construction is employed except in the terminal cities. The poles are placed 100 ft. apart. They are of chestnut, are 35 ft. long and have 8-in. tops and 14-in. butts. Both the butts and tops were treated with a preservative compound consisting of a mixture of coal tar and crude oil. A cross-arm below the bracket carries telephone and feeder wires, while those poles between Evansville and the one sub-station on the line carry on a ridge pin and a single cross-arm a three-phase, high-tension line. The

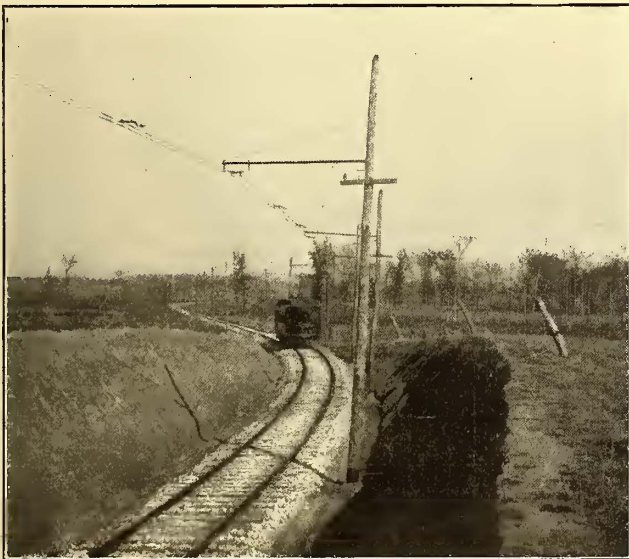
On the ground floor of the new station waiting rooms and ticket and freight offices will be located, while the second story will contain the offices of the company. The station will be built on Fifth Street, near Main Street, on the site of the present one.

At Boonville a large two-story building formerly used as a hotel and located one block south of the public square, which is the center of the business district, has been purchased and converted into a passenger station. The remodeled building contains separate ladies and gentlemen's waiting rooms and ticket and express offices. It is lighted with current from the city mains and is heated from the city central station heating system. An express station with a covered track between it and the main building has been built to the west of the passenger station.

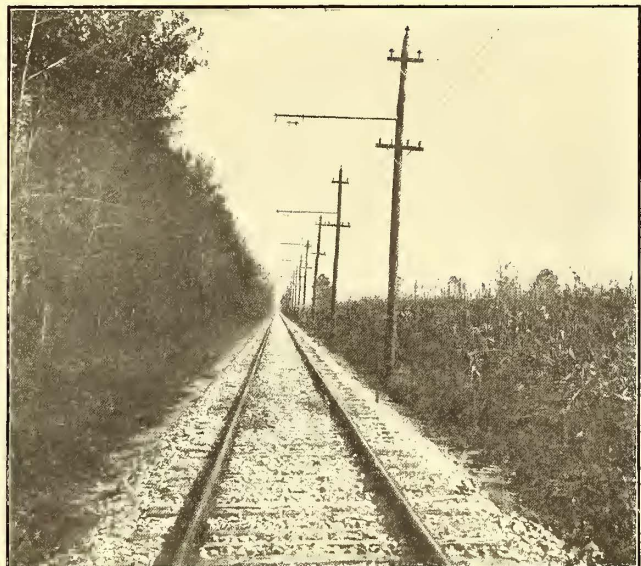


DETAILS OF OVERHEAD CONSTRUCTION AND SECTION OF TRACK

The station at Chandler is a neat structure with the en-



A HEAVY CUT NEAR BOONVILLE. NOTE ALSO THE SHORT POLES USED AS ANCHORS FOR THE GUY WIRES ON THIS CURVE



A TANGENT ON THE BOONVILLE BRANCH, SHOWING THE HEAVY BALLAST AND THE OVERHEAD CONSTRUCTION

brackets are of Ohio Brass Company manufacture and support two 000 grooved trolley wires. Lightning arresters are placed over the entire system at intervals of 1700 ft.

STATIONS

The present station in Evansville is inadequate, but plans have already been prepared for a thoroughly modern two-story structure, measuring 70 ft. x 150 ft., to replace it.

closed portion surrounded by a veranda. An unloading platform for freight is provided.

In Newburgh there are two stations, one in the lower and one in the upper part of town. Both are built with waiting rooms and offices for agents. All of the stations mentioned are provided with local and private telephones. Small shelters will be placed at all road crossings and at other points where stops are made.

## POWER SUPPLY

The possibility of future extensions and the fact that power can be rented at a reasonable rate makes it inadvisable at the present time to erect a power house. However, should it be deemed advisable to build a station at any time the company has on hand a surplus of \$200,000 which can be used for this purpose. Power is rented on a meter basis from the Evansville Gas & Electric Light Company.



VIEW ON THE NEWBURGH BRANCH APPROACHING THE HOSPITAL FOR THE INSANE

Largely because of the demands made upon it by this railway and also by the Evansville & Mt. Vernon Electric Railway, the lighting company is now rebuilding its generating plant in Evansville. Two Curtis steam turbines of 1000-kw and 500-kw capacity respectively, together with more boilers, have been installed, and further generating capacity is contemplated. Three 100-kw oil-cooled Westinghouse transformers in the generating station raise the current generated at 2300 volts and 60 cycles to 13,200 volts.

A pole line through the city streets carries the high-tension line to a point about one mile from the station

300-kw Westinghouse rotary converters in the operating room are started by induction motors. They are each located near a side wall of the room, while a six-panel switchboard of Vermont marble occupies a position near the rear wall and midway between the converters. The switchboard is arranged in duplicate for each of the converters, there being two a. c. panels, two d. c. panels and two feeder panels. Bus-bars tie the d. c. panels together so that the machines may be operated in multiple and the two feed-



EXTERIOR OF THE BOONVILLE SUB-STATION

ers leaving the station are so connected that they may be thrown on either of the feeder panels.

## ROLLING STOCK

The five electric passenger cars operated on the line were built by the St. Louis Car Company. They are 45 ft. 11 ins. long over bumpers and 9 ft. wide over all. The bottom framing was made in accordance with plans furnished by the railway company and is of extra heavy construction. The center sills of 4½-in. x 6-in. yellow pine are reinforced by 6-in. I-beams running the full length of the car body. A



OLD STEAM PASSENGER EQUIPMENT NOW USED TO HAUL EXTRAORDINARY CROWDS

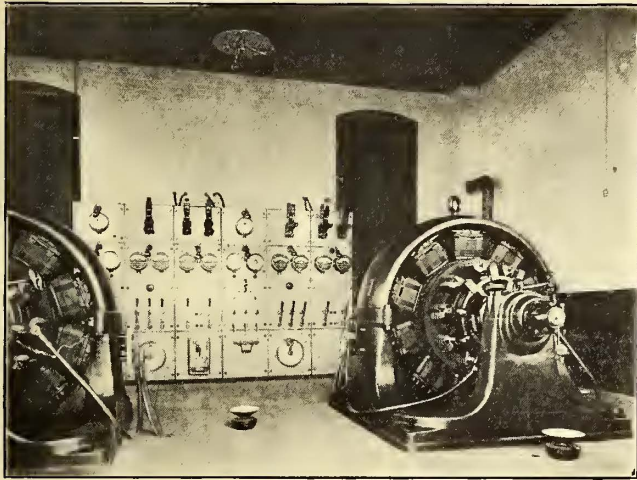
to the tracks of the railway company, where the wires are received on the trolley poles. The high-tension wires are of No. 6 copper and are arranged triangularly with 28 ins. as the minimum distance between wires. At the time of the electrification of the Newburgh line a sub-station was built at a point midway between Newburgh and Evansville. After the completion of the line to Booneville the apparatus in this station was removed to the present one, located about 8 miles out of Evansville on the Booneville division. The sub-station building is of brick. It contains two rooms. In one is installed all the high-tension apparatus, including three 13,200-volt to 265-volt oil-cooled transformers, lightning arresters and stick high-tension switches. The two

6-in. channel bar is bolted to the inside of the side sill, and at each end this bar is bent to extend alongside the end sill to which it is securely bolted. On the bottom side of the side sill is bolted a steel plate the edge of which projects ½ in. beyond the outside surface of the sheathing to prevent the bottom edges of the sheathing being damaged by collisions with vehicles. Each of the four platform timbers is reinforced by 1-in. x 6-in. steel plates which extend back beyond the bolsters. A feature somewhat out of the ordinary is the "barn door" type of construction of the vestibule doors. These consist of two parts, an upper and a lower, the division being made at the height of the belt rail. The two parts may be opened and closed inde-

pendently of each other, permitting the upper half to be opened in warm weather and the lower half closed for the protection of passengers. The floor of the car is double, being filled in between with felt paper. The interior is finished in mahogany ornamented with marquetry work. The ceiling is of the full empire design and the half oval deck sash are glazed with leaded art glass, Holophane globes enclosing clusters of five lights and located in the domes of the ceiling. Peter Smith hot-water heaters are installed.

While this door gives the motorman access to his cab, which is partitioned off from the central portion of the car by a pipe rack, the chief reason for placing it in the end of the car was to permit the hauling of timbers, rails or other freight which, because of its length, could not have been loaded through one of the side doors.

In addition to the electrical equipment, the company still has the cars and engines used before the electrification of the road. This equipment, which is now used for passenger



INTERIOR VIEW OF BOONVILLE SUB-STATION



CAR HOUSE OF THE EVANSVILLE-BOONVILLE LINE

Three of the cars are of the combination baggage and passenger type, while the others are for passengers alone. The car body, which is painted a Pullman green, is mounted on St. Louis Car Company trucks having wheel bases of 6 ft. 3 ins. and fitted with steel-tired wheels. The trucks

service in emergencies only, consists of four closed and eight open passenger cars and three enclosed locomotives with 10-in. x 14-in. cylinders. The freight equipment consists of thirty-two standard gondolas and box cars, but it is the intention to increase this equipment by the purchase of additional gondolas to be used in coal shipments and by a locomotive of standard type.



ONE OF THE COMBINATION PASSENGER AND BAGGAGE CARS

carry four GE-56 motors. Three of the cars are provided with type-M control and two with K-14 controllers. The cars weigh complete 63,000 lbs. each.

The one express car operated on the Boonville division is shown in an accompanying illustration. The car is 45 ft. long and measures 8 ft. 9 ins. over the sills. To avoid overhang of the ends the trucks are placed as far apart as the clearance of the pilot permits. The arrangement of the end doors is somewhat out of the ordinary. In each end a door opening out onto the bumper occupies the space between the right end corner post and the adjacent front post.

REPAIR SHOPS

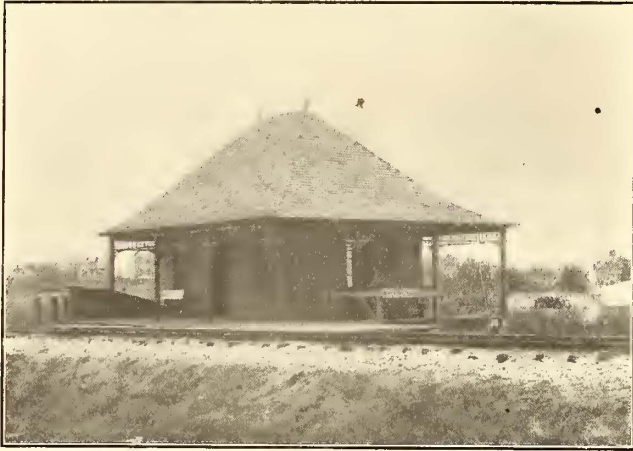
The electrical equipment is housed and repaired in a brick building in Evansville near the city limits. This building, which is 120 ft. long, is divided into two compartments by a fire wall extending lengthwise of the building. In one compartment are two storage tracks while the other, which contains one track with a pit underneath, is used as a repair shop. This room is provided with a concrete floor. An overhead runway facilitates the handling of arma-

tures and heavy parts. A full equipment of machine tools has not yet been installed, but it is the intention to fit the shop up with these within a short time.

OPERATING FEATURES

The road is operated on a very economical basis, and in fact the operating expenses exclusive of taxes and insurance, are only 44.6 per cent of the gross earnings. General Manager Gus Muhlhausen operates the road on the "everybody busy" principle. Another fact tending to reduce the cost of operation is that practically no trouble whatever is

experienced with the electrical apparatus of the cars. During almost two years of operation of the system by electricity but one armature has been lost, and this is thought to have been grounded by lightning. The small amount of trouble is the result of the careful inspection and attention the cars receive in the shop, and partly of the treatment to which they are subjected on the road. Nearly all of the



THE CHANDLER STATION ON THE EVANSVILLE-BOONVILLE LINE

motormen are experienced engineers and, possessing a thorough understanding of machinery in general, they have proper respect for the electrical equipment and know how to observe care in handling it. They are instructed to watch the armature bearings and other parts of the car as closely as was their custom of watching for trouble in the equipment when driving the steam locomotives.

Regular fares are about 2 cents per mile, with a minimum fare, outside of Evansville, of 10 cents. For regular patrons of the road a book with \$12 worth of coupons is sold for \$9, which gives a 1½-cent per mile rate. With the exception of at 7 a. m. and 12 o'clock noon on the Boonville line, a one-hour schedule is maintained between 6 in the morning and 8 at night. The first car leaves Boonville at 6 o'clock and carries about 100 miners to the mines near Chandler, and the last one leaves Boonville at 11:15. The running time between Boonville and Evansville is about 45 minutes. On the Newburgh line cars are operated on a schedule of 1 hour and 20 minutes. Three cars are required to maintain the regular schedule of both divisions. When large excursions are to be handled the old steam locomotives and all of the twelve passenger cars may be pressed into service. By means of a train consisting of a locomotive and seven cars similar to those shown in an accompanying reproduction, together with the electrical equipment, on the occasion of the county fair at Boonville last fall, 3200 people were carried from Boonville to Evansville between 4 and 10 o'clock p. m.

#### FREIGHT TRAFFIC

The system will depend as much on freight receipts as on passenger earnings, and is one of the very few electric railways in existence belonging to steam railway associations. As a member of the American Association of Railways and of the Louisville Car Service Association, it is permitted to receive car-load lots from other roads and to

bill cars through from its own system to foreign points. The road has track connections in Evansville with the Southern and the Illinois Central Railways, and ground has been purchased in Evansville upon which freight yards of ample capacity will be built.

In winter when the Ohio River freezes over, and in the low-water seasons, Newburgh is entirely dependent on the railway for its commodities. But the greater portion of the freight business on this branch consists in the handling of



CONVERTED HOTEL IN BOONVILLE USED FOR A PASSENGER STATION

coal from several mines located on the line. Two steam freight trains handled by the dummy engines are run in each direction daily. Heavy freight traffic has not yet been established on the Boonville division. Package freight is cared for by the express car to which reference has already been made, which makes two round trips between Evansville and Boonville daily.

Several of the mines near Chandler will have track connections with the road, and as the capacity of some of these mines is as high as fifty cars per day, the steam locomotive of standard type to be purchased will handle the coal trains.

#### EFFECT OF ELECTRIFICATION.

A forcible example of the effect of changing over to electrical operation on passenger traffic was shown by comparison of the passenger receipts on the Newburgh division for the last eight months of 1905, when passenger cars were



THE ONE EXPRESS CAR ON THE SYSTEM. AN UNUSUAL FEATURE IS THE NEARNESS OF THE TRUCKS TO THE ENDS OF THE CAR

operated by electricity, and for the eight months of the previous year. Without any cause other than the change in motive power and the increased number of trains the travel shows a 40 per cent increase. The receipts from passenger service during eight months of 1904 were \$9,440, against \$15,936 for the same period of the year following. The months of July and August of the latter year show an increase of 75 per cent in the passenger traffic. When operated by steam, 45 minutes were required to make the trip, as against 28 minutes under electrical operation, and



there were but five trains in each direction on week days, as against eleven when the motive power was changed.

FRANCHISES

All of the company's franchises are perpetual. Neither in Evansville nor in any of the towns is the company required to pay a revenue or franchise tax of any kind. The franchise in Evansville provides for a double track to Fifth and Main Streets and permits the hauling of freight in car-load lots by steam to Canal and Eighth Streets, which is but a few blocks from the wholesale and retail district of the city. The franchise in Boonville permits car-load lot freight to be handled by steam to a point three blocks from the public square, and in Newburg freight may be hauled through the town. The company also owns real estate in the terminal cities and at other points along the railway, exclusive of the right of way, valued at \$35,000 to \$40,000.

The officers and all of the stockholders of the company are Evansville and Newburgh business men who keep in touch with the management of the property and take considerable pride in it. F. W. Cook, as president of the company, is active in the management of the system. The thorough manner in which the construction work has been carried out and the absence of any appearance of cheap work in it is largely due to the efforts and ideas of General Manager Muhlhause, whose experience as general manager of the former steam road has convinced him that the best of track and car construction will in the end result in most satisfaction to the company and its patrons.

IMPROVEMENTS IN SCRANTON

Plans are under way for a \$250,000 viaduct to be built jointly by the steam railroad companies and the Scranton Railway Company, in Scranton, Pa., to eliminate the grade crossings in that city. The viaduct, including approaches, will be 1300 ft. long, and will provide for a double-track electric road and for a 30-ft. highway. The plans are being prepared at the Philadelphia office of the American Railway Company for this structure. The Scranton Railway Company has also a new power station in contemplation.

NEW SOUTH WALES TRAMWAY REPORT

The report of the railway commissioners of New South Wales for the quarter ended Dec. 31 shows for the tramway lines as follows:

Tramways	Quarter Ended Dec. 31, 1906	Quarter Ended Dec. 31, 1905
Miles open .....	127	125¾
Revenue .....	£232,517	£212,456
Expenditure .....	£196,099	£182,355
Tram miles run.....	4,159,133	4,079,208
Earnings per tram mile....	1s. 1½d.	1s. 0½d.
Expenditure per tram mile..	11¼d.	10¾d.
Percentage—Expenditure to earnings .....	84.34	85.83
Number of passengers carried .....	39,745,665	30,320,934

The Chicago Union Traction Company is probably the only electric railway system having in its organization the office of "superintendent of sanitation." This office is held by Thomas J. Manning, who confines his work principally to the sanitation and cleaning of cars.

UNDERWRITERS' NATIONAL ELECTRIC ASSOCIATION

The annual meeting of the Electrical Committee of the Underwriters' National Electric Association to consider changes in the National Electrical Code will be held March 27-28 at the rooms of the New York Board of Fire Underwriters, No. 32 Nassau Street, New York. As is well known, it has already been the endeavor of the Electrical Committee to make only such changes in the Code as become necessary by progress in the art or such as have been shown by some field experience to safeguard hazard, as changes in the Code, even when desirable, cause more or less confusion and trouble. A number of suggestions have been received during the past year in regard to changes in the Code, and the committee feels that it may fairly expect that the parties who have sent in these suggestions will be present at the general meeting and ready to support their recommendations with such arguments as they may have in their favor.

The sub-committee on wiring and equipment of street railway property, including rolling stock, has made the following report in regard to the two matters which were referred to them at the last meeting of the association:

1. Rewording of section submitted permitting of a less distance than 4 ins. between woodwork and the current carrying parts of resistances in panel heaters, as required under Rule 32. Under direction of the Laboratories a series of tests on both panel and cross-seat type of heaters were conducted early last year; the conclusions drawn from these tests were that it was not advisable to change the requirements, and your committee so recommends.

2. In regard to wiring of street railway property the following changes are recommended:

Rule 21: Section d.—Add fine print note to read as follows: The above requirement does not apply to the grounded circuits of street railway systems.

Rule 28: Section b.—Amend to read as follows: Must not be used when the difference of potential between the two wires under normal conditions is over 300 volts.

Rule 33: Section c.—Amend to read as follows: Must have a cut-out switch located at a proper place outside of the building so that the trolley wire in the building can be cut out at one point, and section insulators must be installed so that when this cut-out switch is open the trolley wire will be dead at all points within 100 ft. of the building. The current must be cut out of the building whenever the latter is not in use or the road is not in operation.

Rule 33: Section d.—Amend to read as follows: All lamps and stationary motors must be installed in such a way that one main switch can control the whole of each installation, lighting and power, independently of the main cut-out switch called for in section c.

Rule 33: Section e.—Amend to read as follows: Where current for lighting and stationary motors is from a grounded trolley circuit the following special rules to apply:

1. Cut-outs must be placed between non-grounded side and lights or motors they are to protect.

2. Cut-outs must be so placed that no group of incandescent lamps requiring more than 2000 watts will be dependent upon one cut-out.

3. Switches must be placed between non-grounded side and lights and motors they are to protect.

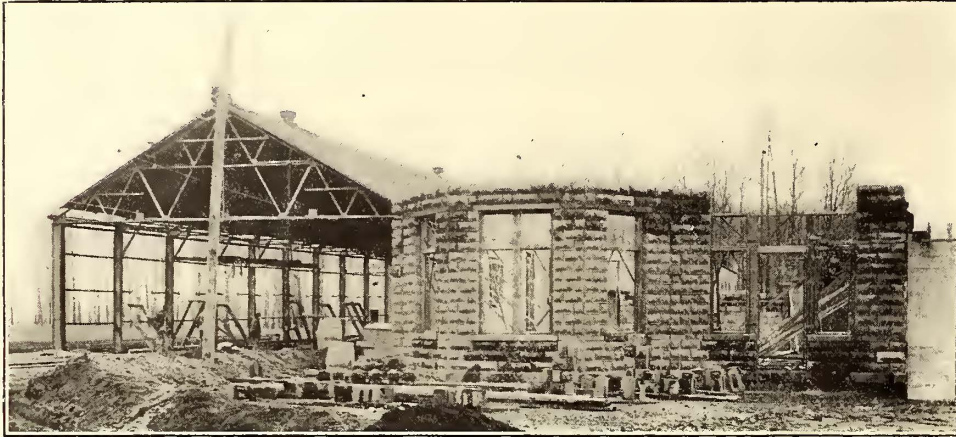
4. Must have all rails bonded at each joint with a conductor having a carrying capacity at least equivalent to No. 00 B. & S. gage annealed copper wire. All rails and all lighting and stationary motor circuits must be connected to the outside ground return circuit by a No. 00 B. & S. gage copper wire, or by equivalent bonding through the track.

Rule 33.—Add new sections to read as follows: All pendant cords and portable conductors will be considered as subject to hard usage (see 45 f).

Must, except as provided in section e, have all wiring and apparatus installed in accordance with rules for constant potential systems.

## THE DUNELLEN TERMINAL OF THE PUBLIC SERVICE CORPORATION AT LINCOLN, N. J.

The Public Service Corporation of New Jersey has recently erected a terminal at Lincoln, N. J., to take care of about fifty cars on the main, Arlington, Netherwood and



CONSTRUCTION VIEW OF THE CAR HOUSE AND SERVICE BUILDING

Bound Brook lines operated from this site. The general design is that of open operating depots so largely adopted by this company because they represent a smaller investment than the closed terminal, can be erected quickly, and are particularly advantageous for this company, as the operating conditions over a large part of its suburban territory are liable to change. Besides it may be turned into a closed terminal when desired. The car house originally was located at Westfield, and was moved to its present site. This proved both easy and economical, as the structure is of steel framing with corrugated iron roof and sides. There has also been erected at this point a shop that will be operated as an overhauling depot in connection with the Plank Road

partition and doors so that it can be kept heated for the benefit of the shopmen. Adjacent to the car house is an addition for washing cars, large enough to accommodate two 25-ft. cars or one large car. This building is separately heated with Peter Smith hot-water heaters and is arranged with a tank for obtaining warm water. The floor is of concrete and is graded to drains which connect with sewers, so that dripping water is quickly carried away.

In the shop proper there are three pits each 50 ft. long, while in the open car house the three pits are 100 ft. long. The cars that need overhauling will be placed over the shop pits, while those requiring inspection only will be placed over the open pits.

An interesting feature of the open car house is the wheel grinder installed for taking out flat spots without going to the shop. This wheel grinder was first described in the *STREET RAILWAY JOURNAL* for Sept. 2,

1905, on page 343, and is now the standard for this work in the Public Service Corporation's shops. Seven of them are now installed on different parts of the system.

The machine consists of two electrically-driven emery wheels mounted on a single casting securely bolted to the pit floor. The emery wheels are arranged to move either in a transverse or vertical direction. To regulate the speed of the wheels the operating current is first sent through a water rheostat. All cars with flat wheels are brought over the wheel grinder pit and jacked up. The car wheels then are made to revolve in a direction opposite to those of the emery grinder. When the grinding is once started an ordinary flat spot can be taken out in the comparatively short



CAR HOUSE FRAMING AND ROOF NEARLY COMPLETED, ALSO SHOWING THE ADJOINING CAR-WASHING HOUSE

shops. Offices and trainmen's quarters are provided in a separate building.

### CAR HOUSE AND SHOP

The car house proper is 205 ft. long and 45 ft. wide, accommodating three tracks spaced 13 ft. centers. The rear of the car house is separated from the main building by a

time of ten minutes. The average cost for grinding a pair of wheels on one axle is about 30 cents.

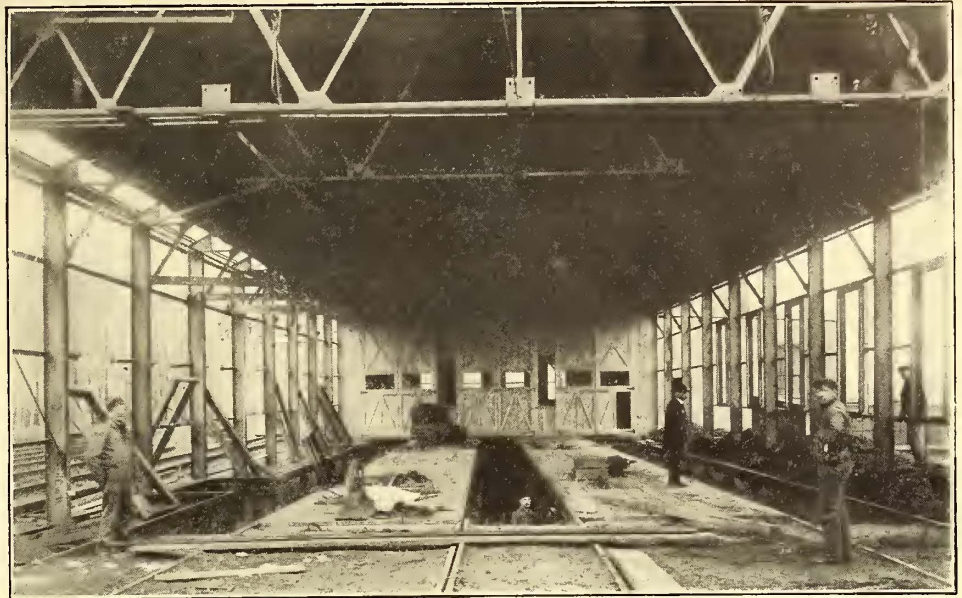
The pits in the shop are equipped with narrow-gage tracks running along the bottom. These are to be used for the operation of a traveling pit air hoist. At each pit a revolving jib crane with chain 8-in. x 5-ft. air hoist to handle

heavy parts to and from the pits to the shop floor is to be installed. Moreover, there will be a traveling chain hoist whose carriage will operate on the bottom of an I-beam supported from the trusses. This traveling hoist will facilitate the lifting of car bodies when trucks are to be run from under them. The shop also contains an electrically-driven forge, lathe, drill press, an air compressor and other machine tools.

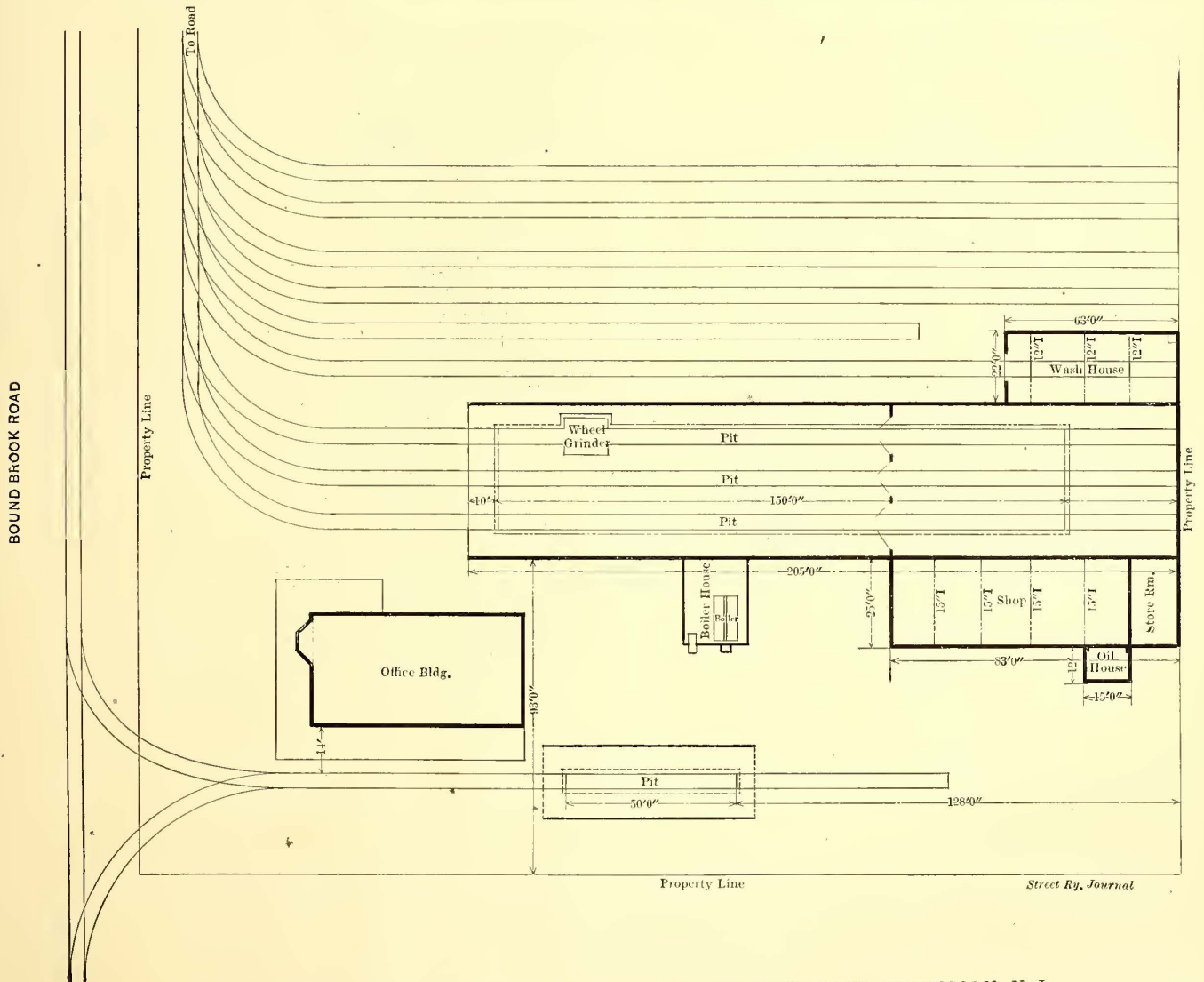
OIL HOUSE

Adjacent to the shop is a fire-proof oil house for storing all the inflammable material necessary about the depot. This oil house follows the standard type adopted by the company for small terminals. From one of the accompanying drawings it will be noted that it covers an area of 7 ft. x 12 ft. The walls are of brick, 12 ins. thick and 7 ft. high. The

of old T-rails placed on 4-ft. centers. The floor is of concrete. In addition to the oil stored in barrels, the oil house



INSIDE THE CAR HOUSE DURING THE CONSTRUCTION PERIOD



GENERAL PLAN OF CAR HOUSE, STEAM PLANT, OFFICES AND STORAGE AT LINCOLN, N. J.

entrance is a standard self-closing fire door. The roof is made of concrete, the reinforcement generally consisting

is equipped with an oil filter and waste tank of the type illustrated in the STREET RAILWAY JOURNAL for Sept. 2, 1905.

OPEN STORAGE TRACKS

It will be noticed from an inspection of the general plan that in addition to the tracks in the car house there are five open storage tracks 300 ft. long, besides the wash house track. The track layout also shows a Y-connection near the office building. This is for single-ending cars that run in either direction from the terminal. The office building is so situated with reference to this track that passengers will be able to step directly off under a shed and go to the waiting room. A shed-protected pit is located in the rear of the Y-track connection to permit the proper inspection of single-ending cars.

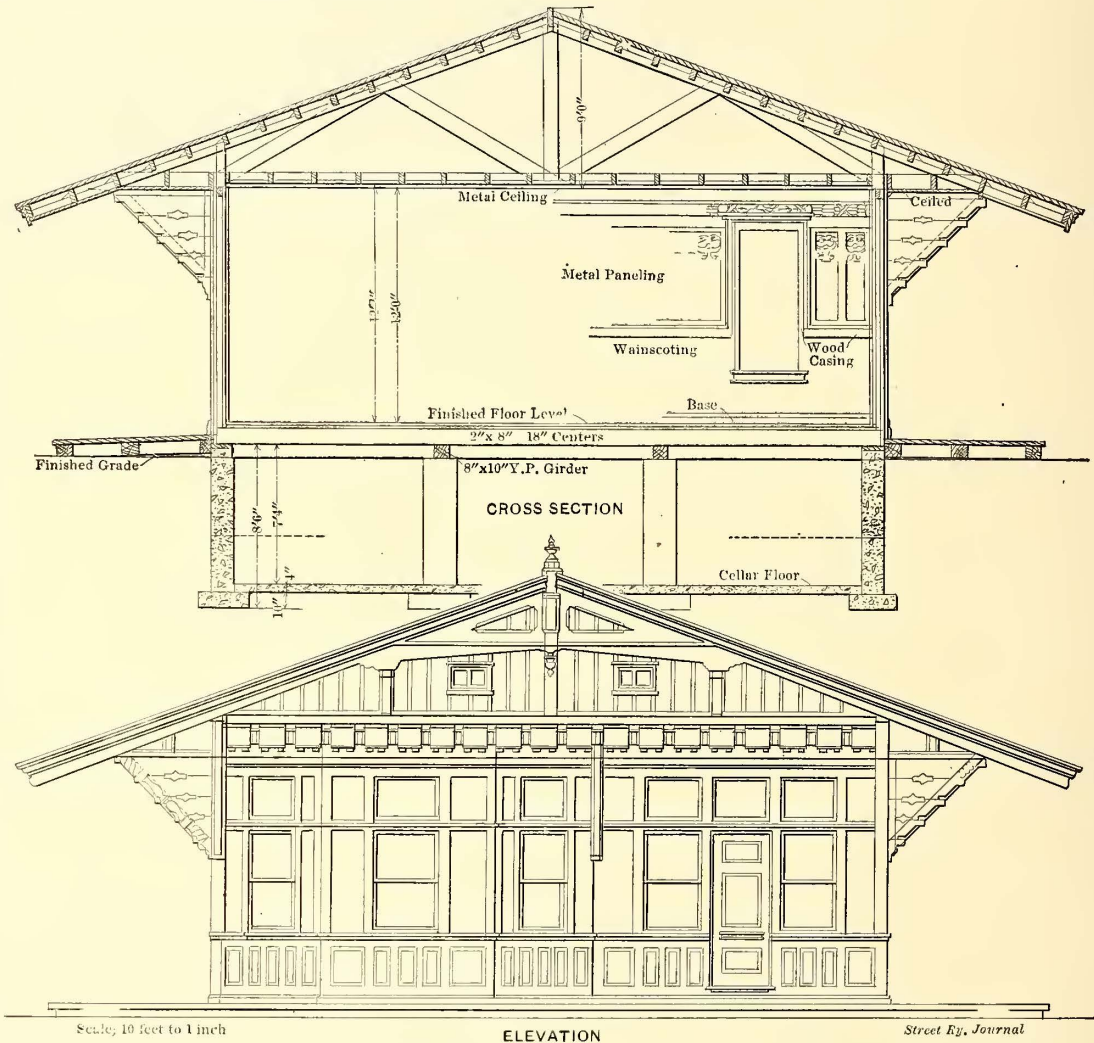
GENERAL SERVICE BUILDING

The building which serves for an office, waiting room and trainmen's quarters is of very neat appearance and is erected on the plan of a small steam railroad station. The building has a bay window front and a low overhanging roof, and, as shown in the accompanying views taken during erection, it is constructed of concrete blocks. The superintendent's office is in the front of the building, where it occupies a space of 19 ft. x 15 ft. The starter will also be located here, as the position of the room makes it easy to get a good view of the track in either direction.

As this installation is a terminal and lay-over point for cars, the waiting room shown was provided. There is also a carmen's room, 22 ft. x 45 ft., which is to be fitted up with pool tables, current literature library and table games. Adjacent to this room is a room for 100 employees' lockers. In may be interesting to note that these lockers will follow the standard type adopted by the Public Service Corporation for all of its terminals. Each locker is 6 ft. high, 12 ins. wide and 18 ins. deep, with the sides and back of sheet metal, while the front door, bottom and shelf are of expanded metal 3/4-in. mesh. Besides the shelf which is 18 ins. from the top of the locker there are five closet hooks. The bottom is 6 ins. from the floor and is supported by small angle-irons with cast-iron feet. The door has three hinges and is equipped with substantial Yale locks, and is also fitted with a hasp and staple to permit the use of separate padlocks. All locks are arranged for a master key kept by the superintendent in his office. These expanded metal lockers

present a very neat appearance, are reliable, and from the points of cleanliness, safety and compactness answer the purpose a great deal better than the old wooden lockers formerly used. They were furnished by Merritt & Company, of Philadelphia, to the specifications of the Public Service Corporation.

Adjoining the locker room is a neat and substantial toilet laid out with slate stalls and baseboard. All of the exposed piping is nickel plated and the other fittings are of heavy porcelain. The floor is of concrete, pitched toward a center drain which allows it to be thoroughly washed out with a hose at frequent intervals. The floor of the rest of the building is comb-grained yellow pine, kept well rubbed and oiled.



CROSS-SECTION AND ELEVATION OF DUNELLEN OFFICE BUILDING

HEATING SYSTEM

Heat is furnished for the shop and office building from the boiler house indicated on the general plan. This is a depressed room whose roof and glass side extend 4 ft. above the ground. This arrangement brings the boilers low enough to permit the water of condensation from the radiators in the office and shop to return by gravity.

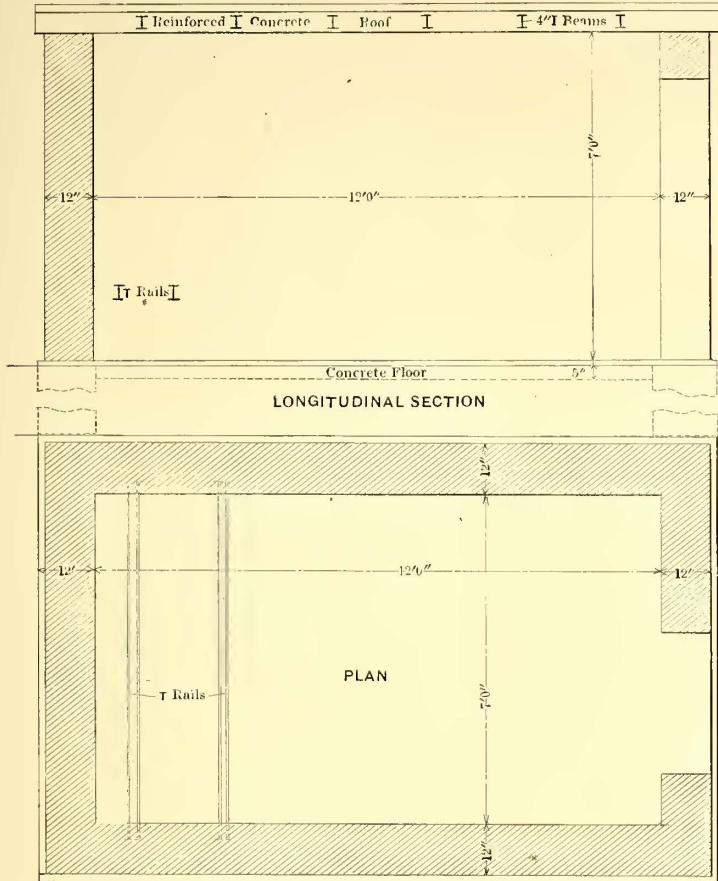
The boiler equipment consists of two Bundy cast-iron boilers removed from Westfield. They are of such capacity that taken together, they furnish ample heat in the coldest weather; in milder weather only one boiler is put on the line. Hence this arrangement easily secures the desirable flexibility in service. The radiators in the office building are new, and while steam pipes were originally intended for the

car house, the company happened to have so many old radiators on hand that it was found desirable and economical to use them in this car house.

**FIRE PROTECTION**

The building and office are equipped with chemical fire extinguishers and inside hose connections to standpipes; there are also outside connections to fire hydrants. Fortunately the water pressure in the vicinity is upward of 85

buildings are of bridge construction and corrugated iron and cost \$60,000. The street car company is now using them for making repairs to its rolling stock. The buildings just finished are but part of the large plant which the street railway corporation has in contemplation on its Ocean Avenue property. Eventually it will spend several hundred thousand dollars on improvements at this point, but in the immediate future the building will probably be limited to a



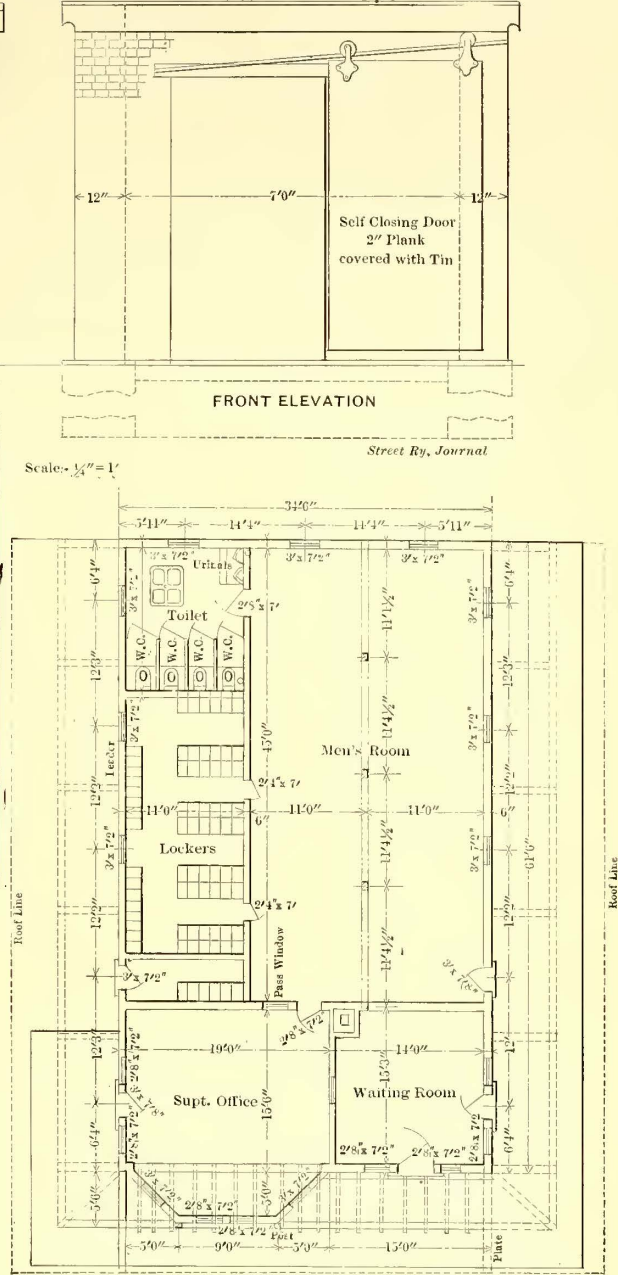
PLAN, ELEVATION AND SECTION OF OIL HOUSE

lbs., a condition which is very favorable for fire fighting and made unnecessary the installation of pumps or of elevated storage tanks.

**UNITED RAILROADS REBUILDING ITS CABLE PLANT—NEW MOTOR AND TRUCK SHOP**

The United Railroads of San Francisco is rebuilding its cable power house at Washington and Mason Streets to almost twice its original size. The company has bought two lots adjoining on Washington Street, and has begun tearing down some new flats that were started there. It has also bought two lots back of these and extending completely through to Jackson Street, so that the whole land area is now 180 ft. 6 ins. on Washington Street and 187.6 on Mason, with a wing 170 ft. long and 50 ft. wide extending to Jackson Street above the corner. The new building is to be of brick and three stories high. The old chimney has been cut down and rebuilt and is now but 60 ft. tall, as that height is ample for fuel oil. The building will be completed in four months.

The Scofield De Palos Company has completed a motor and truck shop, 96 ft. x 306 ft., and a machine shop, 96 ft. x 102 ft., both one story in height, for the United Railroads at the corner of San Jose and Ocean Avenues. These



Projection of Gable GROUND PLAN GROUND PLAN OF OFFICE BUILDING AT DUNELLEN TERMINAL

reinforced concrete warehouse, to cost \$90,000, and in addition to the machine shop just finished, which will cost about \$30,000. These two buildings will be of bridge construction. Plans are being prepared in the office of Chief Engineer Hartwell, of the United Railways, for a car house on H Street, between Thirteenth and Fourteenth Avenues, that will occupy an area of 250 ft. x 400 ft. and will cost about \$100,000. The contract has not yet been awarded for this building, which will contain eighteen tracks, capable of accommodating 150 cars of the new type adopted by the company. The building will be fireproof.

**PROPOSED REINFORCED CONCRETE TRACK CONSTRUCTION**

Martin Schreiber, engineer maintenance of way of the Public Service Corporation of New Jersey, has proposed a concrete track construction for paved streets which presents the novelty of reinforcing rods for the footings to give a continuous beam construction and expanded metal or reinforcing rods in the concrete bed under the paving. The reinforcement for the footings consists of three 7/8-in. twisted rods on each side. This reinforcement considerably reduces the amount of concrete required and at the same time strengthens the sub-structure so much that even heavy street cars should have no difficulty in getting over soft foundations without depressing the track. This assumption is confirmed by a case in Cleveland where cars were operated for days over a cavity caused by a burst water pipe without any effect on the concrete roadbed. With proper reinforcement, of course, the construction would be even better.

It will further be noted from the illustrations that the footings are 1 ft. 8 ins. wide at the base and extend to a height of 1 ft. 5 ins. before reaching the concrete under the pavement. The footings are of rectangular section for convenience in pouring the concrete. The pavement, whether block or asphalt, rests on a 1-in. sand cushion and 4 ins. of

but are spiked to tie-plates which are bolted to the blocks by two anchor bolts.

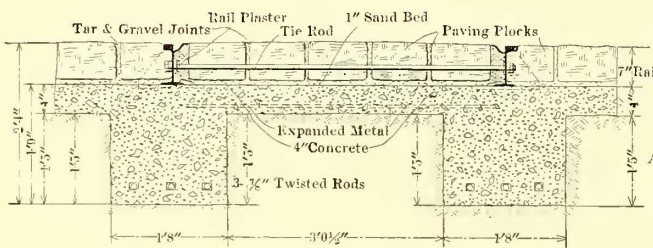
This construction requires no wood or metal ties, but the track is held to gage by the brace tie-plate construction every 7 ft. and the tie rods installed midway between the blocks, so the rails are held to gage actually every 3 ft. 6 ins.

As the concrete is not allowed to extend higher than the base of the rails, all that is necessary to replace worn-out rails is to take up the pavement and loosen the fastening between the rail base and the rail brace plate. As these plates cover the block completely, the latter is saved from wear and will last practically as long as the rest of the sub-structure.

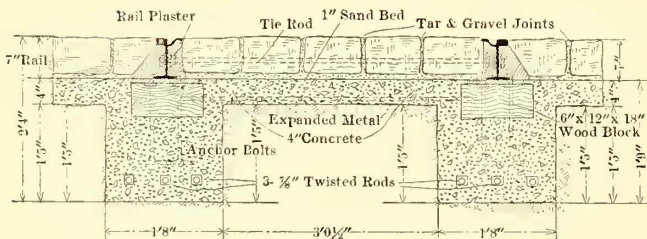
Mr. Schreiber estimates the total cost of this construction as outlined on the drawings, would be about \$6 per running foot of single track. It is to be understood that this construction is advocated only where there is no likelihood that the tracks will have to be disturbed for water and gas pipes, conduits, etc.

**CINCINNATI CAR MEN TO VISIT EASTERN CITIES ON AN INSPECTION TOUR**

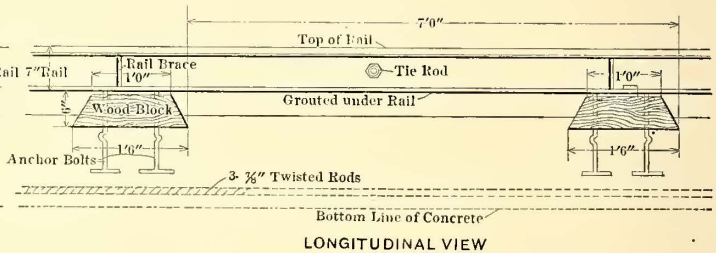
The annual outing of the Street Railway Employees' Mutual Benefit Association will be held at Chester Park on



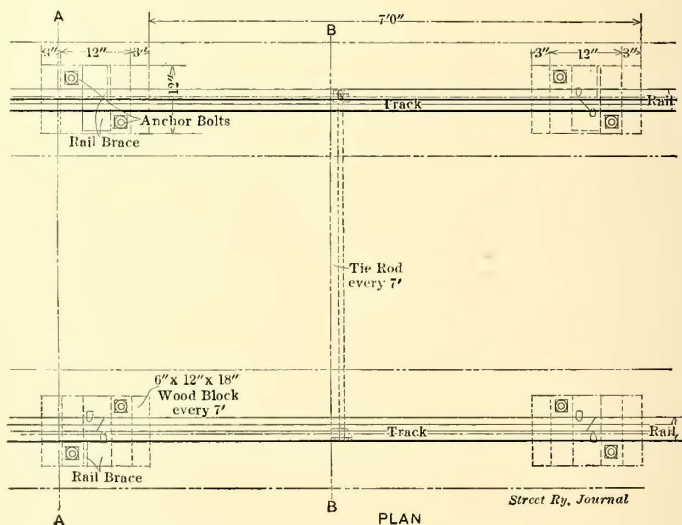
CROSS SECTION ON LINE B-B



CROSS SECTION ON LINE A-A



LONGITUDINAL VIEW



PLAN

SECTIONS AND PLAN OF PROPOSED REINFORCED TRACK CONSTRUCTION IN CITY STREETS

concrete reinforced either with continuous expanded metal or 1/2-in. twisted rods placed every 8 ins.

The rails are not fastened directly to the concrete but to brace tie-plates laid on 6-in. x 12-in. x 18-in. wood blocks placed at intervals of 7 ft. These blocks give greater elasticity to the track than is possible with the usual all-concrete construction. The rails do not rest directly on the blocks

June 20, 21 and 22, three days having been decided upon in order that the time may be so divided that all employees may attend, and also because of the large crowds that are always present. It has been decided to send twenty-four of the most popular employees on a circuit of the East, stopping three days in New York, two at Atlantic City, two at Washington and three at the Jamestown Exposition.

**CORRESPONDENCE**

**ON THE SUBSTITUTION OF THE ELECTRIC MOTOR FOR THE STEAM LOCOMOTIVE**

New York, March 11, 1907.

Editors STREET RAILWAY JOURNAL:

In your issue of Feb. 9 you printed a letter from G. B. Henderson discussing certain features of the paper which we had the honor to present at the meeting of the American Institute of Electrical Engineers on Jan. 25. Mr. Henderson attempts to show that we have made mistakes in our conclusions in respect to certain important factors, and we have thought it might be worth while to point out some of the fallacies of assumption which have led him to conclusions materially differing in some respects from those at which we arrived. We also avail ourselves of the opportunity to explain certain details of assumption and calculation which we had not thought it necessary to include in our paper.

Perhaps the most important factor of operating costs in respect to which Mr. Henderson's views are not in agreement with the results of our calculation is the item "Fuel." In discussing this important subject in our paper we endeavored to adopt and follow a conclusive line of reasoning. We were careful to state in detail the facts and assumptions upon which we based our calculations of aggregate freight and passenger ton-miles. In estimating the average works cost of the kilowatt-hour we took the figure 0.6c.; this figure being somewhat in excess of the actual results attained at the Seventy-Fourth Street plant of the Interborough Rapid Transit Company. We showed that this is the cost in a plant using coal at \$3 per ton and employing high-priced labor. We pointed out that where "fuel is less expensive, as in the Middle West, large modern plants, using steam turbines, are producing the average kilowatt-hour at a price not exceeding 0.5c. exclusive of capital charges, and in at least one case at a works-cost approximating 0.4c." We were very careful to state the essential points in our reasoning in detail, and the conclusion reached was stated as follows:

"The cost of a kilowatt-hour effective for traction, therefore, is 0.8c., and the cost of a horsepower-hour effective for traction about 0.6c., of which 0.35c. is for fuel when coal of 14,000 B. T. U. per pound costs \$3 per ton of 2240 lbs., and 0.25c. is for other power-house supplies, power-house labor and maintenance of power-house equipment."

As our estimates of average length of run and average speed of train were necessarily approximations and not established facts, we included in our paper charts showing the effect upon power consumption of changes in assumptions covering length of run and average speed. These charts showed that no probable error in the assumption, sufficient to cause a material error in our estimates of the energy required, can exist.

Incidentally, and in the way of corroboration, we obtained from the records of the Manhattan Railway Company the actual aggregate coal consumption and the aggregate ton mileage during the year ending June 30, 1901, when steam locomotives were employed, and during the year ending

June 30, 1904, when electricity was exclusively used. From these quantities we calculated directly the ton mileage per pound of coal in the case of each of the two contrasted motive powers. Our conclusions were stated in the paper as follows: "The average speed under electric operation is approximately 2 miles an hour greater than that attained by steam, and if correction be made for this difference the ratio of ton-mileage per pound of coal, excluding weight of locomotives, is approximately 3 to 1, and including locomotives 2 to 1 in favor of electric traction."

Mr. Henderson attempts to controvert conclusions thus carefully worked out by the following statement: "The continuous service given on the elevated lines is certainly very conducive to a small fuel account, but we could not expect such satisfactory results from overland freight traffic.

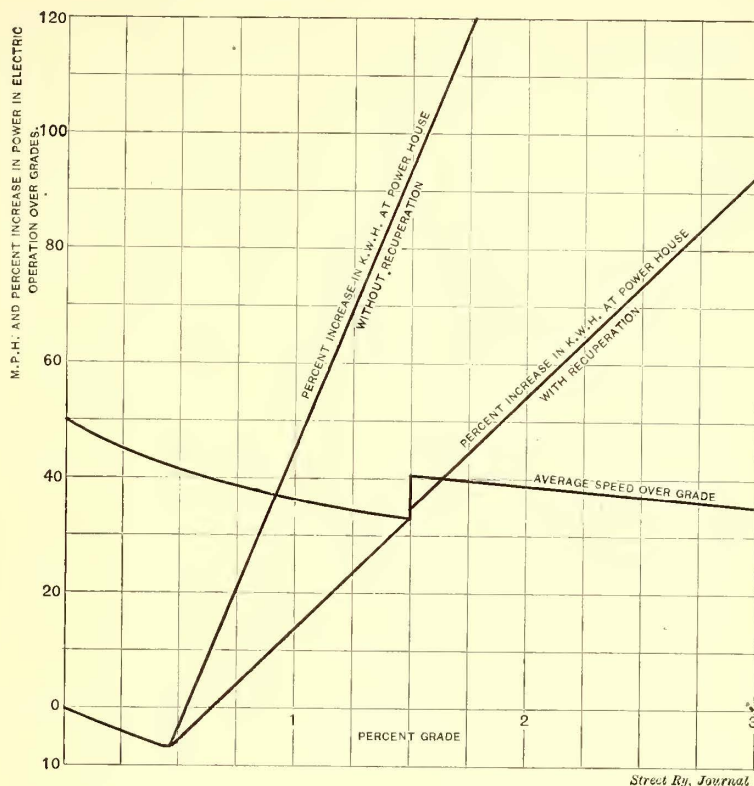


FIG. 1.—POWER CONSUMPTION DUE TO GRADES IN PASSENGER SERVICE

Passenger Service, 300-Ton Train, including 1 Locomotive; 50 M. P. H. Down Grade; No Stops Included; Single-Phase Motors; Motor, 85 Per Cent Efficiency; Transmission, 90 Per Cent Efficiency.

The tests made at the St. Louis Exposition indicate that under favorable conditions a locomotive may operate with a consumption of about 2 lbs. of coal per horsepower-hour, but there are many cases, as where heavily-loaded freight engines are ascending steep grades, in which the consumption may be two or three times that amount. Therefore we believe that some advantage will accrue in the cost of train operation, but by the time we allow for the transmission losses and develop at our locomotives only 70 per cent of the power produced at the central station, it is apparent that we cannot expect such a ratio of improvement as 3 to 1, which has been suggested, or even possibly 2 to 1." Of course there is no argument embodied in Mr. Henderson's statement. It is simply an expression of opinion, and the confusion of ideas is such that it would be entirely pertinent to content ourselves by referring him to the text of

our paper, but his letter apparently is written in good faith, and as it is typical of much so-called reasoning published from time to time in our technical journals, it may be worth while to point out some of its errors.

In the first place, his statement that the "continuous service given on the elevated railways is conducive to small fuel account," and that "similar satisfactory results could not be expected from overland freight traffic," is an unusually flagrant case of what logicians call "begging the question." As a matter of fact the energy per ton-mile in Manhattan service is about 100 watt-hours, while in the average passenger service of the United States it will approximate 33 watt-hours and in freight service 18 watt-hours. If by "continuous service" he refers to load factor he is answered by the fact that on the Manhattan this

used to-day requires not more than one-half the amount of coal per ton-mile which was consumed in the days of steam operation. Moreover, electric service on the Manhattan, which shows this superiority over the exceptional steam service which preceded it, is using 100 watt-hours per ton-mile, as against one-third of that amount which would be required in the average passenger service of the United States and one-fifth of that amount which would be required in average freight service. The high energy consumption in Manhattan service is, of course, due to the fact that trains stop about three times in each mile and attain comparatively high speed between stations.

All this possibly may be confusing to the class of railway men who have been accustomed to deal with energy problems along the lines indicated in Mr. Henderson's communication, but it may be useful to the many clear-headed steam railway engineers who are capable of appreciating the value of careful analysis of utilization of waste energy which in 1905 cost the railroads of the United States something over \$156,000,000.

The attempt to reach accurate conclusions relative to aggregate fuel consumption by starting with test conditions of a model locomotive and applying loose guesses and assumptions to the results obtained under these test conditions is practically useless. In the early days of electric lighting the companies supplying dynamos and engines talked of 4 lbs. of coal, or even 3 lbs. of coal, per kilowatt-hour. Some years later the National Electric Light Association collected statistics of coal consumption based upon actual bills paid by central station companies, and found for many hundreds of central station plants that the grand average fuel consumption was more than double the figures based upon tests. A similar mistake is made by Mr. Henderson in this instance, and has been made by others who have attempted to deal with this question.

Mr. Henderson says further: "But by the time we allow for the transmission losses and develop at our locomotives only 70 per cent of the power produced at the central station, etc., etc." It is difficult to realize how any one who has taken the trouble to read our paper and our calculations could fail to understand that our figures from Manhattan records covering fuel consumption comprise all losses as well as power actually utilized in the propulsion of trains and for train auxiliaries.

Referring to our diagrams showing the relations of speed and energy consumed, Mr. Henderson remarks that "It seems as if they were based upon trains on a level only and that no allowance has been made for the adverse effect of rising grades."

He remarks further: "It must not be assumed that an undulating profile will require no more power than a level division, because the work of ascending a grade is a very severe and heavy draft on the power whatever it may be, and which is not compensated by the following run down hill, even if this should be of as great amount as the ascent." It is pertinent to remark here that "what goes up must come down," and, therefore, since trains operate in both directions, down grades, in the aggregate, must be equal to up grades. The point which Mr. Henderson has in mind is a very serious one in the operation of steam locomotives and

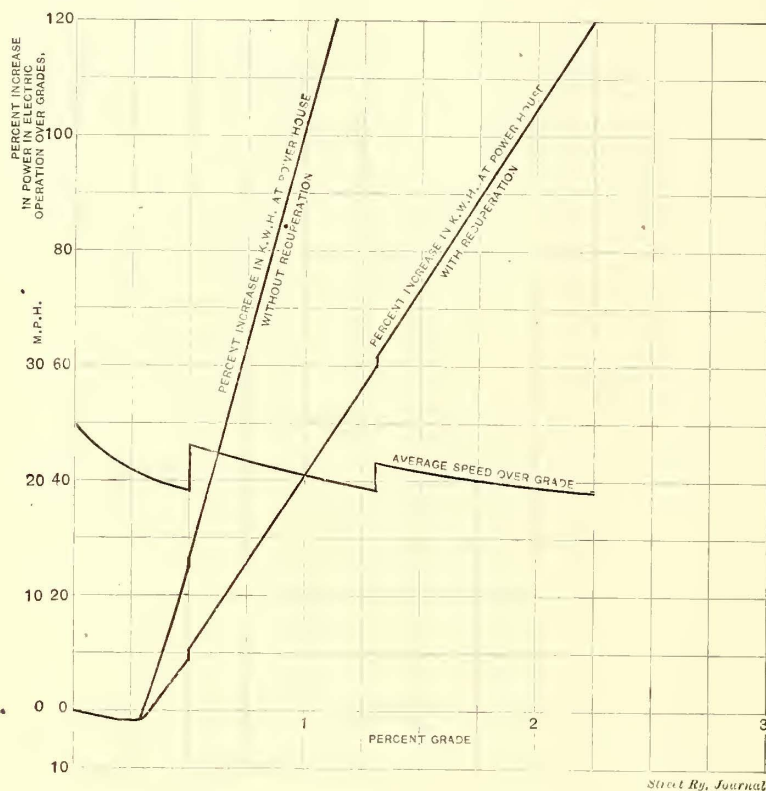


FIG. 2.—POWER CONSUMPTION DUE TO GRADES IN FREIGHT SERVICE

Freight Service, 1300-Ton Trains, Including 1 Locomotive; 25 M. P. H. Down Grade; No Stops Included; Single-Phase Motors; Motor, 85 Per Cent Efficiency; Transmission, 90 Per Cent Efficiency.

factor does not exceed 0.5, while in overland freight traffic, if stretches of line 300 miles in length be supplied from each power house, the average load factor will be very materially higher.

If, on the other hand, he means to assert that when steam locomotives were used on the Manhattan conditions of service were such as to favor high fuel economy, as compared with average conditions in overland freight traffic, he is undoubtedly correct. The point, however, does not favor his contention that our estimates are in error. On the contrary, it emphasizes the superiority of electric service. In other words, we have compared electric service on the Manhattan elevated with the exceptionally economical steam service which preceded it, and we have shown that, notwithstanding the very excellent economy in fuel consumption attained in that steam service, the electric equipment





operation in this country would be at least double that which has been estimated by the authors." This conclusion may be satisfactory to Mr. Henderson, but it certainly is not convincing.

Mr. Henderson, by reasoning (?) similar to that which he brings to bear upon the fuel consumption, apparently satisfies himself that about twice the power house capacity indicated by our estimate would really be requisite for the operation of the railway systems of the United States. It is unnecessary to attempt to follow him, but it may be well here to define the load factor assumptions upon which our estimates are based.

The report of the Interstate Commerce Commission gives the total revenue traffic for the entire United States for the year ending June 30, 1905, as 1,038,441,430 train-miles, of which 459,827,029 is passenger train mileage and 546,424,405 freight train mileage. The unclassified balance, 32,189,

are within current practice in plants now in commercial operation in this country, under conditions and for purposes identical with those contemplated in our paper.

In our calculations we assumed that passenger trains are geared for a maximum speed of 50 m. p. h. and freight trains 25 m. p. h., on a tangent and level track. We assumed that the average run of passenger trains is 10 miles and freight trains 15 miles between stops. With the gear ratios used this gives an average speed of 40.5 and 23 m. p. h., respectively. At these speeds the average load on each power station supplying 300 miles of line is 1.98 passenger trains and 3.84 freight trains, an average of 5.82 trains of both kinds. With equal intervals between passenger and freight trains, respectively, the average load on the power house is 2100 kw, the load factor is 0.97, and the maximum momentary peak is estimated to be 3000 kw. This method of operation is shown in Fig. 3.

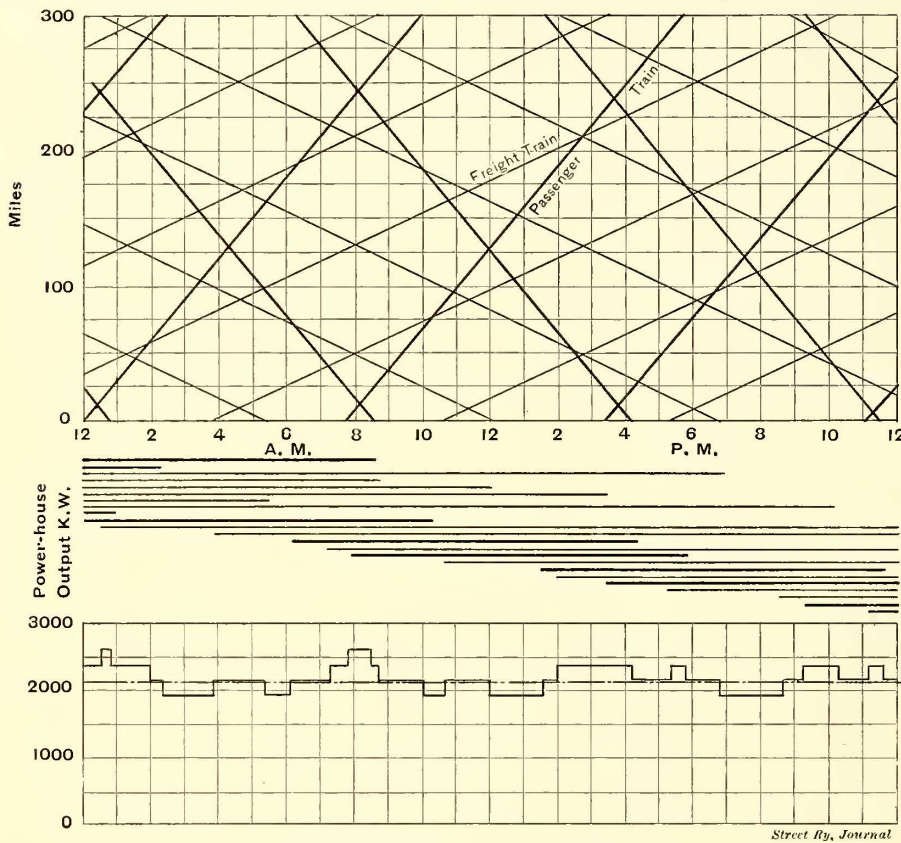


FIG. 4.—POWER-HOUSE LOADS, REDUCED SPEEDS

The schedule speeds above mentioned include momentary stops only. As trains are now operated the average passenger train, owing to stops and delays of various kinds, does not make more than 30 m. p. h., and through and local freight trains probably do not average more than 12 m. p. h. In Fig. 4 we have illustrated the results at the power house if trains were operated at these modified average speeds. The average load remains practically the same as before, while the load factor is reduced to 0.823 and the estimated maximum momentary peak is increased to 4700 kw. Our estimate of the total power house capacity

DATA FOR FIG. 4

Passenger trains, ave. speed 30 m. p. h.	
Freight trains, ave. speed 12 m. p. h.	
Average trains per section, passenger....	2.6
freight .....	7.4
Total ....	10.0

Average load, 24 hours:  
 $(2.6 \times 210 + 7.4 \times 187) \div .90 \text{ eff.} = 2140 \text{ kw at p. h.}$

Estimated momentary peak, 85 % eff.

$\frac{1}{3}$  trains accelerating,  $\frac{1}{3}$  running,  $\frac{1}{3}$  standing = 4720 kw at p. h.  
 Load factor, 1 hour reading = .823.

996, we have assumed to be mail and express train mileage. Including the mail and express trains with the passenger train service there is an average of 6.2 passenger and 6.9 freight trains per mile of line per day, or approximately 7 trains each way per day.

Using average weights of equipment, as stated in our paper, and the average haul of goods and passengers, the traffic amounts to 3,000,000 ton-miles per mile of line per annum, of which 600,000 ton-miles is in passenger service and 2,400,000 ton-miles in freight service. In electric operation these figures would be reduced by the weight of engine tenders and a part of the weights on pony trucks.

To supply electric power for the operation of the steam roads, we have assumed that the power houses would be located at average intervals of 300 miles. This requires a transmission of 150 miles, and for this purpose we assumed in our calculations 60,000 volts. As stated in our paper, both the distance of transmission and the voltage employed

ity of all the railroads of the United States is 2,100,000 kw, which is approximately 3000 kw for each 300-mile section. This is nearly 50 per cent in excess of the average load. The generators proposed for this power house equipment have a momentary overload capacity of 100 per cent and can carry an overload of 50 per cent for several hours. It is evident, therefore, that the average power plant provided, after deducting 20 per cent for reserve, is ample to take care of ordinary variations in traffic.

It is manifestly impossible for railroads to operate their passenger and freight trains on equal headway. Some roads as a matter of convenience dispatch freight trains in "fleets" and cattle and some produce trains must arrive at their destinations at fixed times of the day. This method of operation is desirable and practicable in steam operation, and obviously is objectionable in electric operation, as power house capacity must be provided for the maximum number of trains on the division. On the other hand, on those

roads where traffic is most congested, the track facilities can best be utilized by equal spacing of trains. When this question becomes important, therefore, the natural tendency is towards an approximately equal distribution. As the generators included in our estimates have a continuous overload capacity of 25 per cent, 50 per cent for several hours and 100 per cent momentarily, and as we have provided an excess of nearly 50 per cent in case of emergency, the power house capacity provided is ample for any reasonable variation in the method of operating trains. In this connection, we would call attention to the fact that, under average conditions, freight trains require twenty-five hours to traverse the length of line supplied from a single power house, hence if trains are dispatched in "fleets" a second "fleet" will begin to draw upon the power house as the first "fleet" passes off, the power house load remaining practically constant.

Mr. Henderson quotes Mr. Wilgus, of the New York Central, to the effect that in the electrification of the New York terminal of that system "The actual cost of electrification was only about one-fourth of the total cost of expenses made necessary by that electrification." He does not undertake to explain this remark, but apparently is much impressed by it, and infers that the cost of electrifying railroads should be multiplied by four to cover total costs of the change. This, of course, is erroneous. It is probable that Mr. Wilgus included in the statement referred to the cost of the new terminal buildings, the double-deck track terminal and the very expensive yard construction involved in the plans which the New York Central has adopted and which provide for a great increase in the traffic which it is expected to handle at Forty-Second Street terminal. Obviously the cost of excavation incident to alteration in track arrangements and the cost of new and expensive terminal buildings, in no way a necessary concomitant of electrification, should not be charged against electric power. So far as our estimates are concerned they are based, as stated, upon duplication of existing motive power equipment, including, of course, power houses and systems of electric distribution. Naturally they include nothing for such work as increase of terminal facilities which may be necessary to provide for increased traffic.

LEWIS B. STILLWELL.

H. S. PUTNAM.

### THE NEW YORK CENTRAL ACCIDENT

The shearing of the spikes on the outside rail of the 3-deg. curve near Woodlawn Bridge, where the New York Central train was wrecked on Feb. 16, has attracted a great deal of attention to the theory of superelevation on curves, the strength of spikes and the strains produced on curves by steam and electric locomotives operating at different speeds. The evidence before the coroner and Railroad Commission showed that the same type of electric locomotive as that used with the wrecked train had frequently been run at Schenectady and on the so-called "instruction tracks" in the New York zone near Highbridge under the same conditions as they would have in actual service except that the speed was higher than normal, yet the electric locomotives showed no tendency to widen the gage. Some studies made subsequent to the accident by the engineers of the General Electric Company, the American Locomotive Company and the railroad company indicated, in fact, that the electric locomotive imposes a maximum strain on the track in question that is well within the factor of safety, and at 60 m. p. h. is only slightly more than the standard Atlantic type of steam

locomotive used by the New York Central Company. An abstract of this analysis is given below:

There are three fundamentals of "mechanics of curve resistance":

- (1) Component of slipping in the direction of the radius, due to curvature.
- (2) Component of slipping in the direction of the tangent of track, due to unequal rail lengths inside and outside.
- (3) Net effect of centrifugal force (super-elevation of outer rail considered).

In determining the effect of these components, consideration should be given to the action of the rigid wheel base on the curve in question, taking into account the clearance in the gage and the clearance between the main drivers and the rigid frame.

It will be appreciated that the radial slip on the front outside driver of either an electric or steam locomotive when rounding the curve is self-contained and of itself does not tend to displace the rail, and that the radial slip on the inside front driver does tend to displace the outer rail acting through the front axle to the outer front driver. If the clearance between the driving wheel hubs and the locomotive frame is more than the ordinate of the curve at the second axle, the second axle will run to the outer rail until the flange of outer second driver bears against the rail, thus the frame of the locomotive does not have to carry the radial slippage of the second set of wheels. The centrifugal effect (3) and the super-elevation of the outer rail are readily calculated and need no explanation.

To solve the problem to the last refinement becomes a complicated and tedious investigation, but if the fundamental and major elements only be considered the guiding effect may be determined with sufficient accuracy for all practical purposes.

Where the second driving axle bears against the locomotive frame and so transmits the radial thrust of the second axle to the outer front driver, a comparison of the New York Central electric locomotive with the Atlantic type steam locomotive on a 3-deg. curve with a 4½-in. super-elevation shows that the pressure of the steam locomotive driver against the rail (force *P*) is greater at all corresponding speeds. The resultant shear on the spikes, however, allowing for the friction of the rail on the tie plates, is less with the steam locomotive than with the electric up to about 80 m. p. h., where the shear on the spikes due to the outer front driver is practically the same for both.

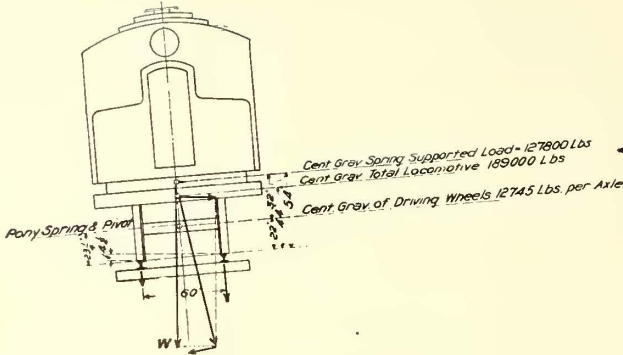
The difference between the pressure against the rail and the shear on the spikes is affected so far as the drivers are concerned by the height of the center of gravity, which, under the influence of centrifugal force, increases the vertical pressure on the outer rail. The greater effect of the higher center of gravity of the steam locomotive disappears, however, at the higher speeds by reason of the increasing preponderance of the horizontal force due to centrifugal action. At about 90 m. p. h. the shear on the spikes for the steam locomotive would not only be in excess of that of the electric locomotive, but at this speed the steam locomotive would be in danger of overturning.

The maximum shear on the spikes is not necessarily caused, however, by the driving wheels of the locomotives, but at certain speeds may exist at the leading wheel of the guiding truck. Although the pressure of the guiding truck wheel against the rail may be actually less than that of the driver, the weight upon the rail of the guiding wheel is so much less that the resultant shear on the spikes is consequently greater.

due to the effect of its higher center of gravity.

Under this second condition the shear on the spikes due to the guiding truck is in excess of that due to the drivers up to about 75 m. p. h. On the steam locomotive the shear on the spikes due to the guiding truck is in excess of that due to the drivers at all speeds, and this shear exceeds that of

either the driving or truck wheels of the electric locomotive up to 75 m. p. h.

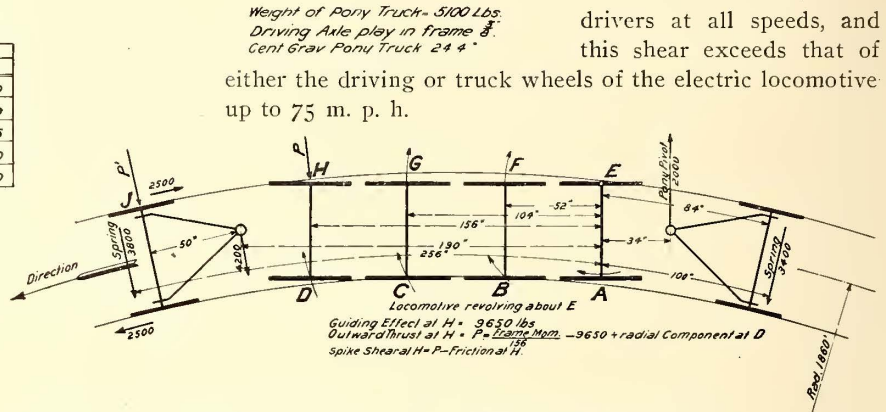


Speed M.P.H.	Weights on Rigid Wheel Base							
	A	B	C	D	F	G	H	
40	14325	20570	18500	17500	13725	15745	16750	
50	13775	19975	17100	16800	14275	17140	17450	
60	13125	19300	15945	15645	14945	18300	18605	
70	12425	18500	14900	14300	15745	19355	19950	
80	11425	17600	13770	12770	16650	20470	21480	

FIG. 1.

On the electric locomotive the shear on the spikes at J, due to the guiding truck is in excess of that due to the drivers up to about 40 m. p. h. On the steam locomotive the shear on the spikes due to the guiding truck is in excess of that due to the drivers up to about 65 m. p. h., and this shear exceeds that of either the driving or truck wheel of the electric locomotive up to between 50 and 60 m. p. h.

Considering, second, the conditions



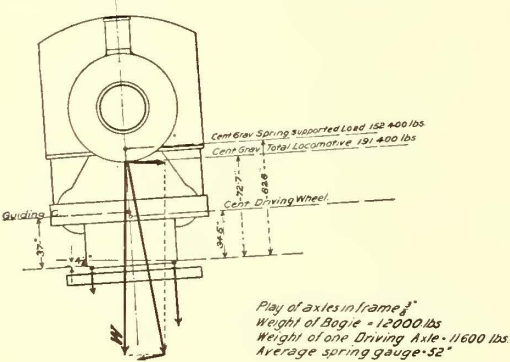
Speed M.P.H.	Centrif Effect at H	Friction Resistance Rigid Wheel Base						Rad. Comp. at D	Ave. Cent. Thrust longitudinal at H		Ave. Cent. Thrust radial at H		P'	Spike Shear at J
		A	B	C	D	F	G		P	P'				
40	1590	3600	5150	4620	4380	3440	3920	4180	4080	4740	560	3860	6410	2410
50	1320	3450	4980	4300	4200	3560	4280	4360	3930	7400	3040	4120	6600	2570
60	4880	3300	4800	3980	3900	3740	4560	4650	3640	10470	5820	4480	6830	2780
70	9050	3130	4620	3720	3580	3940	4830	5000	3350	14130	9130	7460	2460	7100
80	13790	2900	4400	3430	3200	4150	5100	5360	2970	18360	13000	11000	5640	7400

FIG. 2.

Summarizing, then, it will be seen from the attached tables that for a speed of say 60 m. p. h. on a 3-deg. curve with a super-elevation of 4 1/2 ins., the maximum shear on the outer spikes of the outside rail under the most unfavorable conditions is for the electric locomotive 5820 lbs., as compared with 4890 lbs. for the steam locomotive. The ultimate shearing resistance of the standard spikes used on the curve

in question ranges from 14,440 lbs. to 17,060 lbs. Assuming a factor of safety of 4, the permissible shear per spike is 3810 lbs. up to 4265 lbs.

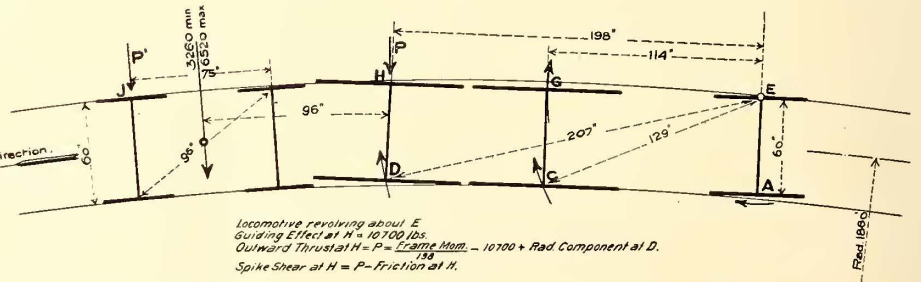
The 100-lb rail in use on the curve acts as a continuous girder distributing the stresses over several spikes, but to



Speed in M.P.H.	Weights on Rigid Wheel Base				
	A	C	D	G	H
40	22120	27085	27085	25165	25165
50	20540	25365	25365	26885	26885
60	18590	23245	19545	29005	32705
70	16580	21055	14555	31195	37695
80	13640	17945	7245	34305	45005

FIG. 3.

where the second driver axle clears the locomotive frame by reason of the end play and so bears directly against the outer rail without transmitting to the leading driver the thrust due to its radial slip; the pressure against the rail of the leading steam locomotive driver as in the first condition is greater at all corresponding speeds. The resultant shear on the spikes is less, however, with the steam locomotive,



Speed M.P.H.	Cent. Effect at H	Friction Resistance Rigid Wheel Base					Rad. Comp. at D	Ave. Cent. Thrust longitudinal at H		Ave. Cent. Thrust radial at H		P'	Spike Shear at J
		A	C	D	G	H		P	P'				
40	380	5530	6770	6770	6280	6280	6120	—	6280	—	7830	4630	
50	1970	5130	6340	6340	6720	6720	6080	7450	730	6220	7950	4740	
60	7450	4650	5810	4890	7250	8170	4680	11230	3060	5460	—	8130	4890
70	13090	4150	5280	3640	7800	9420	3500	15390	5970	7570	—	8170	4840
80	21050	3410	4480	1810	8580	11250	1730	21160	9910	13020	1820	8200	4770

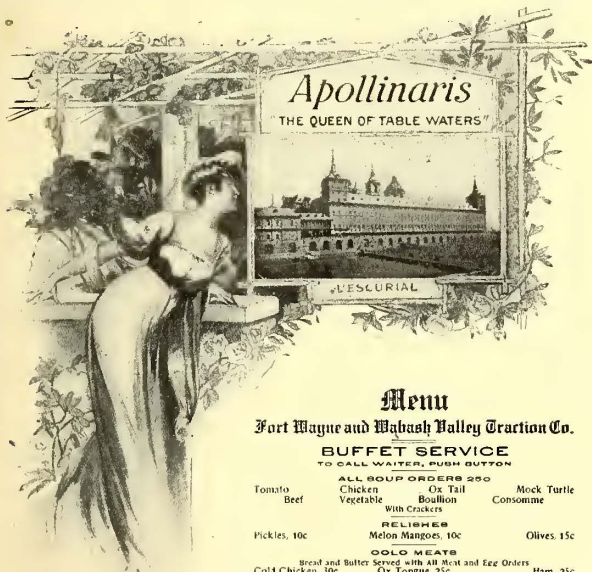
FIG. 4.

be conservative, two spikes may be taken as resisting the unbalanced outward thrust. Consequently at 60 m. p. h. we have actual maximum shears with either steam or electric locomotives ranging from 5820 lbs. to 4890 lbs., borne by two spikes, which with a factor of safety of 4 are proper for shears of 7620 lbs. to 8530 lbs. In other words, the actual factor of safety is approximately 6.

In conclusion, it appears that under the most unfavorable assumptions the electric locomotive imposes slightly greater unbalanced stresses than the steam locomotive on a 3-deg. curve properly maintained, with super-elevation of 4½ ins., and that the shearing force on spikes, one on the outside of the outer rail in each tie, with tie plates, is far within the limits of safety for speeds in excess of the so-called "equilibrium speed" of about 46½ m. p. h. to which the super-elevation of 4½ ins. corresponds. And it should be noted that with the second driver running against the outside rail up to 70 m. p. h. there is no resultant spike pressure at the first driver, and at 70 m. p. h. while the spike pressure at the first electric driver is 2460 lbs. the spike pressure at the first steam locomotive truck wheel is 4840 lbs.

### DINING SERVICE ON THE FORT WAYNE & WABASH VALLEY TRACTION COMPANY

Buffet service has become quite a feature on many Western interurban railways, and in fact it is a necessity on



#### Menu Fort Wayne and Wabash Valley Traction Co.

##### BUFFET SERVICE TO CALL WAITER, PUSH BUTTON

ALL SOUP ORDERS 25c		Ox Tail	Mock Turtle
Tomato	Chicken	Boilition	Consomme
Beef	Vegetable	With Crackers	
Pickles, 10c	Melon Mangos, 10c		Olives 15c
Bread and Butter Served with All Hot and Egg Orders			
Cold Chicken, 30c	Ox Tongue 25c		Ham, 25c
FISH			
Imported Sardines in Oil, 35c			Salmon Steak, 35c
ENTREES			
Boston Baked Beans Hot or Cold, 25c			Veal Loaf, 35c
Corn Beef Hash, 25c			
EGGS, ETC.			
Eggs, Boiled, Fried and Scrambled, 25c		Ham and Eggs, 45c	
Bacon and Eggs, 45c		Poached Eggs on Toast, 25c	
SANDWICHES, ETC.			
Club Sandwiches, 25c	Ham Sandwiches, 40c	Egg Sandwiches, 20c	
Chicken Sandwiches, 15c	Tongue Sandwiches, 15c	Caviar, 25c	
Imperial Cheese, 25c	Toast, Dry or Buttered, 10c	Saratoga Chips, 10c	
PRESERVED FRUITS, ETC.			
Strawberries, 20c	Cake, 10c	Peaches, 20c	
Pie, 20c			
Imported Swiss Cheese, 15c			
Coffee, 10c per Cup	Coffee, 15c per Pot	Cream, 15c	Milk, 10c
			Tea, 10c

##### SPECIALS FOR TODAY

Lemonade 10c	Apollinaris Lemonade 25c	Imported Ginger Ale, 25c	Domestic Ginger Ale (pints) 15c
Root Beer (pints), 15c	Aperitif Water (Aperitif), 15c	Bromo Caffene, 10c	Sweet Cider, 10c
CANDIES, CHEWING GUM, ETC.			
Aurum's Celebrated Chocolates, 10c, 15c, 30c	Sweet Wheat Chewing Gum, All Flavors	Other Candies, 5c, 10c and 25c Packages	
CIGARS			
Don Antonio, 10c and 2 for 25c	Duke of Ormond, 10c and 2 for 25c	Ellellico, 5c, 10c and 2 for 25c	Roigs, 5c

#### MENU ON THE LIMITED CARS OF THE FORT WAYNE & WABASH VALLEY TRACTION COMPANY

trips extending over several hours. The Fort Wayne & Wabash Valley Traction Company fully recognizes the value of keeping its patrons in good cheer by serving a high-

class luncheon on the four daily limited trains each way which make the trip from Fort Wayne to Indianapolis in four and one-half hours. On March 1 the company began serving menus of the type shown in the accompanying reproduction. This one was designed by J. B. Crawford, superintendent of transportation, and undoubtedly is among the most artistic ever given out by an electric interurban railway. The one reproduced shows a graceful young woman in a rose garden looking toward the famous Spanish palace, the Escorial. The attractions of the menu however, are not confined to its ornamentation, for an inspection of the items shows the large variety of food, delicacies and drink offered at prices more reasonable than one is usually asked on steam trains. The new service should not only pay for itself, but attract additional traffic.

### CENTRAL CALIFORNIA TRACTION COMPANY TO USE 1200 VOLT MOTORS

The Central California Traction Company, which has been operating local lines in the city of Stockton, Cal., is now building an interurban system to Lodi, a distance of 15 miles, and later will build to Sacramento, an additional distance of about 35 miles. In the construction of the new lines some features novel to Western construction will be introduced. For the interurban road power will be taken from a third rail, while the overhead catenary construction is to be used on the city lines. This latter type is used at present in connection with the span-wire construction on the lines now in operation in Stockton. The wires are supported by wooden poles from angle-iron brackets with gas-pipe braces every seventh pole and on curves. The 000 copper trolley wire is suspended from a ¾-in. galvanized-iron messenger cable by adjustable spacers.

A 40-lb. A. S. C. E. standard rail with a conducting equivalent equal to 400,000 circ. mils is to be used for the third-rail construction. This rail will be supported on reconstructed granite supports set 12 ft. apart, and will be covered on top and sides. The difference in elevation between the top of the running rail and the bottom of the third rail is 3 ins. The cars will be operated by the Sprague-General Electric multiple-unit control system, with the innovation of 1200-volt motors. For city operation 550-volts will be used, the 1200-volt system being installed on the interurban stretches. The lights, heaters and air pump will be operated on 550 volts to be supplied by a dynamotor on each car during third-rail contact. In the city on changing to the trolley potential of 550 volts, the dynamotor will be cut out and the auxiliaries operated directly from the trolley wire.

The Central California Traction Company has the following operating officials: General manager, E. P. Hilborn; consulting engineer, R. S. Masson; electrical engineer, H. W. Crozier; roadway engineer, D. S. Unruh.

### ANNUAL REPORT OF THE RAILROAD DEPARTMENT OF Y. M. C. A.

The annual report, just issued, of the railroad department of the Y. M. C. A. shows an increase in number of associations between 1905 and 1906 from 207 to 230, of membership from 74,324 to 84,610, and of attendance from 33,951 to 41,984. Among the new street railway associations mentioned are those at Birmingham, Ala., and Sherman, Cal. Announcement is also made that a building costing \$40,000 is assured during 1907 by the Atlanta street railway branch.

## A SUCCESSFUL PUBLICITY CAMPAIGN

BY G. W. HARRIS

To reap the largest success possible to it a street railway company must have the good will of the community it seeks to serve. The old fashioned policy of secrecy—of ignoring the desires and demands, even the needs and rights, of the public—has been tried and found wanting. In too many places it has been persisted in too long. The general awakening of public service corporations of all kinds throughout the country to the need of some sort of check to the growing hostility on the part of the great mass of the people toward the corporations as such, regardless of their individual deserts, is shared by the street railway companies; and in many places the managements of these companies have found it incumbent upon them to change radically their attitude toward the public. Even the biggest traction corporation in the world, which always has more business than it can handle satisfactorily, has come to realize the necessity of fostering a more friendly public feeling, and the first announcement made by Theodore P. Shonts on assuming his new duties in New York City was an appeal through the newspapers for the good will and the "co-operation" of the people.

Mr. Shonts was prompt to recognize the fact that not only the best way but practically the only way to gain this friendliness of the public he seeks for the corporation he is to manage is through the newspapers. Other managers of traction companies in widely scattered parts of the land are learning that it pays to keep thoroughly in touch with the public and to welcome the intelligent criticism of the best element of the community and encourage suggestion for service betterments. This is the age of publicity, and nothing else can approach the legitimate use of the local press for setting the street railway company right in the eyes of the people, for telling the public what the company is trying to do, for combating the unjust and misguided attack of the "crank" who does not understand the situation or of the knave who twists the facts to serve his own ends.

That a properly conducted campaign of newspaper publicity will work wonders has been proved abundantly by a publicity campaign just concluded by the C. W. Lee Company, of Newark, N. J., for the Roanoke Railway & Electric Company, of Roanoke, Va., of which R. D. Apperson is president and J. W. Hancock general manager. Besides operating the street railway system of Roanoke this company does an electric lighting business in which it enjoyed a monopoly until six months ago, when a rival concern started in with cut rates and by insinuations of "robbery," "extortion" and open charges of "unfairness" soon succeeded in stirring up a deal of bitter feeling against the older company. Several other things added fuel to the fire of discontent—among them the fact that the main business streets of the city were torn up for repaving and remained in a chaotic condition for six months or longer. Despite the fact that the company paid one-third of the cost of the new pavement in all the streets traversed by its tracks and that it was required to double-track its system in the business center of the city, the contractor employed by the city was permitted to take his own time to finish the work and to handle it in such a way as to hamper seriously the running of the street cars on any kind of schedule. Of course the company got all the blame for this, and in fact began to be blamed for just about everything that went wrong whether having any earthly connection with it or not. There was an epidemic of "cussing the street railway."

In the hope of bringing about a better understanding of

its real position, of what its service meant to the city, and a better feeling toward the company on the part of the public, the publicity campaign was undertaken. This took the form of a display advertisement, regularly paid for as an advertisement, three columns wide and 12 ins. or 13 ins. long, a new one every day, printed in each of the three daily newspapers of Roanoke; and a "reading notice" measuring anywhere from one inch to a column and a half, the space for this being determined solely by its value to the papers as news. The advertisements were called "Electric Talks" and were numbered consecutively. Contracts were made with all the papers for 2000 ins. of advertising space to be used in two months, and the daily space was apportioned as needed. In the free reading notices was printed only news of what the company was doing: these articles told of the progress of the double-tracking and street paving work; when a new boiler or other new equipment was installed, described it and told how it would help to improve the service; explained any changes in car schedules. Two new steel bridges were ordered for one of the lines, an article described them in detail and told to whom the contracts were let and how much they were to cost; if an accident happened (and several did happen), the company printed a true account of it and announced what steps would be taken to remedy the difficulty and prevent its recurrence.

"Electric Talks" began with some more or less general consideration of what the company had already done to pro-

### ELECTRIC TALKS—NO. 4

Everybody admits the benefit of the rapid extension of street railways. They are revolutionizing life in our cities by enabling people to live away from their work in healthy and pleasant homes in home neighborhoods—away from the factory and the shop—where the air is purer and all surroundings are more wholesome.

The Roanoke Railway & Electric Company has been doing this sort of work for Roanoke.

Look anywhere you like in the region of American homes which encircle the business part of Roanoke and you can see plainly the effect of the service which we render.

Take one example:

In 1903 we extended our Franklin Road line into the section south of Tenth Avenue, five squares, to Woods Avenue.

Before that there was not one house on Woods Avenue west of Franklin Road. Now it is built up solidly for three blocks with good, substantial homes. The same is true of Fourteenth Avenue. Then there were four houses west of Franklin Road. Now it is also built up solidly. On Tenth, Eleventh and Twelfth Avenues, and on Franklin Road itself, there are now twice as many houses as there were before our line was extended. To the east of Franklin Road twenty-five or thirty new houses have been built and occupied on Roanoke Street south from Tenth Avenue, since we began to take people there. Many new homes also have been established on Maple Avenue—and on other streets of the section.

The extensive development in the Crystal Spring section and in the West End section, along and adjacent to Patterson Avenue and Thirteenth Street, also have followed the building of the street car lines.

What do these things mean?

Simply this: That the development of this city follows the extension of our street railway system.

Have you thought of that? Have you considered what it means to the welfare of this city?

It is worth your careful attention.

What we told you yesterday, in regard to our improvement in street car equipment, we repeat:

This is only the beginning.

We are here to stay. We are planted firmly to grow and flourish—and to help the city of Roanoke to grow and flourish.

In all our business dealings with the people of Roanoke we guarantee a "square deal." Don't forget that.

Have we not the right to ask the same at the hands of the city and its people?

### ELECTRICITY TALKS.

Note.—Each day you will find here something new on the street railway and electric lighting situation and its relations to the people of Roanoke. This will interest you. Watch for it—read it—ponder it. Our constant endeavor is to serve the best interests of the public.

ROANOKE RAILWAY & ELECTRIC COMPANY,

By J. W. Hancock, General Manager.

TALK NO. 4.—ON BUILDING UP THE CITY THROUGH EXTENSIONS

vide a street railway service for the city; how, by extending its lines to new sections and in various other ways, it had helped to build up the city, to extend its growth and to bring more people and more business to it. Then the cost of the improvements made since the present management took hold of the property was taken up in detail and what it meant as a permanent investment for the benefit of the city was explained. Something of the complex and complicated nature of the street railway business was elucidated in an elementary way. It was explained how the double-track work would improve the service, and outlines were given of the company's plans for extensions and other improvements. The company's aims and purposes and its guarantee of a "square deal" to the people were reiterated day after day. It was a campaign of education and a campaign of truth-telling. There was never any attempt to color the statements made or to distort the facts.

An attempt was made to give the advertisements as neat and distinctive an appearance as the equipment of the local composing rooms made possible, and above all else to make

ELECTRIC TALKS—NO. 16

The business of running an electric street railway system is a complicated business.

It is also a costly business.

Just how costly, right here in this city, the Roanoke Railway & Electric Company is trying to give you some idea in these "Talks."

Yesterday we told you that this company had spent \$64,324.23 for new street car equipment in the last four years.

That is only one item. Let us look at some others.

Since 1900 this company has rebuilt the roadbed of half of its system, has put in approximately 50,000 new ties, has "bonded" anew all its tracks with copper, and has put down several miles of new 60-lb. steel rails, at a cost of \$71,944.43.

Besides that we have put in new overhead work—trolley wires, feeder wires, and so on, at an additional cost of \$8,565.68.

Now, let us see what these items foot up:

New cars, motors and trucks.....	\$64,324.23
New roadbed and tracks .....	71,944.43
New trolley wires, etc.....	8,565.68
	<hr/>
	\$144,834.34

Remember this: That \$144,834.34 was invested in the Roanoke Railway & Electric Company by its stockholders in order to provide simply a street railway trackage and a street car equipment for the people of this city. It does not include improvements to the power station or the car house.

You say the stockholders will get their money back, out of the earnings of the street railway system?

When?

A simple computation will show that \$144,834.34 means 2,896,687 nickels paid in street car fares.

But when the people of Roanoke have ridden in the street cars 2,896,687 times (and paid cash for each ride) they will not have paid anywhere near one-half of the cost of this \$144,834.34 worth of improvements.

Why?

Because this simple method of computing returns leaves nothing for operating expenses.

You cannot run a street car without a motorman and a conductor. You cannot run a trolley car without electric current. You cannot generate electric current without boilers, engines and dynamos. You cannot keep a fire under your boilers without coal. And you must have men to fire the boilers, men to run the engines and dynamos, men to take care of the cars, the car house and other property, and other men to manage the company's office—to sell tickets, to keep the books, to do a thousand and one other things—and you must have competent superintendence over all these things.

Now the salaries of these men, and the cost of maintenance, the wear and tear on your cars, tracks, wires and electrical machinery, eat up by far the larger part of every five-cent piece paid in street car fares.

Do you begin to realize something of the complicated costliness of this street railway business? Something of what it means in dollars and cents to give the people of Roanoke an adequate street railway service?

Note.—Each day you will find here something new on the street railway and electric lighting situation and its relations to the people of Roanoke. This will interest you. Watch for it—read it—ponder it. Our constant endeavor is to serve the best interests of the public.

ROANOKE RAILWAY & ELECTRIC COMPANY,  
By J. W. Hancock, General Manager.

TALK NO. 16.—ON THE COST OF OPERATING AN ELECTRIC RAILWAY

the "Talks" interesting. In a foot note the people were urged to read and ponder the statements made. The company soon had abundant testimony that they were doing so. By the end of the first week the "Electric Talks" were the talk of the town. Everybody was reading them and talking about the company. People began to write letters to the newspapers about them. Some berated the company, but others took its part against the fault-finders. Each of the papers in turn took up the controversy in some aspect and printed editorial articles commending the company for its adoption of a policy of publicity and for its open and fair way of dealing with the public. The direct benefits to the company were so unmistakable that before the second month had expired it decided to continue the campaign for a third month.

The improvement in public sentiment began to be shown in various ways. At the outset the proprietor of one of the newspapers had hesitated about entering into a contract to advertise the street railway. He said he was afraid the company sought to dictate the editorial policy of his paper,

ELECTRIC TALKS—NO. 20

All comparisons are not odious.

Let us give you one that we think is creditable—and then see what you think of it.

In the last six years the city of Roanoke has grown some. In that time the municipality has had to make improvements to keep pace with that growth. It has made many minor betterments from year to year which have been met by its regular revenues (from taxation) and by local assessments on the property directly benefited. These may be summed up as the regular increase in the cost of maintenance.

But besides this the city government has appropriated:

For street improvements .....	\$275,000.00
For sewer improvements .....	100,000.00
For the Fire Department .....	25,000.00

Total .....\$400,000.00

These expenditures have been met, or are to be met, by the proceeds of the bond issue of Jan. 1, 1906. They may be termed expenditures for extraordinary improvements, outside of the regular cost of maintenance.

You know how much fuss and pother there was over that bond issue. You know that many people feared it would burden the city unjustifiably—would cripple its finances. You know whether you favored it.

But you can have no doubt now that the improvements it is securing will be of lasting benefit to Roanoke.

Those are the only extraordinary improvements authorized by the city since 1900—yes, since the bond issue of 1891. But they made a creditable showing.

Now, since 1900 the Roanoke Railway & Electric Company has spent for extraordinary improvements, outside of the regular cost of maintenance, the sum of \$360,775.80. Furthermore, its directors have authorized the expenditure of \$108,000 more, just as soon as the additional new equipment can be procured from the manufacturers.

Now let us figure up the total amount:

Improvements made since 1900 .....	\$360,775.80
New improvements authorized .....	108,000.00

Total .....\$468,775.80

Here, then, is our comparison. For extraordinary improvements:

Authorized by Roanoke Railway & Electric Company.....	\$468,775.80
Authorized by the City of Roanoke.....	400,000.00

Difference .....\$68,775.80

In other words, this company in the last six years has authorized the expenditure of \$68,775.80 more than the city of Roanoke for extraordinary improvements. These are the exact figures.

There has been no fuss and public outcry about the appropriation of its \$468,775.80 by the Roanoke Railway & Electric Company. The directors simply voted the amounts called for, and the money is spent to give the people of this city the best possible service.

What do you think of this showing?

Does it disclose a niggardly policy on the part of this company? Or does it bespeak a policy of public spirit and a genuine interest in the welfare of this magic city of Virginia?

Note.—Each day you will find here something new on the street railway and electric lighting situation and its relations to the people of Roanoke. This will interest you. Watch for it—read it—ponder it. Our constant endeavor is to serve the best interests of the public.

ROANOKE RAILWAY & ELECTRIC COMPANY,  
By J. W. Hancock, General Manager.

TALK NO. 20.—COMPARISON OF IMPROVEMENT EXPENDITURES BY THE CITY AND THE RAILWAY

and that the company would prejudice the people against him and his paper. He was reassured on that point, but for several days—until he came to understand just what the company was doing—he watched the “copy” for the “Talks” with eagle eye. It was not long, however, before he became enthusiastic over the campaign. One day he said:

You certainly are giving us a right fine line of talks. And the people are reading 'em; yes, sir, everybody is reading 'em. Everybody who comes in here is talking about them. They can't help but do your company a whole lot of good.

A few days later he said:

I want to tell you that these “Electric Talks” are not only doing your company a whole lot of good, but they are doing this town good. You're telling the people a lot of things they never knew before, things they ought to know. I did not have any idea of what the street railway had done for this town. It certainly has spent a big pile of money. And telling the people about it is going to help you a lot. Why, before these talks started there wasn't a day that I didn't have anywhere from one to a dozen people come in here and ask me why I didn't jump on the street railway. Everything that went wrong was blamed on the street railway, and people kept telling me I ought to jump on it, for this, that and the other thing. But they're letting up since you began these talks. Yes, sir, the kicks have been dropping off gradually; last week I only had three or four kicks, and for the first five days of this week I haven't had a single person ask me why I don't jump on the street railway.

Before the campaign ended this editor assured the company that its “Electric Talks” constituted the “best advertising that ever was done in the city of Roanoke.”

The counsel for the company had not approved of the campaign. He said simply that it would be throwing a whole lot of money away. Before the first month was up he had changed his mind on that point and was glad to

#### ELECTRIC TALKS—NO. 30

Ask yourself how many times you used the street cars last week.  
And where you went.  
If there had been no street cars to ride in, how would you have gone to those places?  
If you had walked how much time would you have lost?  
If you had ridden how much money would you have paid in cab hire?  
In other words, how much time and money did the street railway save you last week?  
How much of a convenience is it to you?  
Have you ever grumbled when the service was not just what you wanted it to be at the moment?  
Have you ever stopped to consider the hundreds of other times when it was just what you wanted—when it took you to your desired destination, swiftly, comfortably, without delay, without loss of time, without hitch or hindrance—all for the trifling cost of five cents?  
In our modern life this great convenience of street car transportation is so much a matter of course that the average man seldom thinks of the subject at all—unless something goes wrong and he is delayed five minutes; then he “kicks.”  
It is no easy job to provide satisfactory street railway transportation for the 40,000 people of Roanoke and its neighboring towns.  
But the Roanoke Railway & Electric Company has undertaken that job, and it is going to stick at it as long as there is any city of Roanoke.  
We are spending time and thought and money and energy all the time to give you the best street railway service that it is possible to give. We are making improvements in that service constantly. As the city grows and comes to need them, we stand ready to extend the street car lines, and to build new ones, when and where the people want them.  
We are telling you these things in detail in these “Electric Talks” because we want you to understand our position, and because we want your good-will and your co-operation in the work of helping to build up this magic city of Virginia—helping to bring more people and more business—to make the city flourish as never before.  
Just one thing we ask you to remember.  
In all the business we transact we guarantee a “square deal.”

#### EDISON LIGHT—RIGHT LIGHT

Note.—Each day you will find here something new on the street railway and electric lighting situation and its relations to the people of Roanoke. This will interest you. Watch for it—read it—ponder it. Our constant endeavor is to serve the best interests of the public.

ROANOKE RAILWAY & ELECTRIC COMPANY,

By J. W. Hancock, General Manager.

TALK NO. 30.—ON HANDLING THE TRAFFIC

admit that he had been entirely wrong and that it was doing “a heap of good.” He said:

Why, sir, I had no idea what you could do with newspaper publicity. I am convinced that this is the finest thing for the company that it ever undertook. There is nothing so telling as the constant hammering day after day, and the people of this city simply have got to hear and understand our side. You're making friends for us every day. But besides all that, I want to tell you something that probably has not occurred to you: I can go before a jury with the facts you are printing in these “Electric Talks,” and the fact that they have been printed in the newspapers of Roanoke, and I honestly believe that before a year is ended I can save this company in decreased verdicts for damages more money than this whole campaign is costing.

People generally, before the campaign had run its full course, came to admit to themselves and to one another that the street railway company was not so bad, after all, that it had done some things for the benefit of the city and that at least, when charges were made against it, it deserved a hearing for its side before final judgment was passed.

The most progressive business men of the city saw some of the advantages accruing to the company from this kind of advertising, and several were prompt to copy the idea, on a smaller scale, for their own advertising. L. E. Johnson,

#### ELECTRIC TALKS—NO. 35

The largest factor in an adequate and satisfactory street car service is the provision of sufficient equipment and facilities to accommodate the people who want to ride in the street cars.

At a steadily increasing yearly outlay the Roanoke Railway & Electric Company is providing additional equipment and facilities, in the determination to give to the people of Roanoke and its environs an adequate and satisfactory service.

Let us tell you to-day about one item of expenditure in this direction. With a single track your service schedule must be determined by the length of time it takes a car to traverse the whole line. And the longer such a line is the more infrequent will be the intervals at which a car can start from or pass a given point. A switch midway on such a line is a great help, permitting the running of two cars in place of one. But even then there is always the likelihood of one car's having to wait at the switch for the other, and it is a difficult problem to keep to schedule time.

With double tracks cars going in opposite directions can pass one another at any point, and you can maintain any schedule demanded by traffic needs.

As we told you yesterday we are ready to extend our double tracks in Jefferson Street from Church to Walnut Avenue, and in Salem Avenue from Commerce to Park Street; and also to replace our old track with new 72-lb. rail and new ties, laid in concrete, in Commerce Street from Campbell Avenue to Franklin Road and in Campbell Avenue from Roanoke Street to Park Street.

All the new rail for this work has already been ordered, and after Feb. 1 (before which date the City Government says the work must not be started) this improvement will be rushed as rapidly as the weather will permit and the necessary materials and men for the work can be procured.

The cost to us of this improvement—the new roadbed, ties and rail, new trolley wire, laborers' hire, and our share of the new paving—will total about \$50,000.

At the same time, the city is going to pave those sections of the streets named whereon our track improvements are to be made. The accepted bids for this work provide for a total cost to the city of \$33,304.30, or about \$16,696 less than we shall spend for improvements on the same streets. The city has contracted also for additional small sections of new pavement on streets where there are no car tracks. Adding the cost of these to the other gives a total of \$42,525.10 which the city will spend this year for new paving.

That means, as you can see, that this company has contracted to spend \$7,475 more than the city of Roanoke for street improvements in the immediate future.

Does not that indicate to you that we are “holding up our end”? Does it not prove to you that we are in earnest when we tell you that we are determined to give an adequate and satisfactory service?

#### EDISON LIGHT—RIGHT LIGHT.

Note.—Each day you will find here something new on the street railway and electric lighting situation and its relations to the people of Roanoke. This will interest you. Watch for it—read it—ponder it. Our constant endeavor is to serve the best interests of the public.

ROANOKE RAILWAY & ELECTRIC COMPANY,

By J. W. Hancock, General Manager.

TALK NO. 35.—ON CONTEMPLATED IMPROVEMENTS AND THEIR COST



president of the Norfolk & Western Railway, whose headquarters are at Roanoke, in speeches before the Roanoke Chamber of Commerce and other civic bodies was emphatic in expressing his appreciation of the progressiveness of the Roanoke Railway & Electric Company in conducting a publicity campaign; repeatedly and untiringly urged publicity for every project and association in which he was interested, and when a big strike was threatened by the employees of his railroad justified the faith that was in him and actually succeeded in gaining the sympathy of the public and averting a strike by copious publication of the railroad's side of the controversy in the local newspapers. And he was frank enough to give the credit for this happy outcome to his adoption of newspaper publicity.

Not only was the majority of the public won over to a better feeling toward the company—a feeling of genuine friendliness, indeed—but incidentally the company's lighting business received the biggest impetus it had ever known and is now growing faster than ever before in the eighteen years of the concern's history. Its rival was fairly driven to the woods.

#### ELECTRIC TALKS—NO. 44

"Keeping everlastingly at it is the secret of success."

Who first uttered this aphorism we do not know, and we do not care. We recognize the truth of it, and we have made it the policy of the Roanoke Railway & Electric Company in this company's endeavor to provide for the city and the people of Roanoke

The best street car service,  
The best electric lighting service,  
The best electric power service,

that can possibly be given—and to keep the service in each of these lines satisfactory and adequate to the needs of this growing city at all times.

In the earlier numbers of these "Electric Talks" we told you in detail what we had done, since this company was reorganized, to increase its equipment and facilities and improve its service; and we showed you how much new capital we had invested to make these improvements possible.

And we said: This is only a beginning.

Later we told you that we are going to spend about \$50,000 for the extension of our double tracks and other road improvements this coming spring, and that we had already ordered the new rails for this work. For, we pointed out that the largest factor in an adequate and satisfactory street car service is the provision of sufficient equipment and facilities to accommodate the people who want to ride in the street cars.

To-day we have something further to tell you in this connection:

We have just bought from the J. G. Brill Company, of Philadelphia, six new street cars.

Understand what we say; we are not promising to buy six new street cars sometime in the dim future—we have already bought them, and the manufacturers agree to deliver them, here in Roanoke, by the first day of next May.

All of these six new street cars are of the newest type and best make of trolley car in the market to-day. They are of a later design than any cars we now have on our lines, and they are equipped with air brakes and all the latest appliances.

Two of these cars are of the type known as the Brill semi-convertible, double-truck car, which means that while the windows, reaching two-thirds of the way to the floor, can be opened up in hot weather, the car cannot be entered from the side.

These cars we intend expressly for the Salem line. Each car will seat forty-four people.

The other four of the six new cars are equally large, and are of the full Brill convertible, double-truck type, of the latest design. These will be used on the various lines of this city wherever they are most needed.

Each of these six new cars, with all its necessary equipment, cost us an average of about \$5,000. You can figure out what the total expenditure amounts to for this one item of additional street car equipment.

We are telling you these things because we want you to know that our guarantee of a "square deal" to the people of Roanoke on all the business we transact is genuine, and that we are "making good" on that guarantee.

#### EDISON LIGHT—RIGHT LIGHT.

Note.—Each day you will find here something new on the street railway and electric lighting situation and its relations to the people of Roanoke. This will interest you. Watch for it—read it—ponder it. Our constant endeavor is to serve the best interests of the public.

ROANOKE RAILWAY & ELECTRIC COMPANY,

By J. W. Hancock, General Manager.

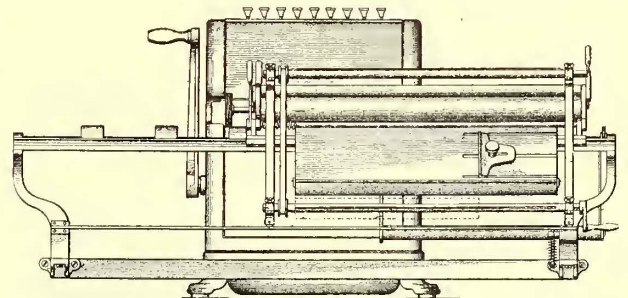
TALK NO. 44.—EXPLAINING THE VIRTUES OF THE NEW SEMI-CONVERTIBLE CARS

Everybody connected with the street railway management is abundantly satisfied with the results of the campaign, and indeed is surprised that its benefits are vastly larger, more direct and more pronounced than any of them even had hoped for. When the work was nearing its end each of the proprietors of the daily newspapers volunteered to give a letter of commendation. One of these, typical of them all, and addressed to the publicity managers, may be quoted here to show what the most intelligent and progressive people of the city thought of the campaign:

As your Mr. Harris is about to close his advertising campaign in behalf of the Roanoke Railway & Electric Company, I take this occasion to say a few words regarding his work. The campaign was inaugurated in November last, and with the exception of a brief holiday vacation each day's issue of our papers has contained something new and encouraging to our people and something directly beneficial to the company. The open manner in which Mr. Harris has dealt with the public has in large measure allayed prejudice, and has placed the Roanoke Railway & Electric Company in a strong position. The people now know, as they never knew before, what the company has done and its aims and purposes for the future. "Electric Talks" have been commented upon in a most favorable manner by the people of Roanoke, and demands for copies of our papers containing them have come from a number of cities.

#### MAKING UP PAY ROLLS ON THE SOUTH CHICAGO CITY RAILWAY

By the use of a special attachment to an adding machine and a special form of pay-roll blank, the tedious process of addition and other tiring mental work in connection with pay rolls is avoided in the accounting office of the South



ADDING MACHINE FOR MAKING UP PAY ROLLS

Chicago City Railway. Not only is there a saving in work, but the pay rolls for 200 trainmen are posted from day to day in less than an hour, and at the end of the half month the pay roll is closed up in approximately three hours' time. The results, moreover, are secured with every assurance of accuracy. The system of getting up the pay rolls and the attachment to the adding machine were devised by Wm. R. Gaither, auditor of the road.

The device, which has been applied to a special Burroughs adding machine, having keys for adding hours and minutes, displaces the usual carriage and roll at the back and consists of a carriage with rollers long enough to take paper 18 ins. wide. One roller carries a supply of paper, and this, after being led over the platen of the machine, upon which it receives the impression of the type, is wound upon a second roller. Provision is made in the device for rapidly reeling the paper from one roller to the other.

The paper upon which the pay rolls are made out is obtained in long rolls about 18 ins. wide, ruled off into square spaces. A length sufficient to make up the entire pay roll is cut off and wound upon the lower roller of the adding machine carriage. After the paper is in the machine the

first operation is to print upon it the badge numbers of the men. In doing so the paper is automatically unrolled from the lower roller, so that the numbers are put down in a vertical column at the left edge of the roll. The paper is then rolled back on the lower roller, and in the second column of spaces the men's time for the first day of the pay period is printed. In the next column each man's time for the second day is entered and his total time for the two days, as added by the machine, is entered below it by pressing the total key of the machine and pulling the lever. This action also clears the machine for the next entry, as is shown by

The attachment to the machine has been patented by Mr. Gaither. Although used on a Burroughs machine, it may be adapted to other makes.

**ELECTRIC LOCOMOTIVE FOR ILLINOIS TRACTION SYNDICATE**

The accompanying illustrations show one of two locomotives recently built by the General Electric Company and American Locomotive Company for the Illinois Traction

**SOUTH CHICAGO STREET RAILWAY COMPANY.**

Time Book and Pay Roll of Trainmen *Conductors* *first* Half Month of *January* 190*7*

Names	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	15th.	Rate	Amount	Dis. Check	H. W. & E. C. F. Ry. Co.	S. C. C. Ry. Co.	Check No.
6 <i>Sherman Yoder</i>	10.20	10.20	10.35	10.20	10.20	10.	10.20	10.20	10.20	10.20	10.20	10.20	10.20	10.20	10.20		3,565			3,565	
7																					0,712

Street Ry. Journal

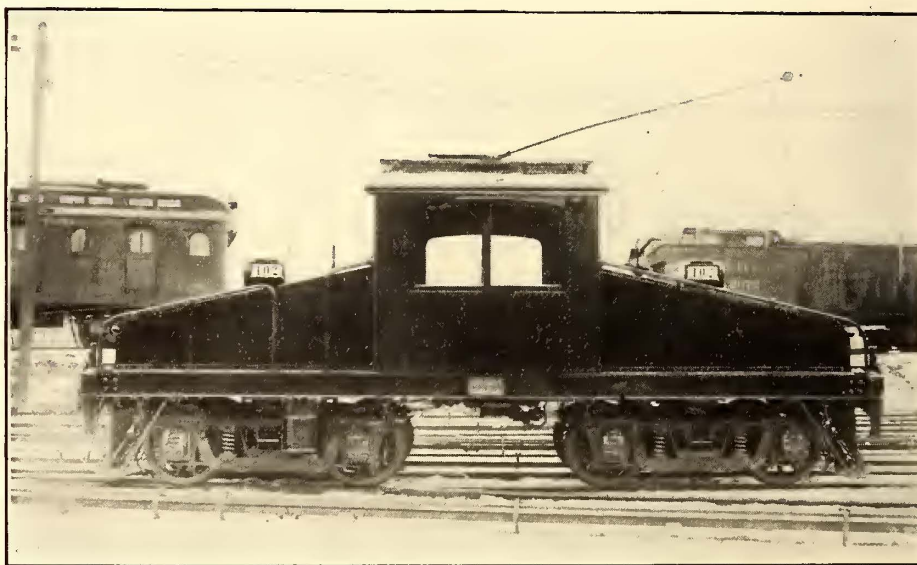
SOUTH CHICAGO STREET RAILWAY COMPANY PAY ROLL, MADE UP ON ACCOUNTING DEPARTMENT

an automatically printed star. The total time is, in a similar manner, carried out each day until the end of the half-month period. Then the rate per hour in cents of each man is placed in the column next beyond that for the last day and for the total time. A rate book is then used to figure the wages due and the amount is inserted in the proper column and the pay roll is totaled by the machine. The wages of each man are then distributed between the two systems operated under the one management, and finally the number of the pay check issued to each man is inserted. After the pay roll is completed it is removed from the machine and the roll of paper is then cut into sheets about 17 ins. long for convenience in handling in loose leaf binders. On each sheet is then pasted a heading as shown in the accompanying reproduction. The names corresponding to the badge number are inserted in the proper blank spaces either by hand or with a typewriter or an addressograph. As will be seen, the sheet remains in the machine during the entire period in which it is being printed. Experience on the South Chicago system, has shown that since the adoption of this machine about four days' time of one man per month is saved.

Other records may be kept on the roll of paper on which the pay roll is kept, by using a roll longer than required for the pay roll. On the additional length may be kept the car mileage by car numbers, car earning and earnings by routes, and each day's storeroom requisitions may be charged to the proper accounts. At the end of the half month when the pay roll is completed that portion of the roll containing this may be cut from the portion containing the records and removed from the machine. The record portion will be left in the machine until the end of the month.

Syndicate. The locomotive is a swivel truck switching type weighing 40 tons on drivers, and equipped with four GE-55-H motors; in other words, is classified as a 404-E-80-4-GE-55-H type, in accordance with the standard system of classification recently adopted by these companies for the rating of electric locomotives.

The cab is the well-known type having a main operating cab and sloping end cabs; the operating cab, having a floor



ILLINOIS TRACTION LOCOMOTIVE

space of 8 ft. x 9 ft. 6 ins., stands in the center of the locomotive and contains an air compressor, together with engineer's seats at the operating windows, control mechanism, master controllers, brake valves and sander apparatus.

The end cabs are of the most recent type and cover a floor space of 9 ft. 6 ins. x 5 ft. 6 ins. each, leaving a 24-in. side platform on either side running from the operating cab to the end of the locomotive. The doors from the operating cab open at diagonally opposite corners on this side platform, thereby giving easy access from the locomotive cab to the end of the locomotive for coupling purposes. At the same time it gives the engineer an unobstructed view of the

track in front of him, or of the train which he may be handling, to the rear, and of the brakeman or switchman at the couplers.

The cab framing is built of 2-in. x 2-in. and 3-in. x 3-in. angles, with sides and roof of No. 8, or  $\frac{1}{8}$ -in., sheet steel. The end cabs are bolted to the floor and main cabs through gaskets, or shielding angles, to protect against rain wash.

The platform is built up of a framing consisting of four 10-in. channels running the length of the locomotive and riveted to the end frames and bolster. The end frames are iron castings with push-pole sockets cast near the outer ends, and with lugs for riveting to center and side sills and the draw-bar castings. Over the centerpins the sills are trussed together with heavy braces stiffened by castings and forming a built-up body bolster. The floor consists of solid sheets of  $\frac{3}{8}$ -in. plate riveted to the longitudinal sills and serving as a stiffening member for the frames. The M. C. B. vertical plane coupler is carried in a draw-bar casting bolted to the end frame and center sills.

On each end of the platform is carried a heavy pilot built of 1-in. round bars riveted to a  $\frac{1}{2}$ -in. bottom plate below and the 4 x 4 angle above. This angle in turn is bolted to the end frame of the locomotive with space blocks which permit adjustment in height of the pilot, and the whole is braced with two center braces and two side braces extending from the pilot bottom plate to the center and side sills of the platform. The pilot steps on the pilot and stirrups on the end frames give easy access to the side platforms of the locomotive at each end.

The truck is of the M. C. B. equalized type with plate bolster. The wheel base is 6 ft. 6 ins., the wheels 36-in. diameter with fused steel tires, and the journals are  $5\frac{1}{2}$  ins. x 10 ins., the construction being particularly heavy in order

and securely bolted to the truck frame. The plate bolster carrying the center pin and side bearings is built up of 9-in. channels and plates riveted together.

The motors used, GE-55-H two-turn, are designed especially for the slow speeds and heavy tractive effort. At the rated load of the motors the locomotive will give a tractive effort at the rail head of 16,800 lbs., and at the slipping point of the wheels will develop 20,000 lbs. tractive effort with a load on the motors slightly in excess of their rated load.

The view of the interior of the locomotive cab shows the apparatus at one of the engineers' operating positions, and also the interior of the end cab. In front of the engineer's seat stands a master controller operating the contactors used for type-M single-unit control. Brake apparatus for both straight and automatic air, and pneumatic sanding valves are also within easy reach. In the end cab are the contactors and rheostats of the control system. The air reservoir and pneumatic sanders arrange for sifting sand through nozzles carried upon the trucks directly in front of the forward wheels of the locomotive. In the center of the main operating cab stands a CP-23 air compressor operated from the 500-volt circuit, having a piston displacement of 50 cu. ft. per minute.

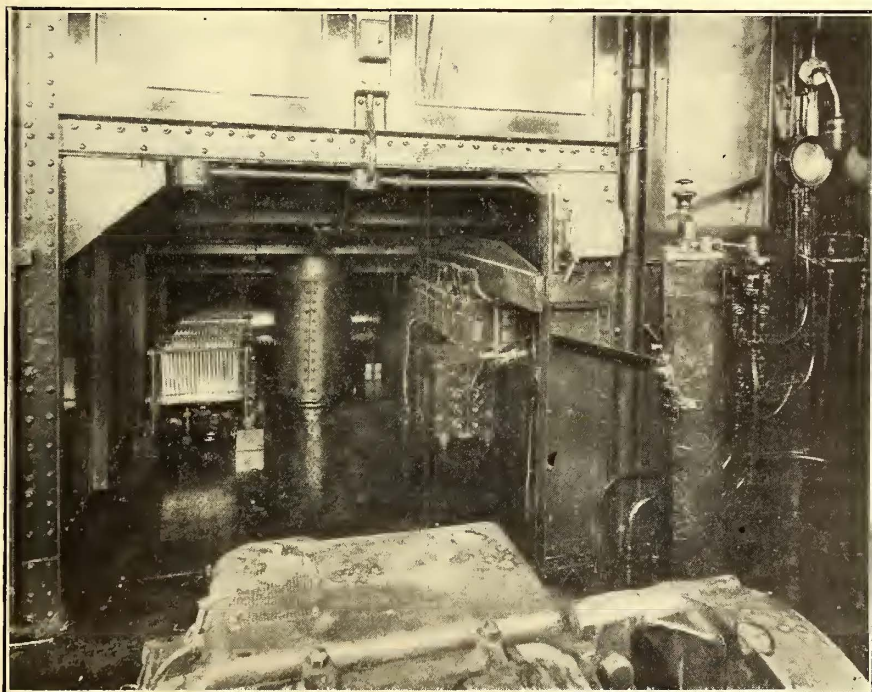
Some of the dimensions of the locomotive are: Length over all, 31 ft. 1 in.; height over cab, 11 ft. 9 ins.; width over all, 9 ft. 6 ins.; rigid wheel base, 6 ft. 6 ins.; weight of electrical equipment, 27,500 lbs.; weight without electrical equipment, 52,500 lbs.

#### INSPECTION OF FORT WAYNE & WABASH PROPERTY

Through the courtesy of the Westinghouse Electric & Manufacturing Company, the Westinghouse Machine Company and the Babcock & Wilcox Company, about fifty engineers of Cincinnati and the vicinity made an inspection trip, March 10, to the new power station of the Fort Wayne & Wabash Valley Traction Company at Fort Wayne, Ind. This station, which was described at some length in the STREET RAILWAY JOURNAL for Oct. 13, 1906, contains Babcock & Wilcox boilers and six Westinghouse-Parsons steam turbines with an aggregate capacity of 7000 kw.

The party left Cincinnati at 8:30 o'clock p. m. Saturday, March 9, in three special sleeping cars, arriving at Fort Wayne early Sunday morning. The greater portion of the morning was spent in an inspection of the plant. The plant of the Fort Wayne Electric Works was also visited. The party was in charge of Edwin K. Gillette, district manager Babcock & Wilcox Company; J. S. Brett, manager Cincinnati office Westinghouse Electric & Manufacturing Company, and Arthur Brown, district manager Westinghouse Machine Company. Included in the party were

Thomas Elliott, consulting engineer of the Schoepf-McGowan syndicate, who designed the power plant visited; Herbert McNulta, chief engineer of the Cincinnati Traction Company; Charles Kilgour, second vice-president Toledo Urban & Interurban Railway; M. H. Folger, Cincinnati Traction Company, and James H. McCabe, district manager Murphy Iron Works.



INTERIOR OF ILLINOIS TRACTION LOCOMOTIVE

to meet the demands of locomotive service. The weight of the truck is carried upon equalizers, each of which is made of two  $5\frac{1}{2}$ -in. x  $1\frac{1}{2}$ -in. bars held apart by suitable distance pieces and carrying the truck frame on spiral springs. The top frame is a 2-in. x  $3\frac{1}{2}$ -in. rolled bar, and end frames of the same section are bolted to it. The truck transoms are built up of 13-in. channels riveted to  $\frac{1}{2}$ -in. x 18-in. gusset plates

## STORAGE BATTERY FOR STATIONARY PURPOSES

The Westinghouse Machine Company has just put on the market a storage battery for stationary purposes known as "Type S." Elaborate tests of these batteries have been conducted at Pittsburg and have proved satisfactory. Both positive and negative plates are of pure lead with the active material formed by the Planté process. The surface of the plate is laminated and the entire plate, including plate and leaves, is pressed into one homogeneous piece. Allowance is made for expansion. The negative plate is similar to the positive plate with the exception that there is approximately 30 per cent more active material due to an increased number of laminations, and also because of a heavier formation permissible through the absence of subsequent corrosion in a negative plate. By providing relatively greater volume of active material in the negative plate it is believed that all the difficulties encountered in the ordinary form of Planté negative caused by shrinkage have been overcome.

The claims made for the plate are long life, maximum efficiency, and freedom from injurious sulphation. The batteries are made in all sizes.

## FREIGHT CARS FOR THE ILLINOIS TRACTION SYSTEM AND THE DETROIT UNITED RAILWAY

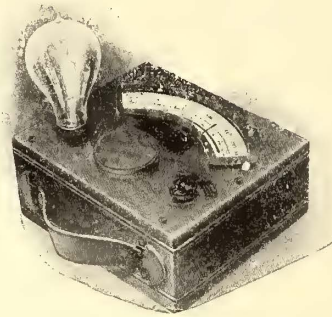
With the completion of the link between Decatur and Champaign, Ill., the Illinois Traction system, which operates and is building an interurban railway network between the principal cities in Central Illinois, will open up a through interurban route between Danville, Ill., and St. Louis, Mo. The operating company has already developed quite an extensive freight business, but when lines now under construction are completed freight traffic promises to be the source of considerable income. To care for growing traffic the company has had constructed three 50-ft. freight and express cars. The cars are built with monitor roofs and hexagonal ends. In addition to a large sliding door in each side at the center of the car body, small hinged doors are provided at the ends of the car for the convenience of trainmen. The motorman's cab is not separated from the body of the car, but a curtain is so arranged that it can be let down to prevent the lights in the car from blinding the motorman. The cars are provided with Westinghouse air brakes and General Electric type-M control. They were built by the St. Louis Car Company.

The same car company has also built several freight cars for the Detroit United Railway, which operates practically all of the interurban lines radiating from Detroit. A considerable revenue is derived by hauling milk from the outlying districts into Detroit, and quite an amount of freight is shipped by wholesale merchants in Detroit to retail dealers in the small towns along the interurban lines. Some new freight cars which have been recently added to the freight equipment to take care of increasing traffic differ considerably in construction and appearance from the type of freight or express car usually found on interurban systems. The car is provided with a closed cab at one end and an open platform at the other. A door in the rear of the car opens out on the platform and entrance may be gained to the cab or front vestibule either through a door from the outside of the car or through a door in the end of the car body proper. A large sliding door is located on each side of the

car at the center of the body. The interior is well supplied with light by six small windows on each side. The car is provided with M. C. B. couplers which are placed at the standard height for steam roads. The body is painted a lemon yellow.

## COMBINATION PORTABLE VOLT-WATTMETER

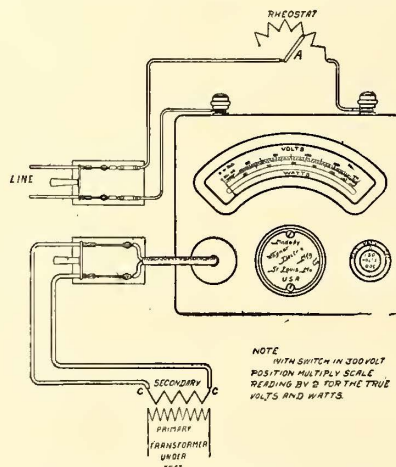
A combination portable volt-wattmeter is being introduced by the Wagner Electric Manufacturing Company, of St. Louis, that while of particular interest to central station managers is of especial value for testing and especially for determining core losses in small lighting and power transformers and for small motor testing. The instrument carries a lamp socket imbedded in the case, in which is placed the lamp or the attachment plug connected with the device under test. To the right hand is a small hard rubber switch, this switch carrying two pointers, one on each side. One of pointers is marked 110 volts or 150 volts, as the case may be, and the other pointer is marked 220 volts or 300 volts, as the case may be, the instrument being designed



COMBINATION PORTABLE  
VOLT-WATTMETER

in such a way as to be suitable for operation on both 150-volt and 300-volt circuits, by simply throwing the switch to the proper voltage point. Each side of this switch, that is, the 150-volt side and 300-volt side, travels over an arc which has three stopping points, the first reading "Volts," the second "Watts" and the third "Off."

The instrument has a double scale, a voltage scale reading, say, up to 150 volts and a wattage scale reading up to 150 watts, there being one needle covering both scales. This needle is actuated by the voltage movement when the switch is on the point marked "Volts," and is actuated by the wattage movement when the switch is on the point marked "Watts." The instrument thus serves the double purpose of being a voltmeter and wattmeter combined. With the switch on the 300-volt side, the scale readings

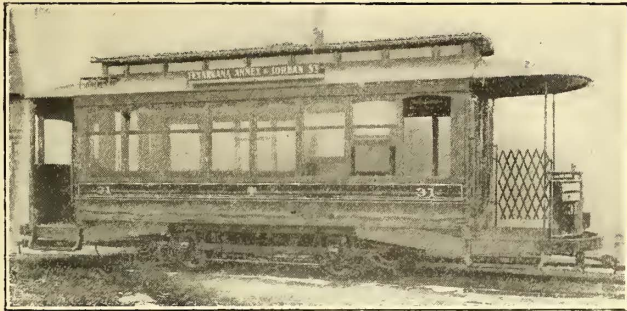


METHOD OF CONNECTING FOR  
TRANSFORMER TESTS

when multiplied by two give a range in both the voltmeter and the wattmeter combined. With this switch on the 300-volt side the scale readings when multiplied by two give a range in both the voltmeter and the wattmeter movement, from 0 to 300. The diagram herewith shows the method of connecting the instrument and a transformer under test to the testing circuit.

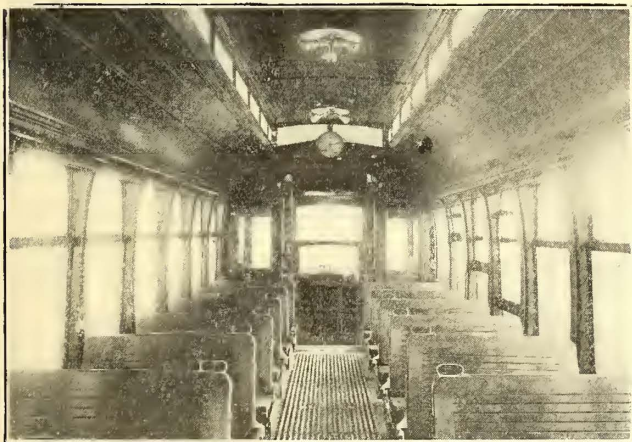
## NOTES ON SHREVEPORT TRACTION COMPANY--NEW CARS

The Shreveport Traction Company recently received a number of groveless-post semi-convertible cars from the American Car Company. They will be put in service on the lines to the Fair Grounds, where an annual spring race meet is held. Aside from the new equipment the railway company operates eighteen cars, all built by the American



EXTERIOR OF SHREVEPORT CAR

Car Company; sixteen of them are of the single-truck drop-sash type; the remainder Brill full convertibles mounted on double trucks, behind which on such occasions as fairs, baseball games, etc., trail cars are operated. In seven years the road has developed from 8 miles of track with an equipment of four cars to 15 miles of track with twenty cars. The engine room is equipped with three generator sets, the largest and main unit being a 500-kw direct connected to a slow-speed engine. The boilers are of horizontal return tubular type fitted with gas burners, under which natural gas is used from the Caddo City fields, 22 miles distant from Shreveport. The boiler capacity is 900 hp



INTERIOR OF SHREVEPORT CAR

and the pumps are of 1500-hp capacity each. The original car sheds are being demolished and in their place a fireproof brick, concrete and steel building will be erected, 120 ft. x 160 ft.

The double-truck cars on the system are each being equipped with four 40-hp motors and the single-truck cars with 35-hp motors. One of the new semi-convertible cars is shown in the illustration. The front end is enclosed with stationary round end vestibules. The rear end of car has an open platform. Folding gates are installed at both entrances. The other semi-convertible car ordered was identical to the one illustrated except that the stationary round end vestibule was at both ends. The

interiors are of golden oak. The slat transverse seats are of the car builder's make. The trucks are of the No. 21-E pattern. The following are the chief dimensions: Length over end panels, 20 ft. 8 ins.; length over vestibules, 30 ft. 1 in.; width over sills, including panels, 7 ft. 9½ ins.; over posts at belt, 8 ft. 2 ins.; side sills, 5 ins. x ¾ ins., plated with ¾-in. x 6-in. angle-iron; sub-sills, 4¼ ins. x 5 ins.; center sills, ¾ ins. x ¾ ins.; end sills, 3½ ins. x 6⅜ ins.

## LARGE ELECTRIC SIGN

The connection between electric railroading and illuminated electric signs has been pointed out on several occasions in these columns, and gives interest to one of the largest electric signs ever built. According to the electrical papers, this is a sign recently constructed by the A. & W. Electric Sign Company, of Cleveland, for the Morgan & Wright Company, owners of the Detroit Electrical Works. This sign has a length of 140 ft. and a height of 30 ft. It consists of two lines of letters, one 10 ft. in height, the other 6 ft. in height, and will be displayed on two buildings facing the Detroit River. It will require about 1400 lamps and will be ready for lighting about April 1.

## ELEVATION OF TRACKS IN WILMINGTON

In the elevation of its tracks at Wilmington, Del., the Pennsylvania Railroad Company is making an effort to reduce noise and vibration. The floors of the bridges, of which there are twenty-four, are of the solid trough construction. The steel work is covered with concrete, which is thoroughly waterproofed with five layers of felt and asphalt compound. This in turn is covered with a layer of protecting bricks laid in sand and grouted. Upon the bricks is tamped the stone ballast, carrying the wooden ties and the rails forming the roadbed.

## NEW CARS FOR THE SCRANTON RAILWAY COMPANY

Several new cars were recently added to the rolling stock of the Scranton Railway Company, which owns all of the lines in Scranton, Pa., and in addition operates under leases several interurban lines running out of Scranton.

The new cars, which were built by the St. Louis Car Company, are of the closed type with bodies 29 ft. 6 ins. in length. The bottom framing is especially heavy for a car of this type. On the inside of the side sills is bolted a ¾-in. x 15-in. steel plate. This extends above the sill a sufficient distance to permit the side posts to be bolted securely to it. The remaining longitudinal sills are reinforced by 4-in. I-beams. Although this steel plate serves to stiffen the car considerably, both inside and outside trusses are provided in addition.

The interior of the car, which is finished in quarter-sawed oak, is divided into a smoking and a passenger compartment by a glass partition. All the cables of the control system are carried in cable boxes on top of the floor alongside the side sills. The seats are of the reversible type and are finished in rattan. The car is provided with a controller at each end, and it is fitted with air brakes.

The Cole law, requiring Ohio corporations to pay a tax of 1 per cent on gross receipts, resulted in the payment of \$264,464.34 by street, interurban and electric railways of all kinds last year, according to the report of the State auditor.

## FINANCIAL INTELLIGENCE

WALL STREET, March 13, 1907.

### The Money Market

The past week has witnessed a material hardening in the local money market, rates for all classes for accommodations ruling substantially higher than those heretofore prevailing. Money on call was in fair supply, and was satisfied at rates ranging from 3 to 15 per cent. For the first time since January last, short-time money commanded a premium, funds for thirty and forty-five days being in demand at 6 per cent, and a premium making the total charge equal to 7 per cent, with practically nothing obtainable even at the high figure, while for three to six months the rate was firmly held at 6 per cent. The high rates for money are not at all surprising, in view of the heavy drafts being made up on the local institutions. Since last Friday the New York City banks have lost \$3,500,000 on their operations with the Sub-Treasury, which is considerably more than the surplus reserve reported by the Clearing House Banks on last Saturday. The demand for money at interior points continued brisk, and during the week shipments of money were made to Southern points. The local demand for funds has been fair, notwithstanding the enormous liquidation in the securities market, and in addition to these adverse influences the banks will be called upon later in the week to provide upwards of \$50,000,000 on account of the Pennsylvania notes, Chicago & Northwestern new stock, and the payments on the Standard Oil and the Consolidated Gas dividends. Sterling exchange has ruled weak with a further substantial decline in rates, which, under ordinary condition, would have resulted in the imports of gold from Europe. Relief from this source, however, has been removed for the time being, by advance in price of American gold coin at London of 5/8d. to 7/6s. 5d. Money at all of the European centers is in active demand, and the action of the Bank of England in advancing the price of American Eagles is interpreted as a warning to American bankers that that institution intends to protect its gold supply, and to adopt other restrictive measures should it become necessary to do so. For many weeks past the arrivals of gold from the Cape have been absorbed by the Bank of England, but the heavy shipments to South America and other points have prevented any considerable net gain in its gold holdings. During the week \$1,000,000 gold was engaged in Amsterdam, Holland, for import to New York, but this was followed by an advance in the official discount rate at that center to 6 per cent, showing clearly enough that there is a general disposition on the part of the large financial institution abroad to prevent any inroads being made upon their gold supplies. At the close of the week there was nothing in the situation to warrant the belief of any decided easing up in rates in the near future. So far, the Secretary of the Treasury has not made any deposits of customs collections with the banks under the provisions of the Aldrich act, but the Secretary has decided to allow all depository banks to retire at their discretion circulation to the amount of \$9,000,000 a month until further notice. The bank statement published on last Saturday was rather disappointing. The decrease in cash of \$6,442,600 was considerably more than expected, and was due in part to the average system. Deposits decreased \$18,542,700. The reserve required was \$4,635,675 less than in the previous week, and deducting this from the loss in cash, the surplus was reduced by \$1,806,925. The total surplus now stands at \$2,051,725, as compared with \$6,463,700 in the corresponding week last year, and \$9,278,150 in 1905, \$29,937,075 in 1904, \$1,024,000 in 1903, \$3,112,900 in 1902, \$10,002,600 in 1901, and \$5,676,375 in 1900.

### The Stock Market

Price movements on the Stock Exchange during the week have been of a conclusive and disturbing character, with short-lived bullish sentiment quickly destroyed by increased monetary stringency in all parts of the world and a general disturbance of loans in the local market that at the end of the past week caused acute demoralization and much forced liquidation. A

week ago there was much talk of trouble in Berlin that was indignantly denied by the most important foreign bankers, but liquidation on a large scale in that period in anticipation of an unfavorable bank statement accompanied by aggressive bear selling carried prices down before Sunday to an extremely low range. The situation before Sunday was extremely ominous and the air was then full of disquieting rumors of pending trouble, but a surprise was sprung on the Wall Street world on Monday by a cessation of both liquidation and bear manipulation, the supply of stock being replaced by what was regarded as inspired inside buying. The interview of J. P. Morgan with President Roosevelt was used as an influential bull factor, and this interview and the arrangement for a formal conference between the national executive and prominent railroad officials was made the basis for a demonstration of strength that was the feature of the market from the opening on Monday until late Tuesday afternoon, when there was a sudden and unexpected change, which, for the time, was unexplained. On Wednesday, intense weakness prevailed from the opening, and the market all through the day was in a semi-panicky condition. In fact, in other years such declines as were then sustained would have been regarded as highly sensational. There was a flood of long stock pressing on the market at all times through the day and an absolute absence of demand except that which came through moderate covering of shorts. Prices of several stocks declined to points during the day, and a number of important issues were forced to the lowest range reached in many years. This was notably the case in Northern Pacific, which sold below the price at which it closed on May 6, 1901, three days before the May panic of that year. Union Pacific, Great Northern preferred and Reading were among the stocks sustaining the greatest losses on this downward movement, and stocks like St. Paul and Amalgamated Copper, in which Standard Oil influence dominates, suffered as severely as those with less impressive holders. The first indication of depression came from Europe, the weak spot of the financial world being in Berlin, and from there weakness progressed in equal force to London.

### Philadelphia

The liquidation in the general stock market was reflected to a great extent in the traction shares during the past week. Trading generally was in moderate volume, but it was attended with a general fall in prices. Philadelphia Rapid Transit, after selling at 20½, dropped to 19½ on sales aggregating about 3000 shares, while Union Traction declined from 56¾ to 55 on transactions amounting to 2000 shares. Philadelphia Company common was more active than for some time, but the price suffered in sympathy with the other public utility shares. From 44½ it fell to 44, while small lots of the preferred brought 47. Lehigh Valley Transportation issues displayed relative strength, the common stock selling at 10¾, while the preferred advanced from 20 to 20¾. Other sales included United Railways at 50, and Consolidated Traction of New Jersey at 73½. Little attention was paid to the report that a big local pool has been formed to support the public utility shares, although at the close this group displayed some strength and recovered part of the early losses.

### Baltimore

Increased activity developed in the traction issues at Baltimore during the week, but the general trend of values was toward a lower level. United Railway issues led the group in point of activity, upwards of \$35,000 of the 4 per cent bonds changing hands at 87¾ to 87½, while the incomes sold to the extent of \$60,000 at prices ranging from 55 to 53¾ and back to 54. The refunding 5s were quiet, with sales at 83¾ to 84. The free stock was quite active, 1600 shares selling at 12 to 11, the last figure representing the lowest price of the year. The pooled stock brought 11¼ to 11¾. Other transactions included Atlanta Street Railway 5s at 103; Norfolk Street Railway 5s at 107½, City & Suburban 5s at 108, North Baltimore Railway 5s at 112; Washington City & Suburban 5s at 101½, and Knoxville Traction 5s at 107.

**Other Traction Securities**

The Boston market for street railway issues was quiet and irregular. Boston & Worcester sold at 26 to 26¼ for several hundred shares, but, on the other hand, Massachusetts Electric fell from 18½ to 17½, while the preferred sold from 66½ to 66. Boston Elevated was steady, with transactions at 147¼ to 147½; Boston & Suburban sold at 12, and the preferred at 57¼; West End changed hands at 94 to 93⅝ and the preferred at 109⅞ to 109. The Chicago market was extremely dull, there being little disposition to trade actively. Northwest Elevated preferred sold at 66.

Brokers did some trading in Cleveland Electric through the past week, and Monday some fractional lots sold as high as 66, but the closing price was lower. There was some demand at 64, but holders were unwilling to let it go at that. Lake Shore Electric bonds were traded in to some extent, as were Washington, Baltimore & Annapolis pooling certificates. Aurora, Elgin & Chicago showed some activity during the week.

**Security Quotations**

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

	Mch. 6	Mch. 13
American Railways .....	49¾	50
Boston Elevated .....	148½	147
Brooklyn Rapid Transit .....	58¾	55
Chicago City .....	150	150
Chicago Union Traction (common).....	4%	4¼
Chicago Union Traction (preferred).....	14¾	13
Cleveland Electric .....	64	65
Consolidated Traction of New Jersey.....	74½	72
Detroit United .....	75¾	72
Interborough-Metropolitan .....	27%	24%
Interborough-Metropolitan (preferred) .....	64¾	60
International Traction (common) .....	54	54
International Traction (preferred), 4s.....	79	79
Manhattan Railway .....	139¼	137¼
Massachusetts Elec. Cos. (common).....	18	17
Massachusetts Electric Cos. (preferred).....	66	65
Metropolitan Elevated, Chicago (common) .....	24¼	23
Metropolitan Elevated, Chicago (preferred).....	65	65
Metropolitan Street .....	—	—
North American .....	79	73¾
North Jersey Street Railway .....	40	40
Philadelphia Company (common).....	44½	44
Philadelphia Rapid Transit.....	20	17
Philadelphia Traction .....	92¾	*91½
Public Service Corporation certificates.....	66	66
Public Service Corporation 5 per cent notes.....	95	95
South Side Elevated (Chicago).....	a80	78
Third Avenue .....	109	103
Twin City, Minneapolis (common) .....	97	93
Union Traction (Philadelphia) .....	56½	55½

a Asked. \* Bid.

**Metals**

According to the "Iron Age," strenuous efforts are being made to get out tonnage, now that weather conditions are improving. The indications, from the achievements thus far this month, are that the March output of pig iron and of finished products of the Steel Corporation will exceed the banner record of October last. Possibly a record tonnage may also be attained in steel. In pig iron both sides maintain a defensive attitude, and there is comparatively little business doing for delivery during the second quarter.

Copper metal displays decided strength; prices for all of the principal grades scoring further advance. Quotations are: Lake, 25¾ to 25¾; electrolytic, 25⅞ to 25¾; castings, 24⅞ to 24⅞.

**A LARGE HOLDING COMPANY FOR THE NORTHWEST**

Articles of incorporation have been filed for the Northwestern Corporation by Isaac W. Anderson and Robert E. Allen, the object being to consolidate all the electric railway lines, power plants and gas plants owned by the interests in control of the

Northwestern Gas & Electric Company. The \$5,000,000 for which the corporation is capitalized is divided into 50,000 shares. The life of the corporation is limited to fifty years. The first board of directors chosen to administer the affairs of the corporation are: I. W. Anderson, Robert E. Allen, R. F. Brackett, Thomas Mickelson, A. K. Dice, S. A. Scott, Otto B. Frank, Robert Breeze, Nick Lawson and Cary M. Rader. Not only will the corporation absorb all the Northwestern Gas & Electric Company, including the interurban traction line to Milton and the power plant on the Walla Walla River as well as the gas plants here and at Pendleton, but it will take over the Yakima gas plant, the Lewiston gas plant, the Baker City electric light plant, the lighting system at Athena and the Boise Traction Company, which operates the street car system in the Idaho capital as well as furnishes power. Besides these holdings the Northwestern Corporation will also take over from ten to twelve lighting plants in the Willamette Valley and other parts of Oregon, including those at the cities of Albany, Eugene, Cottage Grove, The Dallas, Roseburg and Seaside.

**EASTERN CONSOLIDATED ELECTRIC**

The Eastern Consolidated Electric Company reports for the fiscal year ended Dec. 31, 1906:

	1906	1905
Gross earnings Eastern Transit Co..	\$326,693	\$283,264
Operating exp. Eastern Transit Co..	204,025	179,910
Net earnings .....	\$122,667	\$103,354
Charges and taxes East. Trans. Co..	40,324	45,042
Net income .....	\$82,342	\$58,311
Rental Edison Illuminating Co.....	30,000	30,000
Interest and taxes Edison Illum. Co.	2,583	1,983
Net income Edison Illum. Co.....	\$27,416	\$28,016
Gross earn. Easton Cons. Elec. Co..	109,759	86,328
Operating expenses Easton Cons. Elec. Co.....	3,298	3,594
Taxes unpaid and claims.....	.....	14,790
Net earnings .....	\$106,460	\$67,493
Interest and taxes.....	48,500	45,500
Balance .....	\$57,960	\$22,443
Dividend .....	18,750	.....
Surplus .....	\$39,210	\$22,443

President Joseph S. Lovering, in his annual report to stockholders, says:

"The Easton & South Bethlehem Transit Company's line, which is now in course of construction, when completed and in operation give direct service between Easton, Freemansburg, Shimersville, Northampton Heights, Bethlehem Steel Works and South Bethlehem. The line will be a little more than 12 miles in length. This work has been under way since May, 1906. The grading between Easton and Freemansburg is very nearly finished and about one-half of the track laid. The undercrossing at the Easton & Northern Railroad is nearly completed, and the undercrossing at the Central Railroad of New Jersey tracks at Freemansburg will be finished about April, 1907. The line between Easton and Freemansburg, at which point it connects with our present track, will be ready for operation about May 1.

"The claims of your company against the receivers of the Lehigh Valley Traction Company were, after careful consideration, settled by a compromise, your company receiving \$37,500 in cash and 478 shares of stock in the Pennsylvania Motor Company (one of your constituent lines). This stock, together with twenty shares purchased in the market, gives your company complete ownership of the Pennsylvania Motor Company.

"Notwithstanding the increased pay granted to your employees, your constituent companies have shown a steady increase in earning capacity during the fiscal year, which has fully justified the large expenditures for the reconstruction of and additions and betterments to your property, and the outlook for the coming year is very favorable."

## REPORT ON FENDER TESTS IN MASSACHUSETTS

The pamphlet report giving the record of tests of street rail-  
way fenders and wheelguards made under the direction of the  
Railroad Commissioners of Massachusetts, at Newton, Oct. 23,  
Oct. 30, Nov. 9, Nov. 16, Nov. 24, Nov. 27 and Dec. 7, has just  
been made public.

The following statement gives briefly the record of tests of  
certain of the fenders and wheelguards made under direction of  
the board.

### TESTS GIVEN AT NEWTON, OCT. 23, 1906

1. Pfingst Platform Fender (with drop attachment under-  
neath operated by motorman).—A small dummy in an upright  
position on the track was picked up at a speed of about 4 m.  
p. h. A small dummy lying on the track was picked up by the  
drop attachment (one arm under), which was tripped by the  
motorman at a speed of about 6 m. p. h. A small dummy lying  
diagonally with head towards the car was picked up by the  
drop attachment, which was tripped by the motorman. A large  
dummy lying diagonally on the track was picked up by the drop  
attachment, which was tripped by the motorman. A large  
dummy lying on its back was picked up and lay about one-half  
on the drop attachment. A large dummy placed in an upright  
position on the track was picked up on the platform, but the  
head was torn off.

2. Picket Fender.—A small dummy in an upright position in  
the center of the track had both legs broken off at the knees,  
but the body of the dummy was picked up by the fender. A  
small dummy in an upright position in the center of the track  
with its back towards the car was picked up. A small dummy  
lying on its back was struck and pushed along the track, but did  
not go under the fender. A small dummy lying on its back with  
its arms extended (one arm toward the car) was pushed along  
the track, one arm being caught under the fender and torn. A  
large dummy (headless) lying diagonally across the track, with  
one arm extended towards the car, was picked up, but rolled off,  
and cut to pieces. A small dummy lying diagonally on the  
track with its feet towards the car went under the fender and  
as far back as the lifeguard on the track.

3. Weeden Automatic Fender.—A dummy in an upright posi-  
tion with its back towards the car, was picked up on the fen-  
der platform. A small dummy lying on the track on its back,  
with arms extended, was pushed along the fender, one arm  
being caught under same. A small dummy lying diagonally  
across the track, with its head towards the car, was pushed  
along by the fender.

4. Sullivan & Taylor Fender.—A small dummy in an up-  
right position, with its back towards the car, was picked up by  
the fender platform, but rolled off the front of the fender and  
was pushed along the track with one arm under the fender. A  
small dummy in an upright position near the left rail, with its  
side towards the car, was picked up and remained on the fender  
platform.

5. Barnes Patent Lifeguard.—A small dummy lying diagon-  
ally on the track with its head towards the car was pushed along,  
with one arm under the fender. A small dummy lying diagon-  
ally on the track with its head towards the car, was pushed  
along, with both legs and one arm under. A small dummy  
placed in an upright position on the track was pushed down  
with its feet toward the car just before being struck, and was  
pushed along with legs under the fender. A small dummy in  
an upright position, with its back towards the car was struck  
by the fender, knocked down and pushed along, with one arm  
under the fender.

### TESTS GIVEN AT NEWTON, OCT. 30, 1906

1. Sterling Lifeguard.—A small dummy lying diagonally  
across the track with its head towards the car was pushed along  
by the lifeguard. A small dummy lying across the track was  
pushed along by the lifeguard with one arm underneath. A  
small dummy lying on its back lengthwise of the track, with its  
head towards the car, was pushed along by the lifeguard. A  
small dummy lying diagonally across the track with its feet  
towards the car was pushed along by the lifeguard, one arm and  
one leg being underneath.

2. Eclipse Lifeguard.—A small dummy in an upright position  
was picked up and remained on the fender. A small dummy in  
an upright position was picked up, but the fender failed to lock;  
the dummy lay on the fender platform with its feet dragging on  
the ground. A small dummy placed in an upright position near

the rail and facing the car was picked up and remained on the  
fender.

3. Multiple Wheelguard.—A small dummy lying diagonally  
across the track with its feet towards the car, was picked up  
by the wheelguard, which was dropped by the motorman. A  
small dummy lying diagonally across the track with its feet to-  
wards the car and its head resting on one rail was picked up  
by the wheelguard.

4. Bateson Car Fender.—A small dummy in an upright posi-  
tion with its back towards the car, was struck and picked up on  
the platform; but the head was partly torn off from contact with  
back of the fender. A small dummy in an upright position fac-  
ing the car, was picked up by the platform, but the head was  
torn off from contact with back of the fender. A large dummy  
in an upright position with its side towards the car, was picked  
up on the platform, but the head was partly torn off from con-  
tact with back of the fender. A small dummy lying diagonally  
across the track with feet towards the car, was struck by the  
fender and pushed to one side and off the track and was struck  
on the shoulder by the lifeguard of the truck. A small dummy  
lying diagonally across the track with head towards the car,  
was pushed along with one arm under the fender.

5. Pickett Fender (Retrial).—A large dummy in an upright  
position with back towards the car, was picked up, but the head  
was torn partly off. A large dummy lying on its back across the  
track was picked up on the fender platform, but rolled partly off  
and was pushed along with the head dragging on the ground.  
A large dummy lying diagonally across the track with its feet  
over one rail and its head towards the car was picked up, and  
remained on the fender.

6. Smith Automatic Fender.—A small dummy in an upright  
position near one rail, with its back towards the car, was picked  
up by the fender platform. A small dummy in an upright posi-  
tion near one rail, with its back to the car, was picked up on the  
fender platform. A small dummy on the track with arms ex-  
tended, was pushed along with one arm partly under the fender.  
A small dummy lying diagonally across the track with its head  
and shoulders outside of one rail, was pushed along with one  
arm under the fender; the head of the dummy was torn off.  
A large dummy lying diagonally across the track with feet to-  
wards the car, was pushed along with one leg and one arm  
under the fender.

7. Weeden Automatic Fender (Retrial).—A large dummy in  
an upright position with its back towards the car was struck  
and fell against the front of the car, then bounded off and went  
clear of the car at one side. A large dummy in an upright posi-  
tion and facing the car was picked up and remained on the  
fender platform. As the car approached the large dummy, a  
small dummy was thrown on the track about 20 ft. in front of  
the car, which passed entirely over the dummy, the motorman  
failing to trip the fender. A large dummy in an upright posi-  
tion near one rail, with its back to the car, was pushed over just  
before the car reached it and was picked up and remained on  
the fender. A large dummy lying diagonally across the track  
with its head towards the car was picked up and remained on  
the fender.

### TESTS GIVEN AT NEWTON, NOV. 9, 1906

1. Parmenter Fender.—A small dummy standing vertically  
with its side towards the car, was picked up on the fender plat-  
form, but struck against the dashboard protector, bounded for-  
ward and lay across one corner of the fender platform, with  
head on the ground and one foot caught under the front of the  
fender platform. A small dummy in an upright position some-  
what diagonally across the track with its back towards the car,  
was picked up and remained on the fender platform. A small  
dummy in an upright position, with its side towards the car,  
was picked up and remained on the fender, but the head was  
partly torn off from contact with the dashboard protector. A  
large dummy lying diagonally on the track with its head to-  
wards the car, was picked up and remained on the fender. A  
small dummy lying on the track with its head resting on one  
rail, was picked up and remained on the fender.

2. Parmenter Automatic Wheelguard.—A large dummy lying  
across the track was picked up and remained partly on the wheel-  
guard, with head and one arm dragging in front. A small  
dummy lying across the track was picked up and remained on  
the wheelguard, which dropped automatically. A small dummy  
lying across the track with its head outside of one rail was  
picked up on the wheelguard, which dropped automatically. A  
small dummy lying lengthwise of the track, with its feet to-



wards the car, was picked up on the wheelguard, which dropped automatically.

3. Providence Car Fender.—A small dummy in an upright position, near one rail with its side towards the car, when struck fell against the dashboard protector, then fell forward across the corner of the fender platform. A small dummy in an upright position near one rail with its back to the car, when struck fell against the dashboard protector, then fell forward and was pushed along in front of the fender. A large dummy in an upright position in the middle of the track was pushed along in front of the fender. A large dummy in an upright position on the track fell forward and was pushed along in front of the fender with its head and shoulders outside of the rail. A large dummy lying across the track was picked up and remained on the fender. A small dummy lying on the track, with head outside of the rail, was picked up and remained on the fender. A small dummy lying on the track with its feet towards the car and head resting on one rail, went under the fender and the car wheel passed over one arm, the dummy being left on the track about 8 ft. behind the car. A small dummy lying on the track, with its feet towards the car and head on one rail, was picked up and remained on the fender.

4. Barnes Patent Lifeguard (Retrial).—A small dummy in an upright position in the center of the track, facing the car, was struck by the fender and fell on top of same. The wings of the fender opened and the dummy dropped to the ground inside of the wings and was pushed along by the fender. A small dummy in an upright position near one rail, was pushed one side, but went under the lifeguard of the truck, being badly cut up. A large dummy lying on the track with feet over one rail and head inside, went under the fender and was pushed along, being caught under the fender and badly damaged.

#### TESTS GIVEN AT NEWTON, NOV. 16, 1906

1. Berg Fender.—A small dummy in an upright position on the track near one rail with back to the car, was picked up and remained on the platform, the fender being tripped by the motorman. A large dummy in an upright position on the track with its side to the car, was struck by the fender platform, fell against the dasher of the car, then fell forward off the fender and was pushed to one side, where it lay on the roadway. A large dummy lying across the track with head on one rail was picked up but rolled off the front of the fender just as the car came to a standstill. A small dummy lying on the track with its head outside of one rail, was pushed along by the fender with one arm caught under the fender platform. A small dummy lying on the track with its head outside one rail, was pushed along by the fender, with one arm caught. A small dummy lying on the track with its head on one rail, was pushed along by the fender. A large dummy lying across the track with its head on one rail, was picked up, but rolled off in front of the fender and was pushed along, rolling over twice. A large dummy lying diagonally across the track with feet towards the car and head on one rail, was picked up and remained on the fender, which was tripped by the motorman.

2. Sullivan and Taylor Fender (retrial, double-truck).—A small dummy standing on the track was picked up on the fender platform. A large dummy in an upright position was picked up on the fender platform, one foot dragging in front of same. A small dummy in an upright position was picked up on the fender platform. A small dummy lying on the track was pushed along in front of the fender. The fender was tripped by the motorman, and the brake was applied automatically. A small dummy lying on the track was pushed along in front of the fender, one arm and one leg under. The fender was not tripped by the motorman. A large dummy lying on the track was picked up and remained on the fender; the fender being tripped by the motorman, and the brake applied automatically. A large dummy lying on the track in front of the forward truck was passed over and one arm torn off.

3. Maxham Fender.—A small dummy in an upright position was picked up and remained on the fender. A large dummy in an upright position was picked up and remained on the fender, which tripped automatically. A large dummy in an upright position, near one rail, was picked up and remained on the fender. A large dummy lying across the track with its head over one rail was picked up and remained on the fender. A small dummy lying diagonally across the track with its head towards the car and near one rail, was picked up on the fender but rolled off just as the car came to a standstill. A very small dummy placed on the track was picked up and remained on the fender. A very small dummy placed in an upright position on

the track was picked up and remained on the fender. A large dummy in an upright position was picked up and remained on the fender. A large dummy lying across the track with its head over one rail was picked up and remained on the fender.

4. Sherwood Fender.—A small dummy in an upright position, near one rail, was picked up and lay on the fender with feet dragging in front. A large dummy in an upright position was picked up and remained on the fender which tripped automatically. A large dummy lying across the track with its head on one rail, was pushed along for some distance, then rolled partly under the fender. A large dummy lying across the track with its head over one rail, went completely under the fender. A small dummy lying on the track with its head on one rail, went completely under the fender and was run over by the car. A large dummy lying on the track was picked up and remained on the fender, which was tripped by the motorman. A large dummy lying on the track went completely under the fender, and lay in front of the truck.

#### TESTS GIVEN AT NEWTON, NOV. 24, 1906

1. Sherwood Fender (retrial).—A small dummy placed diagonally on the track with head towards the car and near one rail, was picked up and remained on the platform. A small dummy lying across the track was picked up and remained on the platform. A large dummy lying across the track was picked up and remained on the platform.

2. Sherwood Automatic Wheelguard.—A large dummy lying across the track was picked up and remained on the wheelguard, which tripped automatically. A large dummy lying across the track was picked up and remained on the wheelguard, which tripped automatically. A large dummy lying across the track was picked up, but rolled off the front of the wheelguard, and was pushed along, one shoulder under the wheelguard, which tripped automatically. A small dummy lying diagonally on the track with feet towards the car, was picked up and remained on the wheelguard, which tripped automatically. A small dummy lying on the track with head towards the car, was picked up and remained on the wheelguard, which tripped automatically.

#### TESTS GIVEN AT CANTON JUNCTION, NOV. 27, 1906

Wheelock Fender.—A small dummy in an upright position with back towards the car, was picked up and remained on the fender, which tripped automatically. A small dummy in an upright position with side towards the car, was picked up and remained on the fender, which tripped automatically. A small dummy placed in an upright position with face towards the car, was picked up and remained on the fender, which tripped automatically. A small dummy in an upright position with face towards the car was knocked down and pushed along in front of the fender for some distance and then picked up on the fender. A small dummy lying on the track was picked up and remained on the fender, but rolled off one side, and lay on the ground with its head wedged under the forward truck. A large dummy in an upright position, facing the car, was struck by the fender, knocked down and went under the fender feet foremost. The fender tripped automatically but caught feet of the dummy, which prevented the fender from dropping to the roadbed. A large dummy in an upright position with side towards the car, was picked up and remained on the fender, which tripped automatically. A large dummy lying across the track was picked up and remained partly on the fender, with feet dragging in front. A large dummy lying on the track partly over one rail, was picked up but rolled off the fender and was pushed along in front.

#### TESTS GIVEN AT NEWTON, DEC. 7, 1906

1. Keith Fender.—A small dummy in an upright position with side towards the car, was picked up and remained on the fender, which tripped automatically. A large dummy in an upright position with side to the car, was picked up and fell with its head and shoulders over one side of the fender. A large dummy lying on its face across the track with its feet on one rail, was picked up and remained on the fender, which was tripped by the motorman. A large dummy lying on its back across the track, was picked up and remained on the fender. A small dummy lying on its face across the track, with arms extended, was picked up and remained on the fender, which was tripped by the motorman. A small dummy lying diagonally across one rail with its head towards the car, was picked up and remained on the fender, which was tripped by the motorman.

2. Haskins Automatic Fender.—A large dummy in an upright position with its back towards the car, was picked up and remained on the fender, with feet dragging in front. A small dummy placed in an upright position on the track with its face

towards the car, was picked up and remained on the fender. A small dummy lying on its back diagonally across the track, with its head toward the car, went under the fender and lay in front of the truck. A small dummy lying across the track went partly under the fender and was pushed along; the fender did not trip. A large dummy lying diagonally across the track with its head towards the car went partly under the fender and was pushed along. A large dummy in an upright position near one rail, was picked up and remained on the fender, with feet dragging over the front.

3. Hipwood Fender.—A large dummy in an upright position was picked up and carried on the fender with feet dragging in front. A small dummy in an upright position with its face towards the car, was picked up and remained on the fender, which was not tripped. A small dummy lying diagonally across the track with its head towards the car, was picked up and remained on the fender, which was tripped by the motorman. A small dummy lying face down across the track, was picked up and remained on the fender, which was tripped by the motorman. The speed of the car was about 10 m. p. h. A large dummy lying on its back across the track was picked up and remained on the fender, which was tripped by the motorman.

4. Howe Automatic Revolving Fender.—A small dummy in an upright position with its back towards the car, was knocked down, one arm going under the fender, and was pushed along some distance in front, then worked to one side of the track. A large dummy in an upright position was knocked down, one arm going under the fender, and was pushed along to one side and lay in front of the truck. A large dummy lying diagonally across the track, with its head towards the car, was pushed along in front, went partly to one side and lay beside the fender, with one foot under.

6. Maxham Fender (Retrial).—A small dummy in an upright position with side towards the car, was picked up and remained on the fender, feet dragging in front. A large dummy in an upright position with back towards the car, was picked up and remained on the fender. The dummy was almost broken apart from force of contact with the front of the car. A small dummy lying on the track with head on one rail, was pushed along in front of the fender.

7. Jenkins Automatic Fender.—A large dummy in an upright position with side towards the car, was knocked down, falling outside of the fender and lay with head partly under the car, and the head was nearly torn off. A small dummy in an upright position, with face towards the car, was picked up and remained on the fender, which tripped automatically. A small dummy lying on its face on the track with head on one rail, was pushed along, with feet on the fender, and head and shoulders dragging in front. A large dummy lying on its back across the track was pushed along in front of the fender with one arm under.

8. Seavey Automatic Fender.—A large dummy in an upright position, with side towards the car, was knocked down and pushed along in front of the fender; the head being partly torn off. A small dummy placed in an upright position, with face towards the car, was picked up and remained on the fender, which tripped automatically. A small dummy lying diagonally across the track, with head towards the car, was picked up and remained on the fender, which was tripped by the motorman. A small dummy lying on its face on the track, went under the fender and lay in front of the truck. A large dummy lying on its back across the track, was pushed along in front of the fender, which was tripped by the motorman. A large dummy lying on its back across the track, went under the fender, which did not trip.

9. Clark Automatic Wheelguard.—A large dummy lying on its face across the track was pushed along with one arm under the wheelguard. A large dummy lying on its face across the track was picked up and remained on the wheelguard. A large dummy lying across the track was pushed along in front of the wheelguard, one foot under. A small dummy lying diagonally across the track with its face down and its head towards the car, was picked up and remained on the wheelguard. A small dummy was placed horizontally on the track, and another small dummy was thrown onto the track directly in front of the car, as it approached. One dummy was picked up on the wheelguard, the other being pushed along in front of the wheelguard, with one arm under.

10. Pfingst Fender.—A large dummy in an upright position with its face towards the car was knocked down, falling in front of the fender, going under and being pushed along in front of the truck. A large dummy in

an upright position on the track fell before the car reached it, went under the fender and was pushed along in front of the truck. A small dummy in an upright position with its side towards the car, was picked up and remained on the fender. A small dummy in an upright position, with its face to the car, went onto the fender, then rolled off and went under, and was pushed along in front of the truck. The fender was pushed in when it struck the dummy. A large dummy in an upright position was knocked down, went under the fender and was pushed along in front of the truck. A small dummy placed in an upright position on the track with its side towards the car, was picked up and remained on the fender. A small dummy lying on its back went under the fender and was pushed along in front of the truck. In the tests with the Pfingst fender the dummy was prevented from going under the truck, when it went under the fender, by the lifeguard attached to the truck.

## ANNUAL REPORT OF THE WASHINGTON COMPANY

The Washington Railway & Electric Company, of Washington, D. C., has issued its annual report for the year ended Dec. 31, 1906. The income account compares as follows:

	1906	1905
Gross receipts .....	\$3,133,240	\$2,905,907
Operating expenses .....	1,613,006	1,478,466
Net earnings .....	\$1,520,144	\$1,427,441
Other income .....	44,595	50,553
Total income .....	\$1,564,739	\$1,477,994
Fixed charges .....	1,041,118	999,455
Surplus .....	\$523,621	\$478,539

The increase in operating expenses is largely due to an increased expenditure for maintenance. While the total operating expenses increased \$134,630, or 9.10 per cent, the cost of maintenance increased \$64,612, or 20.59 per cent. This increase in cost of maintenance is partly due to the fact that the properties have been maintained in better condition than heretofore, but more to the large increase in the cost of materials of every nature entering into the construction and operation of such properties.

The surplus after the fixed charges for the year ending Dec. 31, 1906, amounting to \$523,623, has been applied as follows:

To payment of 5 per cent dividend on \$8,500,000 preferred stock .....	\$425,000
Discount on \$250,000 consolidated mortgage 4 per cent bonds .....	35,102
Credited to depreciation reserve .....	50,000
Credited to profit and loss surplus .....	13,519
Total .....	\$523,621

The general balance sheet of the Washington Railway & Electric Company, as of December 31, 1906, compares as follows:

Assets		
	1906	1905
Cost of property .....	\$27,743,475	\$27,519,358
Cos. st. and con. mtg. bonds .....	439,350	439,350
Construction bonds .....	227,000	227,000
Investments .....	416,071	416,071
Real estate and sundry securities .....	25,421	27,279
Material and supplies .....	72,974	63,513
Accounts received subsidiary cos. ....	107,558	60,671
Accounts received, miscellaneous .....	22,745	41,816
Prepaid insurance .....	5,192	6,365
Cash .....	361,854	283,959
Total .....	\$29,421,640	\$29,085,382
Liabilities		
Preferred stock .....	\$8,500,000	\$8,500,000
Common stock .....	6,500,000	6,500,000
Funded debt .....	12,913,439	12,647,100
Depreciation reserve .....	516,290	466,290
Accounts payable .....	63,508	65,201
Accrued interest and taxes .....	109,912	111,659
Reserve for renewals and damages .....	80,530	70,691
Profit and loss surplus .....	727,961	724,442
Total .....	\$29,421,640	\$29,085,382

## BILL EMBODYING IDEAS OF GOVERNOR HUGHES, OF NEW YORK, REGARDING SUPERVISION OF PUBLIC SERVICE CORPORATIONS REACHES THE LEGISLATURE

A bill, which embodies the general plan of Governor Hughes for the better supervision of public service corporations throughout the State, has been introduced in the Legislature of New York. The bill abolishes the State Railroad Commission, the State Commission of Gas and Electricity, the office of State inspector of gas meters and the Rapid Transit Commission of New York City. In their place there are to be two State public service corporations. One is to have jurisdiction in New York, Kings, Queens and Richmond Counties (Greater New York), and the other in the remainder of the State. Each commission will have five members, appointed by the Governor, with salaries of \$10,000 a year each, and with power to appoint counsel at \$10,000 a year. Each commission is to have a secretary at \$6,000 a year. The term of office of one commissioner in each district is fixed to expire Feb. 1, 1909, and the term of office of one commissioner in each district expires annually thereafter. Successors are to be appointed for a full term of five years.

The bill prescribes the duties of transportation companies, including railroads, street railroads, express companies, car companies, sleeping-car companies and pipe-line companies, and of gas and electric companies, and gives to the commission power to regulate the operations of such companies. The bill further provides that the franchise of a public service corporation shall not be assigned, transferred or leased without the approval of the commission having jurisdiction. It forbids a railroad or street railroad corporation, domestic or foreign, to purchase or acquire, take or hold any of the capital stock of any other similar corporation, unless authorized by the commission, and a similar provision is made as to gas and electric corporations. It further forbids the transfer to any stock corporation except as collateral security only, of more than 10 per cent of the total capital stock of any railroad, street railroad, gas or electric corporation; but this does not prevent the holding of stock heretofore lawfully acquired.

The commission is also given authority to approve or disapprove the issue of stocks and bonds of a public service corporation; but is forbidden to authorize the capitalization of franchises, except to the extent that the corporation has actually paid for such franchise to the State or a municipality, not including an annual tax or charge. It is also forbidden to authorize the capitalization upon the merger of two public service corporations beyond the amount of the capital stock of the two so merged, or to capitalize any contract for consolidation or lease.

Each commission within its jurisdiction is given power to fix the form of accounts and reports of public service companies, to investigate accidents, and to fix just and reasonable rates, to order adequate service as to cars, motive power, time schedule, safety devices, employees and other instrumentalities. Its orders are to be in force until modified or abrogated by the commission, or unless declared by a court of competent jurisdiction to be unauthorized by this or by any other act, or to be in violation of a provision of the constitution of the State or of the United States.

Penalties ranging from \$1,000 to \$5,000 are imposed upon public service corporations violating the act or failing to obey any order of the commission, and their officers, agents and employees violating the act or any order of the commission, or aiding or abetting the corporation in doing so, are guilty of a misdemeanor. Shippers violating any provisions of the act are also liable to a penalty.

Theodore P. Shonts, president of the Interborough-Metropolitan Company, issued a statement Monday, in which he said that the corporation he represents will not oppose the Public Utilities Commission bill, and that it was the intention of the Interborough to give satisfactory service and have satisfactory relations with the public. The statement follows:

"In order that there may be no misapprehension in regard to our position, I wish it to be distinctly understood that there will be no opposition to Governor Hughes's Public Utilities bill on the part of the interests which I represent, nor will we oppose any bill which will accomplish more harmonious relations between the public and the public service corporations. I took hold of my present work with a firm determination to do all I could to bring about a better understanding between the public

and our corporations, feeling certain that in the long run the corporations could prosper only by giving satisfactory service and by having satisfactory relations with the public and the municipal authorities.

"I believe that the public authorities; whether those now existing or such as may be created, should have broader powers in dealing with the complicated traffic conditions in Greater New York. We will do our best to render effective any plan which the Legislature in its wisdom may adopt with that end in view. I assume the Legislature will welcome suggestions in aid of the purposes of the bills which further discussion and study may develop. I may add that the directors and principal owners of the company are in entire accord with me on this subject."

## STRIKE IN LOUISVILLE

Some 700 employees of the Louisville Railway Company, comprising those men in the company's service who are members of the local branch in Louisville of the Amalgamated Association of Street and Electric Railway Employees of America, are on strike. Their demands for a 10-hour workday with 22 cents an hour, 45 minutes for meals, pay for extra work to begin when reporting for duty is made, time and a half for overtime, subsequent employees to be compelled to join the union, and a board of arbitration to settle all differences between the company and the men, were presented last week and refused by the company. As a consequence a meeting was held Saturday night, at which it was decided by the union to declare a strike, and so no cars were operated on Sunday. On Monday, however, the company resumed service with the 300 men in its employ not members of the union, but the running of cars had to be abandoned, because of insufficient police protection.

President Minary's letter to the union setting forth the position of the company is appended:

Louisville, Ky., March 9, 1907.

Mr. S. L. Wilson, City.

Dear Sir: Your letter of March 8, 1907, duly received.

We understand that you come to us, not as a committee from our employees, but you ask us to arbitrate with an outside party. We understand that, among the things which you ask us to arbitrate, are the following:

First—That we shall agree that, whenever one of our employees is suspended or discharged for a violation of the rules of this company, or a failure on his part to perform his duties, such employee must be reinstated by us if the union says so.

Second—That we shall agree that, whenever one of our employees is dismissed from or loses his membership in the union, we are to be required to discharge him from our service without regard to the fact that he has been a faithful and capable employee.

Third—That we shall agree that every man we hereafter employ must be required to become a member of the union.

The board of directors of this company cannot for a moment entertain the proposition that an employee who has violated our rules, and whose conduct endangers the safety of the public, cannot be suspended or discharged without our asking permission from some outside body.

The board of directors of this company cannot entertain the proposition that if one of our employees violates a rule of some outside body, we must, on this account, discharge him from our service, notwithstanding he has been and is a faithful and competent employee; and

Our board of directors cannot entertain the proposition that we must require all persons whom we hereafter employ to become members of the union, whether they desire so to do or not.

This is objectionable enough, but its evident consequence will be that you will require all old as well as new employees to join. This coercion of old or new men we will not undertake. It would be most unjust to our present employees, and unwisely limit the choice of new men.

The board of directors are clearly of the opinion that to entertain a proposition to agree to such terms as these would be to violate the duty which the board owes to the company and to the public. The safety and convenience of the public absolutely require that the men who operate our cars shall be employed and discharged solely with a view to their being able and willing to promptly and efficiently perform their duties.

The plain English of these demands is as follows:

First—We are not to be allowed to suspend or discharge any of our employees.

Second—You are to be allowed to discharge any of our employees you see fit.

Third—We must not have any employee not a member of your union and subject to your absolute control.

We respectfully decline to consider a proposition leading to such results.

This response is sent by unanimous action of the board of directors had this day.

LOUISVILLE RAILWAY COMPANY,  
By T. J. Minary, President.

## ANNUAL BANQUET OF THE NEW ENGLAND STREET RAILWAY CLUB

The annual banquet of the New England Street Railway Club will be held at the Hotel Somerset, on Thursday evening, March 28, and a large attendance is expected. Among the after-dinner speakers will be John I. Beggs, Esq., president American Street and Interurban Railway Association, of Milwaukee, Wis.; Hon. George Tate Blackstock, K. C., of Toronto, Can.; Samuel J. Elder, Esq., of Boston, and Rev. Willard Scott, D. D., of Worcester, Mass. The price of tickets is \$2.50. They can be purchased from the secretary at 12 Pearl Street, and members are requested to order tickets early so as to make sure of seats. Tickets may be purchased by members for their guests, and this privilege will be allowed until the committee considers that it is being done to such an extent as to exclude members.

The business meeting will be held at 3 o'clock in the afternoon of March 28, at Hotel Somerset, Boston. Balloting for officers will begin at 3:30 o'clock, and the polls will close at 5:30 o'clock. By holding the annual meeting during the afternoon the entire evening can be devoted to the banquet.

## MARCH MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The American Society of Mechanical Engineers will be addressed on Thursday evening, March 21, by John Lieb, Jr., vice-president of the society. The subject will be "Vesuvius and Pompeii," and will be illustrated by lantern slides from original photographs taken by F. A. Perret, who was in the Vesuvian Observatory during the last eruption, and from photographs taken by Mr. Lieb during a visit to Vesuvius and Pompeii shortly after the eruption. A series of lantern slides, showing the state of the mechanical arts in Pompeii have been especially prepared for this lecture. Through the courtesy of E. Burton Holmes, the well-known travelogue author, a series of original moving pictures of Vesuvius in eruption, and of a flowing stream of lava will be shown by Oscar B. Deput.

The meeting will take place in the auditorium of the Engineering Society's building, at 29 West Thirty-Ninth Street. As this is a subject of general interest it is hoped that the members will bring ladies to the meeting. If members who wish to invite friends will address the secretary, invitations will be sent promptly. Persons who are not members of the society and wish to attend this meeting will receive tickets of admission by addressing the secretary.

## INDIANA UNION TRACTION COMPANY EARNS NEARLY TWO MILLIONS

The annual meeting of the directors and stockholders of the Indiana Union Traction Company and its allied companies was held at the home offices of the company in Anderson, March 5. That the year just closed was an unusually profitable one is evidenced by the gratifying report, which shows that the gross earnings for the year were \$1,943,101.83; operating expenses, \$995,266.25; gross earnings, \$947,835.58; fixed charges, taxes, interest and stock dividends, \$832,332.75; surplus, \$115,502.83. Directors were elected as follows: For the Indiana Union Traction Company, J. Levering Jones, Randall Morgan and H. H. Kingston, of Philadelphia; W. Kelsey and Jacob Schoepf, Cincinnati; George F. McCulloch, Muncie; A. W. Brady, Anderson, and Hugh J. McGowan, Indianapolis. It was announced that the directors would meet in Philadelphia on call to elect the officers for the company. The following officers were elected for the Union Traction Company: Philip Mater, of Muncie, president; E. C. Carpenter, Anderson, vice-president; W. C. Sampson, of Anderson, secretary and treasurer. The same officers were chosen to serve the Indianapolis & Northern Traction Company. For the Muncie, Hartford City & Fort Wayne Traction Company the following officers were elected: J. A. Van Osdel, president; E. C. Carpenter, vice-president; W. C. Sampson, secretary and treasurer.

Improvements and betterments were discussed, but no action taken.

## NEW SUBWAYS APPROVED FOR NEW YORK

The Board of Estimate at its meeting, last week, approved the Lexington Avenue subway route, the Bridge subway route and the franchise of the New York Connecting Railway. When the proposed contract for the Lexington Avenue subway came up for consideration, Borough President Color, of Brooklyn, said that he was opposed to the contract. He said that there would be but one bidder—the Interborough Company—under the present conditions. He said that Brooklyn would get no benefit from the subway. The board approved the contract, Mr. Coler, alone, voting against the proposition. The Rapid Transit Commission had already approved of the New York Connecting Railway franchise. The company is to construct a railway under and over certain streets in the boroughs of Brooklyn, Queens and the Bronx, and over Ward's Island and Randall's Island.

The Board of Rapid Transit has made public its proposed contract for the new West Side subway. A public hearing will take place March 25, after which, the specifications must be favorably passed upon by the Board of Estimate and the Corporation Counsel. Like the contract for the Lexington Avenue route, the proposed one provides for bids by section, and for bids for construction alone, or for construction, equipment, and operation together. The most important feature is the alternative route upon which bids will be received, which would form a connection with the present subway at Forty-Second Street and Seventh Avenue.

According to the contract proposed, the new West side subway will begin at the Battery, continue north under Greenwich Street to Morris Street, thence under West Broadway, Washington Square, and Greenwich Avenue to West Eleventh Street; thence under private property to West Twelfth Street and Seventh Avenue, and then under Seventh Avenue to Fortieth Street, where the line will pass under the existing subway at a point near Forty-Third Street and continue north to Central Park West, under that thoroughfare and Eighth Avenue to 149th Street, thence under Macomb's Lane, the Harlem River, 162d Street, and Jerome Avenue to a terminal near Woodlawn Cemetery.

It is proposed that there shall be four tracks from the Battery to 150th Street. The lease is for twenty years, and the road must be in full operation within four years, with a bonus of 1 per cent on every month saved. Advertisements are forbidden in the stations, and all business except news stands. The burden of proof clause, to which the Interborough objected, is retained, making it necessary for the operating company to go to court in order to be freed from directions given it by the Board of Rapid Transit.

Express stations are provided for at Christopher and Murray Streets, and between Thirty-Third and Thirty-Fourth Streets, Fifty-Seventh and Fifty-Eighth Streets, Eighty-Sixth and Eighty-Seventh Streets, 124th and 125th Streets, and 148th and 149th Streets.

It became known Tuesday, March 12, that the contract for the construction of the first section of the so-called bridge loop will be let about April 11, a little more than three weeks hence. The advertisement asking for bids for the construction of the line will appear on Saturday, March 16. Thereafter it will be published twice a week until April 11, when, at noon, the bidding will be declared closed. Under the law, the board has ten days in which to make the award. In any event, there will be a session of the Commission on April 11, and then it will be decided when the bids shall be opened. Conditions under which the bids may be made will be set forth at length in the advertisement. One of them is that a bid, once put in the box for their receipt, may not be withdrawn for correction or other purpose. Each bid must be accompanied by a certified check for \$25,000, made payable to the Controller, and the successful bidder must deposit securities to the value of \$300,000. Actual work on the construction of the road is to begin within sixty days after the contract is finally signed, and the section indicated is to be finished within twenty-one months. Should the contractor succeed in finishing the work ahead of time, he will receive a bonus of 1 per cent of the amount due him at the time the work is finished. Should he take longer than twenty-one months to complete the work he will have to pay a penalty.

It is reported that the New York, New Haven & Hartford Railroad may bid for the Lexington line, but this on rumor only, the company having made no statement as to its purpose.

## MR. BICKNELL ELECTED PRESIDENT OF THE HAVANA COMPANY—WILL GO TO HAVANA TO STUDY CONDITIONS THERE

The changes in the personnel of the Havana Electric Railway Company, forecasted in the STREET RAILWAY JOURNAL of March 2, were effected at the meeting of the company held in New York last week, when a new board of directors was elected, comprising Warren Bicknell, of the Cleveland Construction Company; David T. Davis and Robert Mather, of the Rock Island Railway interests; Walter G. Oakman, of the Guarantee Trust Company; James Rattray, San Miguel, Henry Runken, Carlos Zaldo and Frank Steinhart, of Havana. San Miguel is editor of "La Tucha," Carlos Zaldo is president of the Bank of Havana, Henry Runken is president of the banking house of Upham & Company, and Mr. Steinhart is the American Consul at Havana.

The following officers were elected: Warren Bicknell, president; David T. Davis, vice-president, and Mr. Ashley secretary and treasurer.

Mr. Bicknell will go to Havana this week, and will spend about a month there studying conditions governing the operation of the property. He says the company has as yet formed no plans for extensions or improvements other than those that would come about through the natural depreciation of the plant. Mr. Bicknell served for a number of years as president of the Lake Shore Electric Railway Company, which he brought up to a high standard. Since resigning that position he has been president and manager of the Cleveland Construction Company, which has under way some large contracts, principal among which are the Youngstown & Southern and the Cleveland, Ashland & Mansfield Railway lines.

## IMPROVEMENTS IN SALT LAKE SYSTEM

The plans for the new car houses and machine shops of the Utah Light & Railway Company, in Salt Lake City, have been carefully revised, and it is expected that ground will be broken early in April for the new buildings. The site chosen is the old exposition block at Fifth South and Seventh East Streets. The car house will face on Seventh East, but there will be also an entrance from Fifth South Street. There are to be sixteen tracks in the car house, divided into four sheds, each with four tracks and each compartment separated by a brick wall, as protection against fire. The car house can accommodate 150 cars, and will be built either of brick or concrete. On the southwestern portion of the block the machine shop, carpenter and paint shops will be erected, all modern in detail and equipped with the latest machinery and tools.

On Fifth South the offices of the operating department and quarters for the men will be erected. This will be a two-story structure; the ground floor will be occupied by the officials, the second floor by the employees. According to present plans it will embrace a gymnasium, a lounging room, shower and tub baths and a small restaurant, where light meals will be served the employees at a minimum cost.

Work on the rehabilitation of the city system, under the new Harriman management, will be undertaken energetically in the spring. Improvements have already been completed on the First, Third and Sixth Street lines, and the line to Wandamere will be next, especially that portion beyond Liberty Park, and it will be in proper condition before the amusement season opens. The same applies to the line to the Salt Palace, work on which is now under way. By November it is expected that almost the entire system will have been renovated. It is the intention to remove all the poles from the middle of the street and suspend the wire from poles erected at the side. This improvement is also made necessary by the fact that the fifty large vestibuled cars to be ordered could not be operated on the lines with the center poles remaining in place.

It is not anticipated that the new power house will be completed for a year yet. This new steam station will be located on the Jordan River, in the Western part of the city, near the present sub-station, where the transmission systems of the Utah Light & Railway Company and the Telluride Power Company are tied in together.

For some time a corps of engineers has been at work running a survey from the city limits to a point in the vicinity of Garfield Beach, on Great Salt Lake, for an interurban line. Evi-

dently it is the intention to build on the lake shore, probably at a point north of Black Rock, an amusement resort of large proportions and with all equipment found at modern, up-to-date places of pastime.

## CONCRETE TIES AND RAIL CORRUGATION TO BE INVESTIGATED

The way committee of the American Street and Interurban Engineering Association has issued two question sheets, which are being sent to the members of the association. The committee this year consists of Fred. G. Simmons, chairman, superintendent construction and maintenance and way, Milwaukee Electric Railway & Light Company; Thos. K. Bell, chief engineer, Interstate Railways Company, Philadelphia; C. A. Alderman, chief engineer, Cincinnati Northern Traction Company, Hamilton, Ohio. The letters relate to concrete ties and rail corrugation, and are presented herewith:

### CONCRETE RAILWAY TIES

Gentlemen:—It is a well-known fact that the available supply of wood for railway ties is becoming less year by year, and that the cost thereof is increasing in proportion. The question of the future means to be employed in providing substitutes therefore is rapidly becoming an acute one. Numbers of experiments are being made and various materials used. The possibility of using concrete has appealed to many, and experiments with concrete ties are now undoubtedly under way. The committee of the American Street and Interurban Railway Engineering Association having charge of way matters desires to assist all who may require information upon this subject, and is to this end sending out this circular letter with the request that all roads which have been or now are engaged in experiments with concrete ties, kindly notify the committee that they have been or are so doing, with information as to the method of construction used in the manufacture of the tie and the cost thereof, and forward a statement of results obtained and conclusions arrived at on account of these experiments.

If no result has yet been obtained, the committee suggests that a careful record of all phases of the experiments be kept so that the result may be used later for the benefit of all concerned.

Trusting you will be able to assist us, and assuring all that the results obtained will be available to you, we are, respectfully yours,  
COMMITTEE IN CHARGE OF WAY MATTERS.

### RAIL CORRUGATION

If you have had any experience with the phenomenon commonly called rail corrugations, will you please furnish the following information:

Type of rail affected.

Are different types of rail affected where conditions are similar?

Length of section affected.

Length of time rail was in service before corrugations appeared.

Length from center to center of corrugations.

Depth of corrugations.

Please describe rails most affected, giving the type, weight, manufacturer, date rolled, date laid and composition of rail if possible.

Please describe the track construction, giving the rigidity, drainage, condition of paving and general method of construction, and specify as between track in paved streets and track laid on earth and loose stone or gravel ballast.

Please describe location of corrugations, both on straight tracks and as to inner or outer rails on curves, with degrees of curvature; as to grades and their percentage; as to points where brakes are applied and all other locations tending to indicate a cause. Are opposite rails always corrugated?

Please describe the traffic conditions at points of corrugation, giving frequency of car service, weight, type and speed of cars, type of brake used, type of truck employed, etc.

Please state what remedies have been applied, if any, and what result has been obtained therefrom; also the cost of applying such remedies, if possible.

Please give your general conclusions in the matter and such other information as you may think pertinent.

Replies to both communications should be sent to Fred. G. Simmons, chairman Way committee, Public Service Building, Milwaukee, Wis.

## SAN FRANCISCO ARBITRATION AWARD

The board of arbitration that has had the differences between the United Railroads of San Francisco and the employees of that corporation in respect to wages and hours under consideration for several months, filed its various opinions and made its award on Feb. 28. There was an opinion by Chief Justice Beatty by which the carmen were given an increase of wages ranging from 20 to 24 per cent, the great majority of the increases being in the lower percentage. The schedule is based on the hour, and a day's work is fixed at 10 hours. The employees of the other departments, including electricity and construction, are given, as a rule, the increase in wages they asked and an 8-hour day. There is a concurring opinion by Major Frank McLaughlin, in which this arbitrator agrees with Chief Justice Beatty in the matter of the awards, and expresses his individual views in the case. Rev. Peter C. Yorke filed a dissenting opinion, in which he favored giving the carmen a flat rate of \$3 for an 8-hour day. In the matter of the other awards he agreed with his associates. Chief Justice Beatty then wrote an opinion in reply to the dissenting views of Mr. Yorke, whereupon the latter presented a second dissenting opinion in response to Mr. Beatty's last paper.

The awards as agreed up by the majority, in detail, are:

Case of the electrical workers—wages. Armature winders and electrical machinists in the power house. Journeymen to receive not less than \$4 per day. Apprentices to receive not less than \$2.50 per day during their first year. Thereafter, so long as they continue in the employ of the company, their wages to be increased not less than 37½ cents per day as often as once in six months until they equal journeymen's wages. Wages of apprentices in special cases may be more readily advanced at the option of the company.

Journeymen, shopmen and lamp repairers to receive not less than \$3.50 per day. Apprentices to receive not less than \$2.50 per day during their first year. Thereafter, as long as they continue in the employ of the company, their wages to be increased not less than 25 cents per day as often as once in six months—the company to have the same option to make a more rapid advance in special cases.

No award is made to station construction and wire men, for the reason that the company employs none who are members of the union.

Station operators are paid by the month, and the rates in the different stations have been \$80, \$85 and \$90. These rates are advanced from \$80 to \$96, \$85 to \$102, \$90 to \$108. Each operator is to have one day off in each month, with full pay.

Dynamo tenders and wipers. In each class the wages to be not less than \$2.50 per day. No award is made to the underground men, because none are employed by the company.

Foremen linemen to receive not less than \$4.50 per day. Journeymen not less than \$4 per day. Apprentices to receive not less than \$2.50 per day during the first year. Thereafter, so long as they continue in the employ of the company their wages to be increased not less than 37½ cents per day as often as once in six months until they equal journeymen's wages, with the option to the company to make a more rapid advance in special cases.

Car house and truckmen who were members of the union on Sept. 6, 1906: Foremen are to receive not less than \$110 per month. Journeymen now paid \$2.50 per day to receive not less than \$100 per month. Journeymen now paid \$2.50 per day to receive not less than \$85 per month. All employees in this class to have one day off in each month, with full pay.

With two exceptions, eight hours shall constitute a day's work for all electrical workers. The exceptions are:

First—In the case of the station operators who work upon three shifts during a twenty-four-hour day. The shifts are changed every eight hours, but it appears to be established by the evidence that it is necessary for the safe operation of the stations that the retiring operator shall remain on duty for a time with the operator who takes his place. This extra time is known as the overlap, and has heretofore been one hour. The board is unwilling to wholly set aside this arrangement, and has sought to compensate the operators by an increase in their wages.

Second—In the case of the linemen employed in making repairs as distinct from construction work. The board is satisfied that repair work should be conducted upon the system known as shop to shop, in which the actual working time in a nine-hour day does not materially exceed eight hours.

Upon these conditions a nine-hour day is retained in the case of the linemen engaged in repair work and working shop to shop, and the overlap for the station operators is fixed at a half hour. Men working overtime are to receive time and a half wages up to 12 o'clock midnight; after midnight they are to receive double-time wages. Work on holidays is to be paid for at double-time rates. The following days shall be reckoned as holidays: Sundays, New Year's Day, Admission Day, Thanksgiving Day, Labor Day, Decoration Day, Fourth of July, Christmas Day. When any holiday falls on Sunday, the following Monday shall be considered a holiday. These provisions as to extra pay for overtime do not apply to station operators or car house and truckmen who receive monthly wages, nor to dynamo wipers or dynamo tenders who have heretofore been paid by the month. Transportation to be fur-

nished linemen. This award takes effect and is in force as of the 6th day of September, 1906.

Case of stationary firemen. Wages—Water tenders to receive \$3 per day; wipers to receive \$2.50 per day. Hours—When a station is operated throughout the twenty-four hours the shifts are to be eight hours, and for each shift a day's wages is to be paid. When a station is operated less than twenty-four hours and upon less than three shifts, time in excess of eight hours shall be reckoned as overtime. All overtime is to be paid for at time-and-a-half rates. All work on holidays shall be reckoned as overtime and compensated accordingly.

Laborers are to receive not less than \$2.25 per day during the first month of their employment. After their first month, not less than \$2.50 per day. Handy men to receive not less than \$2.75 per day. Pavers to receive not less than \$3 per day. Night watchmen not less than \$2.50 for eight hours. Work on holidays is to be paid for at time and a half rates. Eight hours constitutes a day's work.

The award in the case of platform men for the period between Sept. 6, 1906, and May 1, 1907, is as follows:

For the time within their first year of service, conductors, motormen and gripmen shall receive pay at the rate of 31 cents per hour and for overtime, 37 2-10 per hour.

For the time within their second year of service the same employees shall receive 32 cents per hour, and for overtime 38 4-10 per hour.

For time within their third year or longer years of service, the same employees shall receive 33 cents per hour and for overtime 39 6-10 cents per hour, overtime to be reckoned with the same allowance for leeway heretofore made.

As to the hours, we make no change in the existing arrangements based upon the ten-hour division. This award does not hold after the first day of May next, and after that time the whole subject of hours and wages is left for adjustment to those concerned.

As to the other employees of the company belonging to the Amalgamated Association of Street and Electric Railway Employees of America, Division 205, the evidence is too indefinite to enable us to make the specific award in dollars and cents.

We have agreed that, as there is no positive evidence that the members of the board, other than the carmen, having been compelled to work under conditions with any considerable degree more onerous than before the fire—except the increased cost of living—they shall receive, in addition to the wages they were to receive under the contract, an addition of 15 per cent in all cases. For those who are employed and paid by the day or month, eight hours shall constitute a day's work. While employed and paid by the hour, they are to have only the 15 per cent advance.

This award takes effect and is in force as of the 6th day of September, 1906.

All sums due the men by the terms of these awards shall be payable within sixty days of this date.

In answer to the finding of the arbitration board, Assistant President Thornwell Mullally, of the United Railroads, issued a public statement, presenting the effect of the decision. He said in part: "The United Railroads considers the decision as a sweeping award in favor of the employees. The award calls for a division of back pay among the employees of about \$417,000. It calls for a division among the employees of the company of about \$1,044,000 a year in addition to the wages now paid, based on the present pay roll, of which additional amount about \$319,000 will be divided among the carmen. This total increase means interest at 5 per cent per annum on \$20,880,000. This amount will be reduced in some measure when the reconstruction work is completed. The carmen of the United Railroads are now the best paid in the world (except in Butte, Mont., where certain abnormal local conditions prevail). Oakland has recently sought to equal this award. A comparison of the rates will show that it has not done so. The carmen of the United Railroads get a higher average wage than the carmen of the Oakland Traction Company. In March, 1902, the wages of some of the carmen were raised, making the wages of all the carmen employed by the United Railroads higher than those on any similar system in the world. Within one month thereafter the carmen's wages were again raised. The following year the carmen's wages were again raised. In January, 1905, a contract was made with the carmen, running by its terms to May 1, 1907, providing for wages, hours and arbitration. Aug. 26, 1906, the carmen struck. Sept. 6, 1906, the company entered into an agreement for arbitration with the Carmen's Union and certain other unions. Sept. 6, 1906, the carmen returned to work, any increase given by the arbitrators to date from that day. The award effects an increase of 50 per cent in the carmen's wages within the past five years. We believe that the public will consider it more than fair to the employees of the company; we believe the fair-minded employee of the company will consider it as being more in their favor than in favor of the company. Earnest consideration of these facts is asked of the people of San Francisco, who are interested in transportation and whose interests the company and its employees alike should consider."

**A NEW COMPANY FOR CHIHUAHUA, MEXICO**

A company has been formed at Chihuahua, Mex., composed entirely of local capital, to take over the present horse-car system operated in that city, the electric light and power plant of the Cia Industrial Mexicana and the Mineral Railroad, which runs from Chihuahua to Santa Eulalia. The reported plans of the company include the building of 5 miles of new line in the city proper, the construction of an extension of 10 miles to Nombre de Dios, the conversion of the Mineral Railroad into an electric line, and the enlarging of the Cia Industrial Mexicana power house. Among those interested in the new company are: Hon. Enrique C. Creel, ambassador from Mexico to the United States; Maximo Krakauer, of the firm of Krakauer, Zork & Moye, and Juan A. Creel, general manager of the Banca Minero.

**THE STRIKE AT PORTSMOUTH, OHIO, FINALLY SETTLED**

The strike of the employees of the Portsmouth Street Railway Company, begun two weeks ago, has been settled. The company has agreed to re-employ all the old men within thirty days, the whole controversy to be settled by three disinterested arbitrators. While a few cars were operated at irregular intervals last week not many passengers were carried.

**THE SITUATION IN CLEVELAND**

President Andrews, of the Cleveland Electric Railway Company, and President Du Pont, of the Municipal Traction Company, have kept steadily at their work in fixing a valuation for the Cleveland properties through the past week, and it is probable that they will arrive at some conclusion within a short time. The valuation of unexpired franchises has proved a hard task, as so many considerations enter into the question. It is said that the valuations are bound to be much higher than was expected. Whether this will have any effect on the plans for operating on a 3-cent fare remains to be seen.

President Du Pont, of the Municipal Traction Company, has intimated that if the Cleveland Electric Railway system is turned over to a holding company he will take steps to improve the down-town terminals. He says that the city has grown too large to expect all lines to terminate at the Public Square. Further, he believes that there should be a subway system for the down-town terminals, in order to facilitate the movement of the cars. Some of the routes, he says, should be so arranged that the cars will have a clear run through. In order to do this he thinks that high-level bridges could be built directly over the present Cuyahoga River viaduct, and that they could be used by the street cars exclusively. This would do away with delays caused by the passage of boats and other things of the kind.

**INDIANA, COLUMBUS & EASTERN COMPANY IMPROVEMENTS**

Bids are being received by the Indiana, Columbus & Eastern Traction Company for the construction of the London cut-off on the Columbus and Springfield division, work on which will begin early in the spring, and for a number of other improvements on that division. The cut-off will be a single track with one turn-out, 5 miles long, between Lafayette and Summerford, in Madison County, Ohio, and will shorten the main line of the division 7 miles. A. F. Schoepf, superintendent of the Columbus and Springfield division, has been instructed to rejuvenate the division by replacing 20,000 of the ties and rebalancing the line. Last year 20,000 ties were replaced on the Columbus end of the division, and with the new work this year the division will be placed in good condition for high-speed running. The capacity of the sub-power station at Brighton, near Springfield, is to be doubled, and a portable sub-station has been ordered for use on the Columbus end. Passenger stations are also to be built at Lafayette and Summerford to accommodate transfer passengers from London, which will cease to be on the main line when the cut-off is in operation. A shuttle or tripper service will be operated around through London. Superintendent Schoepf is preparing a new schedule for limited

and local service to be put in effect with the opening of the cut-off. It will reduce the time between Columbus and Springfield 25 minutes on the limited service, and about 22 minutes on the local service. The limited cars will make stops at all the towns on the line but no intermediate stops, and will make the run of 45 miles in an hour and 30 minutes flat. Every alternate hourly car will be a limited. It is possible the local service will continue on its present schedule and will run around by London for the remainder of this year.

**PENNSYLVANIA'S REPORT ON ELECTRIC OPERATION**

The report of the Pennsylvania Railroad for the year ended Dec. 31, 1906, has just been issued as has also the record of transportation lines owned and operated by and associated with the company, compiled from official data on file with the chief engineer of maintenance of way. The detail figures of operation of the company and its constituents contain little of interest to electric railway interests, except so far as the report of the West Jersey & Sea Shore Railroad may be concerned. The operation of this line by electricity was not begun until the middle of the summer, however. This report shows:

	1906	1905
Gross receipts .....	\$5,206,283	\$4,652,405
Operating expenses .....	3,956,914	3,388,728
Net earnings .....	\$1,249,369	\$1,263,677
Other income .....	40,086	48,667
Total income .....	\$1,289,455	\$1,312,344
*Charges .....	1,014,727	1,251,249
Surplus .....	\$274,728	\$61,095

\* Includes interest, rentals, dividends and other charges, including extraordinary expenses and extraordinary expenditure funds.

Of especial interest are the remarks of President McCrea in reference to the New York tunnel extension. He said:

"The progress upon the tunnel extension has been quite satisfactory, and while the work under the East River is somewhat slower in progress, that under the Hudson River was pushed forward so successfully that on the 12th of September the laying of one of the tubes was completed through from Weehawken to Manhattan, and on the 9th of October the second tube was in place. The work of lining these tubes with concrete is now under way.

"On the section between Harrison, the point east of Newark, where the tunnel leaves your United New Jersey Division, and the Hudson River, many of the bridges have been constructed, and that over the Hackensack River largely completed, while the excavation on the approach to the Bergen Hill tunnel and in the tunnel itself has made substantial progress. The excavation for the station site in New York between Seventh and Eighth Avenues is practically finished, and the foundations for a number of the columns necessary to support the station and the steel viaducts are being put in place.

"The work under the streets between the North and East Rivers and in Long Island City beyond the East River is about two-thirds finished, and also about one-fourth of the excavation and lining for the four tunnels under the East River.

"By reference to the balance sheet, it will be seen that the amount carried on your books, on account of the tunnel extension, is \$28,835,033.26."

After recounting that all of the many and heavy works of enlargement and addition declared in the report of 1902 to be absolutely necessary to the performance of the company's duty to the public have either been completed or are rapidly approaching completion, President McCrea continues:

"There is no question that but for the policy pursued by your management in this direction it would have been impracticable to handle the enormous traffic seeking an outlet over your system; and the wisdom of making the expenditures necessary to accomplish this result has been clearly demonstrated. It must be borne in mind in this connection that in the five years from 1902 to 1907, the tonnage of the main line and branches has increased from about 77,000,000 tons to over 101,000,000 tons, and that of the four grand divisions east of Pittsburg and Erie, which are operated directly by your company, from about 134,000,000 tons to over 172,000,000 tons."

## CENTRAL ELECTRIC INTERCHANGEABLE COUPON TICKET AGREEMENT

The Marion, Bluffton & Eastern Traction Company, Bluffton, Ind., has become a member of the Interchangeable Coupon Ticket Agreement, and is accepting coupon tickets on its road. The above company will be known as Company No. 18, taking the number of the Detroit, Monroe & Toledo Short Line, which has just withdrawn from the agreement. The Toledo & Chicago Interurban Traction Company, of Kendallville, Ind., has also become a member, and books will be put on April 1.

## POSTAL RATES ON PERIODICALS TO CANADA

The present postal treaty between the United States and Canada expires on May 7 next. The Canadian Government has before it a proposition to increase the rate of postage on periodicals from the United States to such an extent as to render it necessary for American publishers to raise their subscription prices to Canada from 50 to 100 per cent. If Canadian subscribers of the STREET RAILWAY JOURNAL object to such an increase of prices it will be well for them to make known their objections at once to the Canadian postal authorities.

## THE MISSISSIPPI VALLEY ELECTRIC RAILWAY COMPANY'S PLANS

The Mississippi Valley Electric Railway Company, which has been incorporated to build an electric railway between Keokuk and Fort Madison, Ia., and Nauvoo, Ill., from there to Carthage, a total of about 46 miles, has secured an option on the Fort Madison Electric Railway, and is negotiating now with the Santa Fe Railway for trackage agreement across the bridges between Niota and Fort Madison. An engineering corps of sixteen are now in the field making the necessary location surveys and requisite franchises have been applied for. The financial arrangements have been perfected for the construction of the project, and the same syndicate will also build a system of water-works at Nauvoo. Major W. A. Calhoun, of Buffalo, is the consulting engineer for the syndicate.

## MINNEAPOLIS COMPANY SEEKS TO RESTRAIN LOW FARE ORDINANCE

The Minneapolis Street Railway Company has secured a temporary restraining order from Judge William Lochren, in the United States Circuit Court, prohibiting the City Council of that city from publishing the recent ordinance passed for the purpose of reducing car fares to six rides for a quarter.

The following statement has been given out by the company in which its side of the affair is given:

The officers and directors have very carefully considered the ordinance recently passed by the Minneapolis City Council and approved by the Mayor, requiring our company to sell six tickets for 25 cents, and in applying to the court for an order restraining the city officials from its enforcement it is proper that the company should give its reasons for declining to accept this ordinance.

Our franchise contracts with the city of Minneapolis give us the legal right to collect a five-cent fare. From 1875 to 1889 the Minneapolis Street Railway Company was operating its system by animal power. At that time electricity began to be talked of as a motive power for street railways, and during the year 1889 considerable agitation arose in the city with reference to changing from animal to electric power. Just prior to this time we had also been urged by the City Council to build several cable lines, and had already begun to do so when we were informed by the City Council that unless we changed our existing system so as to operate by electricity the grant would be made to some other company to construct electric lines in the city.

We urged upon the Council the need of further investigation of the use of electric power as applied to street railways before spending so much money in making the change, and asked that the matter be delayed for a year in order that more thorough tests and development in this new power might be made. The Council, however, insisted that the company should begin at once to change its system, and should within two years not only convert all existing lines, but should also build numerous additional lines, and operate the same by electricity.

The company finally agreed to this and at once began making the change. The system which we then installed was the best known at that time and after making the change we operated with some difficulty for a period of about seven years. This first change was a very expensive matter for the company.

In the meantime the development in electrical equipment changed to such an extent that we found the system we had installed so imperfect and inadequate that we found it necessary to rebuild and reconstruct our entire system. This we did without request from the Council or public discussion or complaint. To-day none of the first equipment and hardly 5 per cent of the trackage first built is in use. In addition to these changes, we have also built new power houses and stations, and have equipped these as well as the entire system, with the most approved and modern appliances.

It is a safe statement to make that there are no better electric cars in the world than those of this company.

The comfort of trainmen has always been given the highest thought and consideration. Conductors are protected from inclement weather by vestibules, and the motorman's cab, warm and roomy, provides him with exclusive quarters, in which he can competently operate his car with perfect comfort to himself and security and safety to the patrons.

Nowhere in the world are the street railway trainmen provided with such modern appliances to insure them comfort in their work as in the Twin Cities.

The area covered by our lines, approximately 55 square miles inside the corporate limits of the city, with a population of 270,000, is very much in excess of that of most cities of equal size throughout the country.

Baltimore, with a population of 650,000, has an area of 30 square miles; Cleveland, with a population of 465,000, has an area of 41 square miles; Milwaukee, with a population of over 300,000, has an area of 23 square miles; Detroit, with over 300,000, has 36 square miles; Cincinnati, with 400,000 population, has 43 miles; Louisville, with 338,000, has 20½ square miles; Kansas City, with 200,000, has 26 square miles; Indianapolis, with 215,000, has 30 square miles.

## IMPROVEMENTS IN ATLANTA

The details are now available of the general improvements proposed by the Georgia Railway & Electric Company, of Atlanta, Ga., of which mention has been made before briefly in the STREET RAILWAY JOURNAL. The work planned includes the rebuilding of a considerable portion of the trackage in the city proper, the extension of several city lines, the construction of a new line to Hopeville, and the erection of new car houses and a repair shop. This work it is intended to complete this year.

The most important improvements will be the construction of new car houses at the Fulton County plant. These car houses will be of brick and steel construction and fireproof, with a capacity of sixty cars. The new repair shops will also be fireproof and of the same material and include a blacksmith shop, machine shop, carpenter shop and planing mill. Forty-seven cars will be added to the service, some of which are being built at the Atlanta shops, while others are being built in Cincinnati.

It is expected that the new Hopeville line will also be completed by Aug. 1. It has been decided to cross the tracks of the Atlanta & West Point Railroad between College Park and East Point by an underpass. Rails have been laid from the center of Hapeville to the outskirts of the town, leaving some 2 miles of construction to be done between the outskirts of Hapeville and East Point. Work on this line will be started within thirty days, a large force being employed in the work.

Among the many lines extended will be that of the Capitol Avenue line. This line will be extended from Bass to Haygood Streets, and double-tracked a distance of more than half a mile. The Luckie Street line will be extended to the mills of the Atlanta Steel Hoop Company, a distance of some three-quarters of a mile. The Stewart Avenue line will be extended to Dill Avenue, a distance of more than a mile. This work is now under way. The West Hunter Street line will be entirely rebuilt. Double-tracking of the West Peachtree Street line will be extended from Pine Street to North Avenue. This will permit of a 5-minute schedule as soon as completed. The Georgia Avenue line will be double-tracked for a distance of some 2300 ft., which will permit of a 5-minute schedule, rather than the present 10-minute schedule. The Ponce de Leon Avenue line will be rebuilt from Ponce de Leon Springs to Myrtle Street, and this, with the double-tracking of Pine and Jackson Streets will represent new construction to the amount of 7900 ft. The main Decatur line will be double-tracked for a distance of more than a mile. This will mean the complete double-tracking of this line. The South Decatur line will be double-tracked to Bell Street, a distance of some three-quarters of a mile. The line to East Lake Junction will be rebuilt with heavy rail for a distance of over 4 miles. This will make possible the cutting down of the present schedule to the new country houses of the Atlanta Athletic Club and other points from 45 minutes, as at present, to about 30 minutes. The Old Soldiers' Home line will be rebuilt, representing construction work of nearly 2 miles.



## PROGRESS ON THE INDIANAPOLIS, CRAWFORDSVILLE & WESTERN TRACTION COMPANY

The power house of the Indianapolis, Crawfordsville & Western Traction Company, located at Crawfordsville, Ind., is completed, and the installation of the machinery is progressing rapidly. The boilers are erected and ready for operation. Steam and electrical machinery is arriving daily. The overhead trolley and feeder line will be finished March 15, and the track will be ready for through operation of cars on June 1, the date set for opening the line. The road will be known as the "Ben Hur Route," consent of the family of Gen. Lew Wallace having been obtained to the use of this name. The two limited cars will probably be named "Ben Hur" and "Messala," and will make the run between Indianapolis and Crawfordsville, 45 miles, in 78 minutes. The annual meeting of the stockholders was held at the company's office, Indianapolis, Tuesday, March 5, and the following directors elected: P. C. Summerville, Eli P. Baker, A. E. Reynolds, C. N. Van Cleave and E. C. Voris, of Crawfordsville; Edward Hawkins, O. P. Ensley, A. M. Glossbrenner, A. A. Barnes and H. A. Mansfield, of Indianapolis; George P. Haywood, of Lafayette; A. A. Swartz, of Jeffersonville; W. O. Ford, of Madison, and A. M. Hewes, of Chicago. The old officers were re-elected, viz.: A. F. Ramsey, of Crawfordsville, president; A. E. Reynolds, of Crawfordsville, vice-president; Edward Hawkins, of Indianapolis, secretary; Oliver P. Ensley, of Indianapolis, treasurer. The Electrical Installation Company, of Chicago, are the engineers and contractors.

## WEST SHORE TRACTION COMPANY GETS PERMISSION TO BUILD

The State Railroad Commission has granted permission to the proposed West Shore Traction Company to construct a high-speed electric railway, 25 miles long, from Tompkins Cove down along the Hudson River to the State line at Cartaret, Rockland County, passing through ten villages. The company has a capital of \$250,000, and is being promoted by Searing & Company, of New York City, who were the backers of the new Delaware & Eastern Railroad, which was granted authority to construct a line from the Pennsylvania coal fields to Schenectady recently by the State Commission. It is reported that the West Shore Traction Company will extend its line from the State line 15 miles through the State of New Jersey to Jersey City, and will eventually enter New York City through the McAdoo tunnel. G. P. Fall, of 76 William Street, New York, is one of the directors of the company.

## RECENT CAR ORDERS

Announcement was made Tuesday, March 12, by the Brooklyn Rapid Transit Company that contracts had just been awarded for 200 new passenger cars for the system at an aggregate cost of \$2,000,000. The cars will be evenly divided between surface and elevated lines. The John Stephenson Company, with works at Elizabeth, N. J., will build the hundred surface cars, which will follow the established Brooklyn type, while the contract for the elevated coaches has been divided between the Jewett Car Company, of Newark, Ohio, and the Laconia Car Company, of Laconia, N. H., each building fifty. Delivery on the surface cars will be made in July of the present year, while the elevated cars will come during the late fall, the first shipments being due to arrive in October. Both elevated and surface cars are to be equipped with air brakes. The surface cars also will be equipped with storm-proof vestibules of the latest design. Seating arrangements in the elevated cars will consist of longitudinal seats along the side save in the center of the car, where four transverse benches will be introduced.

The Washington, Baltimore & Annapolis Electric Railway Company has recently placed an order with the J. A. Hanna Company, of Cleveland, of twenty-five heavy interurban cars and fifty-three heavy Baldwin trucks. Nineteen of the cars are 60-ft. exclusive passenger type, four are 54-ft. combination passenger and baggage type, and two are 54-ft. express or locomotive type. The trucks are 90-40 class, that is, 90-in. wheel base and for 40,000-lb. center plate load, and are to be fitted with Standard Steel Works 38-in. steel-tired wheels bolted to cast steel centers. The electrical equipment is General Electric A-603-A motors, and the cars are geared to 75 m. p. h.

## THE CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY COMPANY

The Cleveland, Southwestern & Columbus Railroad Company, of Cleveland, Ohio, which was incorporated last week with a capital stock of \$10,000,000, as has been stated in these columns, will take over the Cleveland & Southwestern Traction, the Cleveland, Ashland & Mansfield, and the Ohio Central Traction properties, with a combined mileage of 207 miles. Of the capital stock of the new company \$7,500,000 will be common and \$2,500,000 will be 5 per cent preferred. The directors of the company are authorized to issue \$10,000,000 twenty-year 5 per cent bonds, with which to take up the stock of the merged companies. In exchange for the Cleveland & Southwestern preferred stock and accumulated dividends \$2,000,000 preferred and \$200,000 common stock and \$200,000 bonds will be given. For the Cleveland & Southwestern common stock \$3,000,000 of the new common stock will be given. Cleveland, Ashland & Mansfield bonds will be exchanged for \$1,000,000 bonds and \$1,000,000 common stock of the new company, while \$400,000 preferred stock will be given for the preferred stock of the Ohio Central, and \$500,000 common stock for its common stock. For the bonds of the Cleveland & Southwestern, \$3,110,000 of the new bonds will be held in escrow, and \$400,000 will be held in escrow for the bonds of the Ohio Central.

For the immediate use of the company, \$290,000 bonds will be set aside. This will leave \$5,000,000 bonds, \$100,000 preferred stock, and \$2,800,000 common stock to be used in building new road or acquiring roads for future extensions. Nothing has as yet been decided in regard to a Columbus connection. One of the officers said that the company would have all it cared to do in getting the Cleveland, Ashland & Mansfield completed and in working order within the next year, and until that is done they will make no move toward a Columbus connection. The completion of this road will enable the company to reach Bucyrus. F. T. Pomeroy will probably be the president of the new company, and the other officers will be chosen from among the staff of men that have been active in the construction and management of these roads.

## STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED FEB. 26, 1907

845,188. Railway Signal System; Francis M. Myers, Windsor, Mo. App. filed March 22, 1906. Provides plates spaced along the roadway with which specially constructed spring shoes on the train contact, said shoes having a mechanical connection by which their movement closes a special circuit in the locomotive.

845,220. Block Signal System; Fred. B. Corey, Schenectady, N. Y. App. filed Feb. 16, 1904. A block signal system in which alternating current may be used with its attendant advantages and in which all the advantages of the direct-current system without wires may be obtained.

845,353. Ring for Connecting Wires; Ralph E. Noble, Chicago, Ill. App. filed Sept. 1, 1906. The trolley wires at a switch are hooked into a ring which centers or guides the trolley wheel in passing from one wire to another.

845,265. Automatic Air Brake Coupling for Railway Cars; Frank H. Rutherford, Chicago, Ill. App. filed April 14, 1906. Comprises a body having a plurality of independent continuous passages there through, and valves located within said body for controlling the closure of the passages and movable to a position at an angle to the line of draft of the car.

845,323. Trolley Pole; Charles F. Wensinger, Fremont, Ohio. App. filed Oct. 31, 1906. The trolley wheel is pivotally mounted upon a horizontal platform, which is constantly maintained in such horizontal relation by a pair of trolley poles constituting virtually a parallel link motion.

845,335. Motorman's Valve; Fred. B. Corey, Schenectady, N. Y. App. filed March 17, 1906. One feature of the invention relates to valves of the rectilinear reciprocating type. Other details of construction.

845,353. Fluid Pressure Brake System; Maury W. Hibbard, Chicago, Ill. App. filed Feb. 25, 1903. Relates to that class of brake in which the braking pressure is determined by the car load.

845,496. Insulated Rail-Joint; George W. Whiteman, Philadelphia, Pa. App. filed Sept. 14, 1905. The fish-plates are provided with inclined channels or cavities on their inner faces which co-operate with weighted blocks to tightly clamp the rails and at the same time permit longitudinal adjustment.

845,497. Insulated Rail-Joint; George W. Whiteman, Philadelphia, Pa. App. filed April 11, 1906. Relates to modifications of the above.

845,500. Car Brake Apparatus; Robert J. Wilson, Pittsburg, Pa. App. filed Nov. 16, 1905. In order to prevent the severe application of the brakes whenever the train pulls apart, or the train-pipe breaks, the train-pipe or train-pipe connection on each car has a valve which acts automatically upon an excess rush of air out of the train-pipe to throttle said train-pipe, and thus prevent quick reduction of pressure therein.

845,504. Brake-Shoe Adjuster; James S. Ashworth, East St. Louis, Ill. App. filed Sept. 17, 1906. Means for automatically adjusting the brake-shoes to compensate for wear.

845,524. Pleasure Railway; William J. Citron, San Francisco, Cal. App. filed Oct. 1, 1906. A stationary car is vibrated so as to convey the impression of rapid travel to passengers. Means for producing a rumbling sound and moving scenery past the car windows.

845,682. Car Motor; Benson Bidwell, Chicago, Ill. App. filed July 5, 1906. The armature of the motor has a hollow shaft through which air is impelled into the interior of the motor for cooling purposes.

645,683. Signaling System for Electric Railways; Charles P. Breese, Norfolk, Va., and Adoniram J. Wilson, Westfield, N. J. App. filed May 5, 1902. A sectional trolley, each section of which is fed through a relay magnet. The power current is thus utilized for the operation of the block signal apparatus.

845,727. Safety Device for Railroads; Philip Dewitt and Edward J. Clarke, Scranton, Pa. App. filed March 10, 1906. Provides automatic means for simultaneously actuating the locomotive throttle-lever to close the throttle-valve, the engineer's brake valve to apply the air brakes on the train and a whistle or other signal to warn the engineer.

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### PERSONAL MENTION

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MR. F. P. BOAS has recently been appointed superintendent of field work by the Eureka Automatic Signal Company, of Tamaqua, Pa.

MR. ROBERT E. JENKINS, formerly president of the Metropolitan Elevated Railroad Company, of Chicago, Ill., is dead. Mr. Jenkins held many offices of honor and trust in politics and in legal and religious organizations. He was at one time president of the Chicago Law Institute, was treasurer of the Chicago Bar Association for seven years, and was chairman of the Bar Association committee which drafted and secured the passage of the Chicago jury commission law.

MR. A. J. J. PFEIFFER has just been appointed general manager and chief engineer of the Calcutta Tramways Company, Ltd., succeeding in the former position the late Mr. Martyn Wells. Mr. Pfeiffer has had an extended electric railway experience, commencing with the Thomson-Houston Company in this country, and has had charge of the equipment of a number of important roads on the continent of Europe. Mr. Pfeiffer has been connected with the Calcutta system for some time.

MR. L. W. HARRINGTON, who was recently appointed soliciting passenger and freight agent of the Columbus, Delaware & Marion Traction Company, with headquarters at Columbus, Ohio, has had added to his duties the work of acting claim adjuster. Mr. Frank Talmadge, who has the work of claim adjusting for a number of the traction lines entering Columbus, had charge of the Columbus, Delaware & Marion claims, but the company has now decided to have its own officials look after the claims.

MR. JOHN CRAIG HAMMOND, for some time at the head of the publicity department of the Denver Gas & Electric Company, and later associated with the electrical interests of Mr. H. L. Doherty, with headquarters in New York, has now been appointed press representative of the New York Central lines,

with headquarters at the Grand Central Station. Mr. Hammond in his new responsibilities will find a large opportunity for his skill, diplomacy and savoir faire as an exponent of the railroad systems' ideals, methods and relations with the public.

MR. CHARLES M. JACOBS, chief engineer of the Hudson Companies, and his assistant, Mr. J. V. Davies, gave a dinner to the men who are actually engaged in building the tunnels under the Hudson, at Sherry's, New York, on Monday, March 11. Besides the engineers, rodmen, walking bosses, draftsmen, drillers and sandhogs, there were present Mr. W. G. Oakman, president of the Hudson Companies; Mr. W. M. Barnum, of the executive committee; Mr. Pliny Fisk, of the Wall Street banking firm which financed the building of the North River tunnels; Mr. Andrew Freedman, and the officials of all the lighting, power and supply companies furnishing material for the tunnel; Chief Engineer Noble, of the Pennsylvania Railroad East River tunnel; Mr. Lincoln Bush, chief engineer of the Lackawanna Railroad, and nearly every man of prominence in tunnel building in and around New York. Chief Engineer Jacobs, Mr. Pliny Fisk, Mr. Wilbur Fisk, Mr. Barnum and President Oakman made speeches. Mr. Jacobs said that trains would be running through the Morton Street tunnel under the North River by Sept. 1.

MR. R. E. HUNT, general superintendent of railways of the Norfolk & Portsmouth Traction Company, of Norfolk, Va., which operates the street railway lines in Norfolk, Portsmouth and Berkeley, a line to Ocean View and Old Point Comfort, in connection with its steamer service, the Norfolk & Ocean View Railway and the Norfolk & Atlantic Terminal Company, to Pine Beach and Newport News, Va., in connection with its boat service, has been appointed assistant to President Bancroft, of the Utah Light & Railway Company, of Salt Lake City, Utah, to succeed Mr. F. L. Morse, resigned, who, as noted in the *STREET RAILWAY JOURNAL* last week, returns to New York. Prior to his connection with the Norfolk & Portsmouth Company, Mr. Hunt was general manager of the Augusta-Aiken Railway & Electric Company, of Augusta, Ga., which owns and operates the Augusta Railway & Electric Company, Augusta-Aiken Railway, North Augusta Electric & Improvement Company, and North Augusta Hotel Company, and before becoming connected with that company was general manager of the Lexington Railway Company, of Lexington, Ky., which operates the railway, electric light, gas and ice plants. Before being appointed general manager at Lexington, Mr. Hunt was identified with both construction and operating work.

MR. J. R. LOVEJOY has been appointed general manager of the sales department of the General Electric Company. Mr. Lovejoy has long been known to the electrical fraternity, and this title is a formal recognition of the responsibilities with which he has practically been charged for the last two or three years. Mr. Lovejoy was born at Columbus, Ohio, in 1863. After a post-graduate course at the Ohio State University, from which he received the degree of B. Sc., he entered the employ of the Thomson-Houston Electric Company, at Lynn, Mass., August, 1886. Here he gained his practical experience and graduated from what was then known as the "Expert Course," to take up engineering work in the Boston office of the company. Later his time was devoted to executive duties at headquarters, and when the Thomson-Houston Company was merged into the General Electric Company, in 1892, he became general manager of the supply department. In 1900 he was made also manager of the railway and lighting departments of the General Electric Company. He is an officer and a director in several subsidiary companies. Mr. Lovejoy is a director and a member of the executive committee of the Schenectady Trust Company, and was one of the organizers of that concern. He is also a member of the American Institute of Electrical Engineers, the Franklin Institute, and the American Society for the Advancement of Science, as well as several organizations pertaining to electrical science. In addition to his diversified duties, Mr. Lovejoy finds time to take an active part in promoting the welfare of the Mohawk Golf Club, of Schenectady, of which he is president. He is also a member of the Mohawk Club, of Schenectady, and the University Club, of New York. For many years Mr. Lovejoy has been interested in the subject of archæology, so far as it is related to implements of the stone age, particularly Indian arrow heads, of which he has made a noted collection. Mr. Lovejoy's home and principal office are still situated, as for several years past, at Schenectady.