

# Street Railway Journal

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BACK COPIES.—No copies of issues prior to January, 1907, are kept on sale, except in bound volumes.

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

During 1907 the Street Railway Journal printed and circulated 427,250 copies, an average of 8216 copies per week. Of this issue 7500 copies are printed.

### The Consolidation of the Street Railway Journal and the Electric Railway Review

The McGraw Publishing Company takes pleasure in announcing that it has purchased from the Wilson Company the *Electric Railway Review*, which will be combined with the STREET RAILWAY JOURNAL. The first number of the consolidated weekly paper will be issued June 6. It will be known as the ELECTRIC RAILWAY JOURNAL and will be published from the main office of the McGraw Publishing Company, 239 West Thirty-ninth Street, New York. Branch editorial and business offices will be maintained as heretofore at Chicago, Cleveland, Philadelphia and Lon-

don. The McGraw Publishing Company will fulfill with the ELECTRIC RAILWAY JOURNAL all subscription contracts of both of the separate papers. In cases where there is a subscription in the same name to both papers, the expiration date will be extended so that the subscriber will receive as many copies of the ELECTRIC RAILWAY JOURNAL as he would have received of both the STREET RAILWAY JOURNAL and the *Electric Railway Review*. The subscription price of the ELECTRIC RAILWAY JOURNAL will be the same as that of the STREET RAILWAY JOURNAL, or \$3 per year.

It has been apparent for some time to close observers that the exacting requirements of the electric railway field could be much better met by one publication embodying all the editorial strength and all the business resources of both the existing organizations than by two separate papers. The tendency toward specialization in the several departments of electric railways has called for an increasingly high order of ability in the personnel of the corporations occupied in electric railroading. This necessarily has made larger demands upon the resources of the publications which are seriously engaged in the dissemination of news and discussions of developments in this rapidly growing field. The endeavor on the part of each paper to give the latest and best information has resulted in a considerable duplication of matter, and from this has followed an unnecessary expense in preparing and printing twice information that might be just as well circulated if printed but once. Moreover, manufacturers have indicated in many important instances a feeling that there was not room for two strong weekly papers. The tendency toward a division of the patronage of many large advertisers necessitated a reduction in the amount of space which both they and the publishers felt was desirable, not to say necessary, to insure profitable results.

The publishers of the STREET RAILWAY JOURNAL appreciate the good-will, patronage and support of all of its friends who have assisted so cordially in building up the paper and making it what it has become. Under its new name, the first which it has assumed since its establishment 24 years ago, it hopes to warrant the continuance of this approbation and to be of greater benefit to the field than was possible before. The consolidated paper will have such wide reach and scope, as will easily meet the demands of the most critical and exacting, and will possess the equipment and the traditions, and, for the main part, the personnel as well, of both the existing papers.



### The Question of Standards

The announcement of the Committee on Standards, as a result of its meeting in Pittsburg last week, that no further changes will be made this year in the standards recommended at Atlantic City and that a new line of apparatus will be taken up, calls attention to the progress being made in the way of standardization. It developed at the meeting that many electric railway companies have adopted the recommendations of the committee in their orders for new equipment, and manufacturers report an increasing demand for apparatus which conforms to the approved dimensions.

The work this year is to be confined entirely to dimensions of rolling stock between the car floor and the rail; namely, standard height of couplers, platforms, car steps and bumpers, except that the committee also hopes to make suggestions as to standard automatic couplers for inter-urban cars and radial draft rigging. To some these subjects might seem at first glance comparatively easy to settle, but as more attention is given to them many complications are found. Nevertheless, they are of vital importance not only to the mechanical but to the transportation and claim departments as well, as they affect the ease and speed of operation of cars, as well as the comfort and safety of the public. The committee expects soon to issue a data sheet calling for considerable information, and as these data are very necessary for reaching a proper conclusion it is hoped that the companies will answer the questions promptly.

### Maintenance Records and the Legal Department

A few weeks ago the importance of co-operating with the legal department in connection with inspection and repair records of equipment was commented upon in these columns. Further observation of the value of keeping records of this kind in shape for immediate service in court cases suggests the need of accuracy and completeness in the filing of the original data. In the stress of work in the car house or shop it is an easy matter to lose track of some of the apparently minor features of the forms used in inspection and repairs, and unless the work of filling out the necessary blanks is thoroughly done, the vital point in an accident case may very readily be defaulted.

Accident cases in large cities are frequently delayed in trial from one to three years after the alleged injury occurs, and no point in regard to the condition of the car at the time of the trouble is too small for the prosecuting attorneys to elaborate. The company may not in any way be responsible for an accident, but if the prosecution can show that the equipment was defective at any period about the time of the accident, and the company cannot show a sworn statement or record of repairs or inspection signed by the man who did the work, it is certain to be seriously handicapped in saving its case. Even as small a point as whether the fuse box on a car two years back was the identical box in service on that same car to-day is liable to be raised, and in the positiveness of the company's answer to such a question, backed up by records that will pass muster as legal testimony, may rest an impression in the minds of the jury which will bear directly upon the success of the case on the company's side.

Failure to put down the number of the car, the time it was turned in for repairs, when it was again ready for service, the trouble reported by the car service men and the trouble actually found, the name of the car house where the repairs were executed, and the signed name of the pitman or shop employee who passed the car back into operating condition again are all points too important to overlook, simply because the keeping of such records is not an enjoyable task from the standpoint of the car house foreman or shop superintendent. The condition of the brakes is, of all the points to be recorded on inspections, perhaps the most important in relation to possible testimony. It is obviously of prime importance to keep all original records likely to appear in court where they can be had at once, and so expressed that they will carry the greatest weight of legal evidence.

### Economy in the Stores Department

One of the directions in which economy of material can be secured is in the minor store rooms of large operating companies. It is not always realized that a good deal of money can be needlessly tied up in extra supplies, and just at this time there is considerable advantage in checking up the stores to see that the quantities maintained are not too large. In a large organization the need of distributed supplies calls for the establishment from time to time of various sub-store rooms supplied in general from the main storekeeper's division, and unless requisitions are carefully watched by superintendents, chief engineers of power stations and other heads of departments, too large a stock can easily be accumulated. Roads at a considerable distance from the factory, of course, require more latitude in the quantity of supplies kept on hand.

When the effort is being made to cut down all operating expenses to the lowest point consistent with good service it is essential to reduce the quantity of stock carried and keep it at the smallest volume that will be equal to current maintenance. A good plan is to scrutinize personally all requisitions passing through an office and to know that the quantity of stock ordered has been carefully considered with a view to securing the amount of stock needed for 30 days. Foremen and subordinates should be instructed in the need of anticipating the demands of current repairs and put in requisitions in ample time to allow for delays or mistakes in material. The practice of limiting the supply of stock in car houses, power stations and other small store rooms to two weeks' consumption is a policy of economy where the general store room can be drawn upon each week for fresh material. Except in emergency cases, it is well to make out requisitions each week only for stock which it is desired shall be delivered two weeks later. A wise plan in dealing with construction, and unusual or periodical maintenance work, where a large stock of supplies is needed, is to put in requisitions so as to allow at least 60 days for purchase and delivery.

Excessive amounts of material and supply parts are often ordered through a failure to realize that either first-hand or second-hand material in stock will serve the purpose. Success in dealing with these cases depends very largely upon the clerical system used in keeping track of the stores. Shops which are not careful to keep supplies in



place are sure to accumulate excessive quantities, and often large numbers of spare parts outlive the apparatus for which they were originally destined, making the cost of supplies entirely too high, when measured over a period of years. Another source of delay and trouble is the omission of some of the essential data on requisition blanks. A general storekeeper cannot always tell just what is wanted unless the blanks are fully utilized, and this is one of the hardest things to induce busy shop and car-house or power-station men to thoroughly consider. Sometimes a delay in the fulfilment of the requisition, due to too meager data on the original, requires the company to order the needed supplies at a time when a higher price must be paid on account of the very short delivery named as imperative. Every subordinate officer who specifies the time when he wants certain supplies delivered helps the general storekeeper and the purchasing agent far more than he can properly appreciate.

The lesser officials of a large system sometimes get discouraged about the delivery of supplies and come to think that it is of no use to complain of slow or overdue deliveries. Here the management can often improve the situation very materially, and if the making of "kicks" is encouraged, it will tend to bring all departments into closer harmony of action. With the fixing of definite responsibility goes the privilege of the objection, and if all the men in a large or small road feel that co-operation is essential to economy, kicks can be employed without personal animosity and with stimulating results generally.

### Fires in Substations

Substation buildings of small size such as are used on interurban roads are often designed to be built as cheaply as possible without due regard to the hazardous fire risk on the expensive apparatus installed in them. The apparatus is usually installed in a room adjoining the ticket office or passenger waiting stations, the arrangement being determined largely by the size and shape of the available space. The ticket agent acts also as substation attendant and there is economy in first cost and in operation. The same benefits might be obtained, however, without exposing the substation to the constant risk of complete destruction by fire if more careful attention was given to this phase of the problem.

On a recent trip over three interurban railways on one road a substation was noticed which had been entirely burned up with all the apparatus therein. On another road the substations were low frame ticket office buildings with the switchboard, rotary and transformers crowded so closely together that it was dangerous to move around. The third possessed combination passenger and substations designed to be as nearly fireproof as they could be made and costing only a little more to build than those on the first two roads. The road last mentioned runs through a region where severe thunder storms prevail and trouble from lightning had to be guarded against in every possible way. In four years of operation there have been no fires of any kind in the three substations, although much damage to individual pieces of apparatus has been caused by failures of the best protective devices which have been installed on both the high-tension and trolley circuits.

The substation which has been destroyed by fire was a new brick building built especially for the purpose. As an example of bad design it was instructive. The high-tension oil switches and lightning arresters were mounted on a wooden frame over the oil-cooled static transformers at one end of the building; the two rotaries were in the center and the switchboard along the rear wall. A particularly heavy discharge of lightning came in over the high-tension line and jumped across the spark gap arrester, fusing the brass knobs. The molten brass dropped to the floor and immediately ignited a small pool of oil which had leaked from one of the transformer cases and had not been absorbed by the sawdust sprinkled on the floor. The fire caught the film of oil on the transformer cases and quickly leaped to the wooden framework supporting the oil switch tanks mounted above the transformers. Before the attendant could bring fire extinguishers into play the entire end of the building was in flames and both rotaries, the transformers and the switchboard were damaged beyond repair before the fire burned out.

Such a fire would not be possible in the substations described as well-designed. The building is a low structure of concrete, the substation part being divided into three separate rooms by fire walls. The entrances to these rooms are through separate doors in the outside walls and the only connections between them are the tile conduits in the walls under the roof through which the wires are led. The high-tension switches and lightning arresters are in one room, the switchboard and rotary in another and the static transformers, the shells of which are not grounded, are in the third. A fire originating from a short circuit or other cause in one room could be confined to that room alone and the remainder of the apparatus saved from injury. A good supply of dry powder fire extinguishers and grenades together with buckets of sand are kept always on hand and ready for instant use.

At these substations an ingenious scheme has also been devised for supplying tank lightning arresters on the trolley circuit with water. The water is drained from the roof of the building, collected in a barrel mounted under the eaves outside of the building and run through a ½-in. pipe to the arrester tank. The latter is mounted on the wall across the room from the switchboard and away from any other apparatus which might be injured by a discharge through it. An overflow pipe from the tank is led down under the floor and out of the building. In clear weather the drip supply is cut off, but on the approach of a storm anywhere along the line the agents at the various towns are instructed to telephone the dispatcher immediately. He notifies the substation attendants, who open the drip cocks and allow them to remain open until all signs of the storm have passed. A light rain will supply enough water to replenish the barrel.

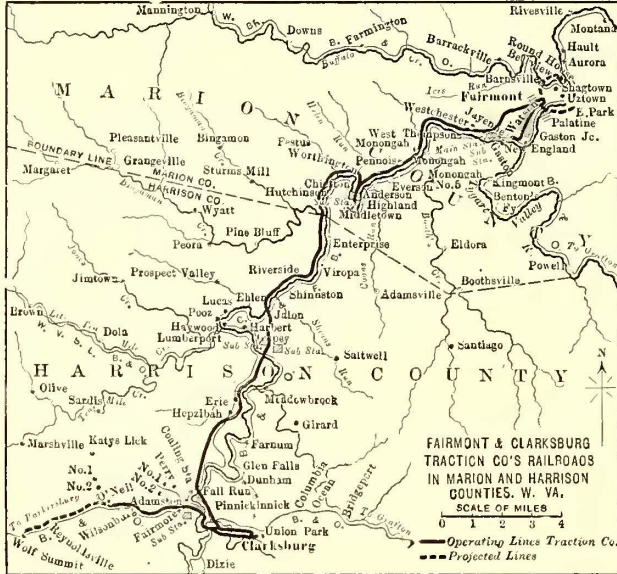
These precautions have cost but little, yet they have probably saved a considerable annual loss from lightning damage. Like any other fire which destroys the property of electric railways, the loss when a substation burns cannot be measured in terms of the settlement with the insurance companies. The interruption to traffic and the uneconomical operation with a makeshift installation are factors which must be taken into account.



### RECENT WORK ON THE FAIRMONT & CLARKSBURG TRACTION COMPANY'S SYSTEM

The Fairmont & Clarksburg Traction Company, of Fairmont, W. Va., has recently completed some important additions to its system, including a power station, transmission line, substations and car house. The power plant serves for railway, light and miscellaneous power loads and is of exceptional interest on account of the low gener-

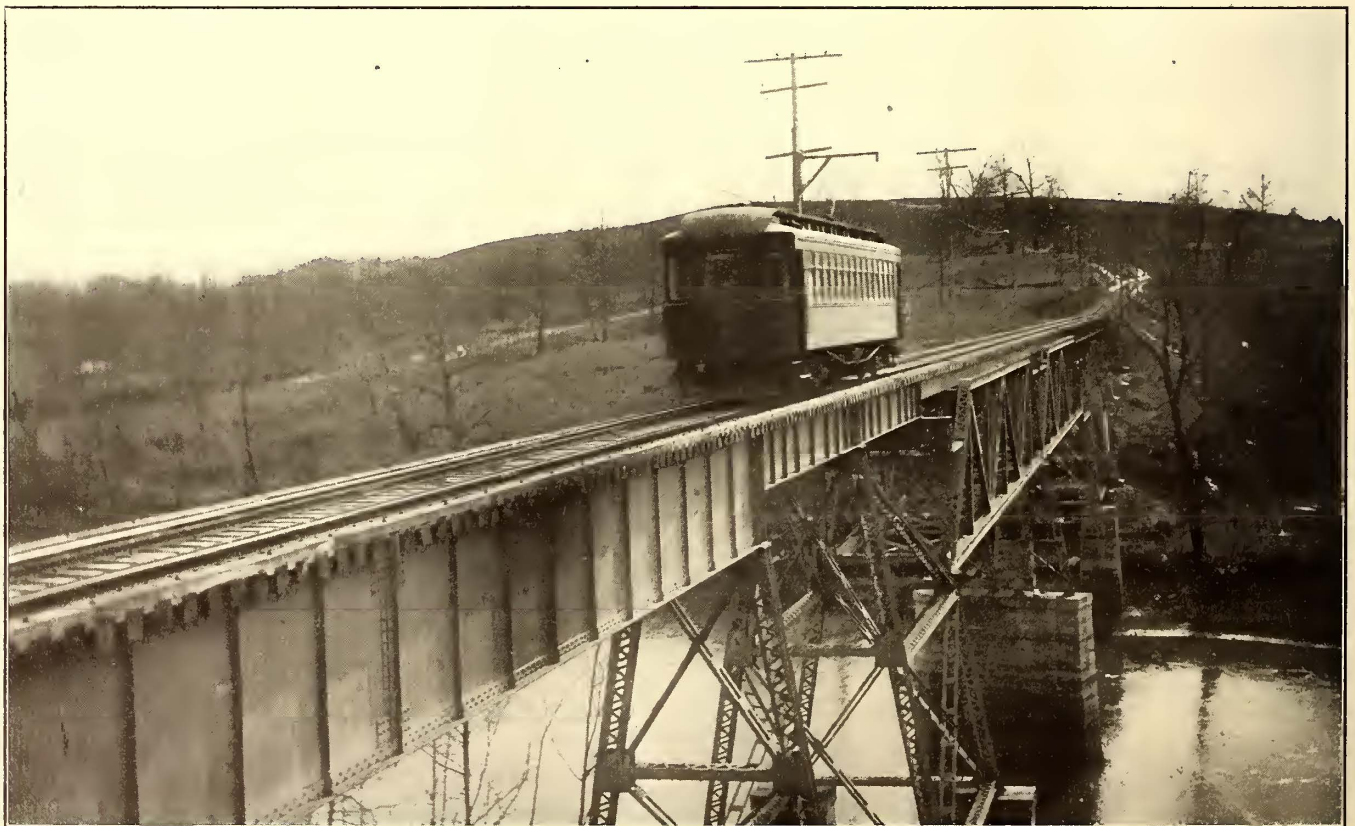
begun Dec. 1, 1905, and completed in December, 1906. The first turbine started June 30, 1906, with an installation of one 1000-kw and two 500-kw turbines. Since then another 1000-kw turbine has been installed,



MAP OF TERRITORY SERVED BY THE FAIRMONT & CLARKSBURG TRACTION COMPANY



THE JAYENN POWER STATION OF THE FAIRMONT & CLARKSBURG TRACTION COMPANY



INTERURBAN CAR CROSSING STEEL VIADUCT ON THE LINE OF THE FAIRMONT & CLARKSBURG TRACTION COMPANY

ating costs obtained by the use of turbines and the cheap fuel gas of high calorific value abundant in this region.

#### POWER STATION

The construction of the power station at Jayenn was

thereby giving this plant a rating of 3000-kw. This structure replaces an old reciprocating engine station at Fairmont which consisted of two Corliss engines driving belted generators, one Corliss driving a Wood arc light machine



and the other a 180-kw two-phase alternator. The old plant had both 60 and 133-cycle, single-phase circuits, while the new plant is 60-cycle, three-phase throughout.

The new structure is 100 ft. 6 in. x 91 ft. inside dimensions. The boiler room section, which is separated from the turbine room, is 29 ft. wide and 42 ft. high; the turbine room is 34 ft. wide, 33 ft. high and contains a 10-ton Alfred Box Company crane. The condenser pit is 9 ft. high. The building foundations are of block stone laid in Portland cement and the walls of brick laid in 30 per cent cement mortar. The outside brick is of buff carried up high enough to form a coping. The chimney is of Custodis radial brick and is 126 ft. high with a maximum inside diameter of 72 in.

The steam battery consists of six 417-hp Aultman-Taylor horizontal boilers operated at 175 lb. pressure in connection with four Foster and two Aultman-Taylor superheaters giving 150 deg. superheat. Each boiler carries fifteen Kirkwood gas burners, or five to each door, as shown in the boiler room view. These burners are so installed that they can be removed to allow coal firing without causing more than a 20-lb. drop in the boiler pressure while the change is being made.

The power units consist of two 500-kw and two 1000-kw, 2300-volt, three-phase, 60-cycle, four-stage Curtis turbines, each of which carries an integrating wattmeter. The R. D.

of Philadelphia. As this station is 1120 ft. above sea level, a 27-in. vacuum is found the most economical to maintain, although 28 in. could be secured if necessary. The condensers for the 500-kw units have 2700 sq. ft. of cooling

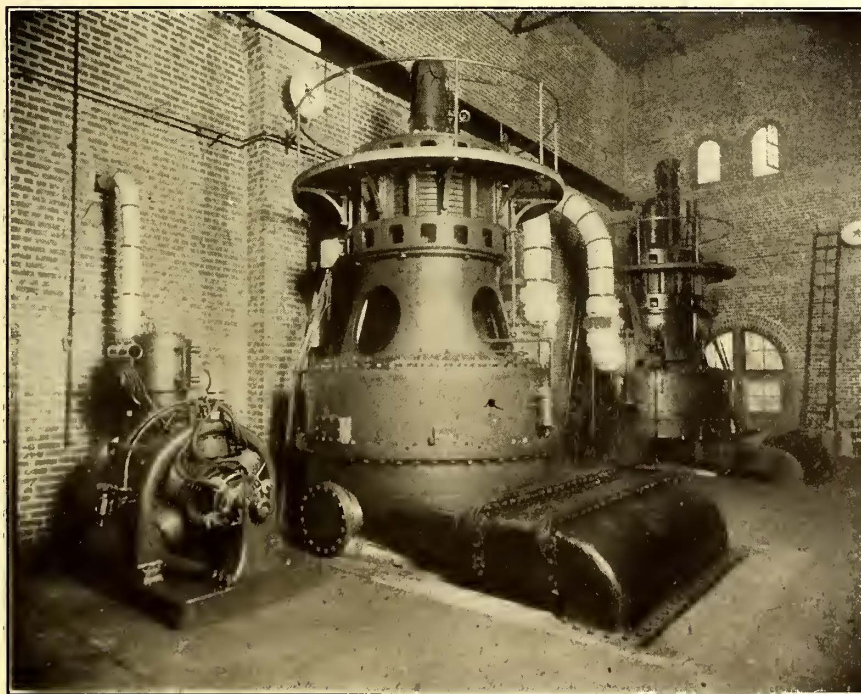


VIEW OF BOILER ROOM, SHOWING THE GAS BURNERS

surface, while the larger units have a cooling surface of 4200 sq. ft. These areas, while found somewhat larger than necessary for ordinary operation, will maintain the regular vacuum when the turbines are running on 50 per cent overload.

The condenser pumps are of the combined steam, air and circulation type, no dry air pumps being used. The boiler feed is handled by two 8 in. x 5 in. x 12 in. outside packed plunger type duplex pumps built by the Warren Steam Pump Company, of Warren, Mass., the maker of the condenser pumps. The oil is supplied through two 2 in. x 2½ in. x 4 in. pumps made by the Blake Steam Pump Company.

All of the live steam lines, such as the main header and boiler connections are of extra heavy steel pipe with Ball-Wood welded steel flanges and have cast steel fittings made by the Boldt Steel Company. The valves, furnished by the Eaton, Cole & Burnham Company, of Bridgeport, Conn., are of cast steel body with steel disks. The step bearing piping is of extra heavy brass with brass fittings and brass valves. The feed water line is



TURBINES AND EXCITER IN JAYENN POWER PLANT

Wood Company furnished the accumulator for maintaining the pressure in the water step bearings of the turbines. There are two step bearing pumps each 10 in. x 3½ in. x 10 in., made by the Worthington Steam Pump Company. The condensers are of the surface type furnished by Eynon & Evans,

of brass with extra heavy fittings and valves.

The exciters for the turbines consist of one 50-hp marine engine connected to a 35-kw, 125-volt generator and a 50-hp, three-phase, 350-volt induction motor, also connected to a 35-kw generator. Each set is capable of exciting all the units.



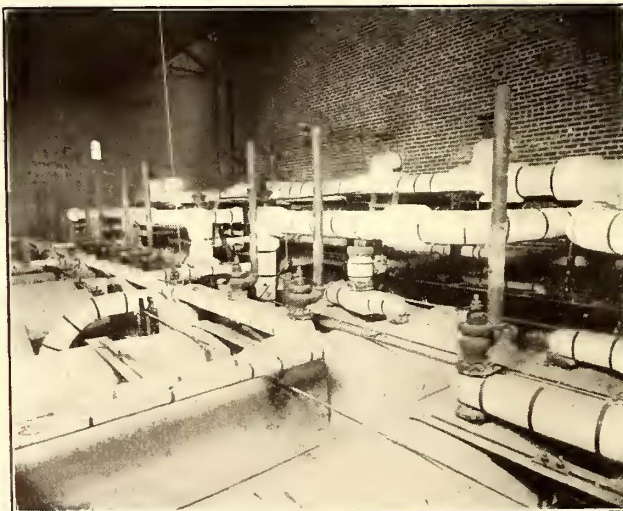
The switchboard is made of the following panels: Four a. c. generator, one a. c. exciter, one d. c. for two exciters, four lighting feeder, two outgoing high-tension line, two rotary converter a. c., two rotary converter d. c., two d. c.



EQUIPMENT IN THE CHIEFTAIN SUBSTATION

feeder and three arc light panels. The transmission line is supplied with two G. E. K-6 automatic motor operated oil switches.

The power house contains the apparatus for substation No. 1 for the railway system consisting of two 300-kw, 60-cycle, 600-volt, six-phase rotary converters and a corresponding set of 110-kw, air cooled transformers, reducing from 2300 volts to 440 volts. Each rotary converter is supplied with an a. c. starting panel consisting of a marble panel containing two triple-pole double-throw switches



VIEW OF MAIN HEADER AND CONNECTIONS

which are connected to the stepdown transformer taps to give a voltage of 170, 320 or 440 for starting the converters from the a. c. side. There are also three 400-kw, 2300/-22,000-volt transformers for the transmission line to Clarksburg.

OPERATING NOTES ON POWER STATION

Although natural gas is the fuel used in the station at this time, the boilers, as previously noted, are arranged for coal firing. In case coal is needed it will be obtained over the company's private track from a nearby mine. As the mouth of this mine is higher than the power station, it will be possible to send the coal cars by gravity over an automatic railway directly into overhead bins in the power house. It is evident, therefore, that a failure in the gas supply will not affect the operation of the plant in the least except in the matter of cost. The following are the average monthly figures for the 11 months ending Nov. 30, 1907:

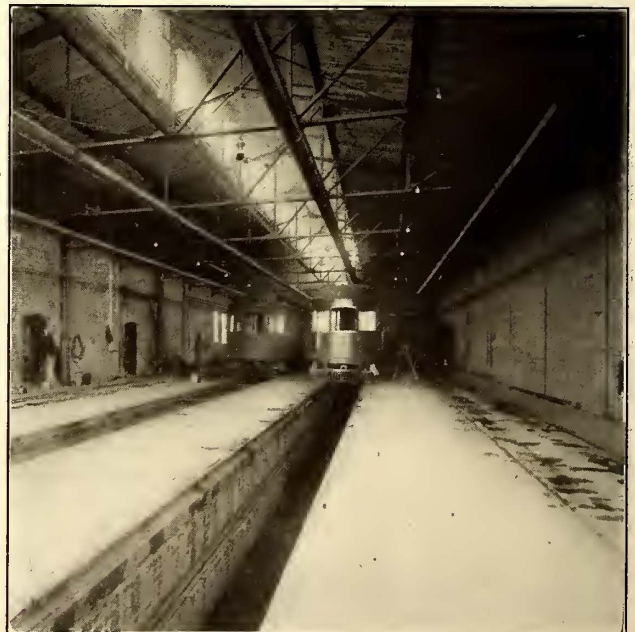
The natural gas used is rated at 1050 b.t.u. per cu. ft. and is purchased at 5 cents per 1000 cu. ft. The power station records for 1907 up to Dec. 1 show that only 29.97 cu. ft. were required per kw-hour.	
Output in kw-hours.....	1,030,200
Fuel (all gas).....	\$1,597.00
Labor .....	543.00
Oil and waste.....	13.00
Repairs .....	28.00

Total cost.....	\$2,181.00
Cost per kw-hour.....	.002117

Total cost for September, 1907.....	\$.002117
Total cost for October, 1907.....	.002119

The foregoing figures fairly represent the figures throughout the year, although in July the cost was slightly higher (\$.003) on account of lighter loads.

The station units are operated in parallel on a common



INTERIOR VIEW OF CAR HOUSE

busbar. As a rule the day load calls only for one 1000-kw and one 500-kw unit, the second 500-kw going into service in the evening. The regulation is all that can be expected, the variation in voltage on the secondaries not exceeding two volts with the swing of the load.



The operating force consists of a chief engineer, one engineer, one assistant engineer and one fireman on each shift of 12 hours.

#### TRANSMISSION LINE AND SUBSTATIONS

The three-phase, 22,000-volt transmission line extends from Fairmont to Clarksburg, a distance of 24 miles. The transmission poles are of chestnut 35 ft. long and set 5 ft. in the ground. They are spaced 100 ft. apart and carry two sets of transmission lines. The latter are of aluminum with a conducting capacity equivalent to No. 4 copper. The d. c. feeders are also of aluminum and equivalent to 350,000 circ. mils copper. The trolley line consists of two No. 00 wire all the way between Fairmont and Clarksburg and is fed every fifth pole or 500 ft. The potential throughout the entire distance of 26.2 miles does not drop below 525 volts. The tracks are bonded with G. E. pin bonds.

There are three brick substations along the route located at intervals of  $7\frac{1}{2}$ , 9 and  $7\frac{1}{2}$  miles, the last being in Clarksburg. As station No. 1 is in the power house, the first station on the route is No. 2. It is located at the top of a grade at Chieftain and contains two 200-kw, 60-cycle, 600-volt rotaries. No. 3 is at Gypsy, 9 miles from No. 1, and contains one 200-kw rotary. Station No. 4 is at Clarksburg and contains two 300-kw rotaries to supply both the interurban and local lines. All of the substations have 22,000-volt lightning arresters, disconnecting switches, oil switches in switch cells and oil cooled step-down transformers. All rotaries have a reactive coil to permit compounding from 575 to 625 volts.

At Chieftain, Lucas and Gore the Fairmont Coal Company taps the 22,000-volt line for supplying its coal mines. This coal company has its own substations with 275-volt rotaries and in all uses about 1200-kw, as shown by inte-

$1\frac{1}{2}$  miles from the power house. It is constructed of brick with buff facing and a steel roof. The structure is 120 ft. x 100 ft. wide, which gives room enough for 12 interurban and 20 city cars. Fire protection is secured by standpipes and by sprinklers, furnished by Kelly & Co.,



SWITCHBOARD AND TRANSFORMER VIEW

of Pittsburg. The city pressure is 90 lb. and is therefore ample for fire service without a pump. There are eight tracks, three of which have steam heated open pits of the concrete type with checker plate devil strips. Two of the tracks are reserved for the machine shop and a third for the paint shop. The latter is separated from the other tracks by a 19-in. brick wall provided with standard fire doors. All track entrances have Kinnear steel rolling doors.

#### ENGINEERING

The New England Engineering Company, of Waterbury, Conn., and New York, was engineer and contractor for



CAR HOUSE OF THE FAIRMONT & CLARKSBURG TRACTION COMPANY

grating wattmeters at each tap. At Lucas and Gore stations a substantial switch house of brick has been erected which contains the wattmeters on the 22,000-volt taps as well as automatic circuit breakers and lightning arresters.

#### CAR HOUSE

A new car house has been constructed at Fairmont about

the entire plant, including substations and lines. The work was done and the designs made under the personal supervision of its chief engineer, Geo. O. Baker, of the New York office. All the electrical apparatus, including car equipments, was furnished by the General Electric Company.



## THE AVOCA SUBSTATION OF THE LACKAWANNA & WYOMING VALLEY RAILROAD COMPANY

The Lackawanna & Wyoming Valley Railroad Company, popularly known as the "Laurel Line," operating between Scranton and Wilkes-Barre, Pa., has recently completed the interesting substation shown in the accompanying views. The original power installation in-



FRONT VIEW OF AVOCA SUBSTATION, SHOWING RUSTICATED BRICK

cluded a generating plant at Scranton and a substation at Hancock, 16 miles distant, with the two 75-lb. A. S. C. E. section third-rails serving both as working conductors and feeders. This arrangement was designed for single-car operation on 10-minute headway, but, with the advent of multiple-unit control equipment and larger train units, the quickest thing that could be done to enable the maintenance of schedules was to add two 500,000-circ. mil feeders between the power house and the Hancock substation with taps into the third-rails at about every three-quarters of a mile. Nevertheless, the traffic grew so fast that conditions reached a point where a second substation was a necessity.

The theoretical location for this second substation was several miles south of where it was placed, but the Avoca site was selected to combine the labor of attendance with that already required for a freight station at that point and to decrease the cost of foundation work in the coal mines common in this district. As located, the station is almost exactly midway between the Scranton power plant and the Hancock substation. Provision was made for an ultimate capacity of 1500 kw, but only 1000 kw is now installed.

Underlying the site of this substation were three veins of coal; one of these had been worked, the second was being worked, and the third still untouched. It was considered advisable to buy the few remaining pillars of coal

in the top vein, closing the openings between them with cribbing and filling in with culm and refuse for an area extending about 25 ft. beyond the site of the building in every direction. Since this vein was about 25 ft. below the surface at this place, this foundation work in the mines would permit an all-around settling of the surface without likelihood of disturbing the substation building.

In view of the 22,000-volt transmission system, it was necessary to construct the building with a tower for the high-tension wires. At the same time, it was felt that even a structure of this design and size could be treated to obtain a reasonably neat and effective appearance. The brick work was laid up of common brick in Flemish bond with bluestone trimmings, the lower portion being rusticated every fifth course and the corners of the tower above the main building quoined in the same manner. The lines of the tower were carried clear to the ground. No additional expense over plain brick work was involved by this method for eliminating a monotonous appearance. The floor space in the tower is 19 ft. x 23 ft. and in the machine room 25 ft. x 45 ft. 6 in.

The lowest or transformer floor of the tower was left one foot lower than that of the machine room and the eight louver windows provided for ventilation were carried down to this floor. In addition two 4-in. pipes were led from the floor directly to the outside so that in case an oil-cooled trans-



REAR VIEW OF AVOCA STATION, WITH THE TOWER IN THE FOREGROUND

former should catch fire the escaping oil could not find its way into the machine room, but would readily pass outside the building. While accidents of this kind have been very rare with the type of transformers installed, it was thought wise to take advantage of the natural slope obtained by locating the building on the side of a hill.

The high-tension circuit breakers are handled from a

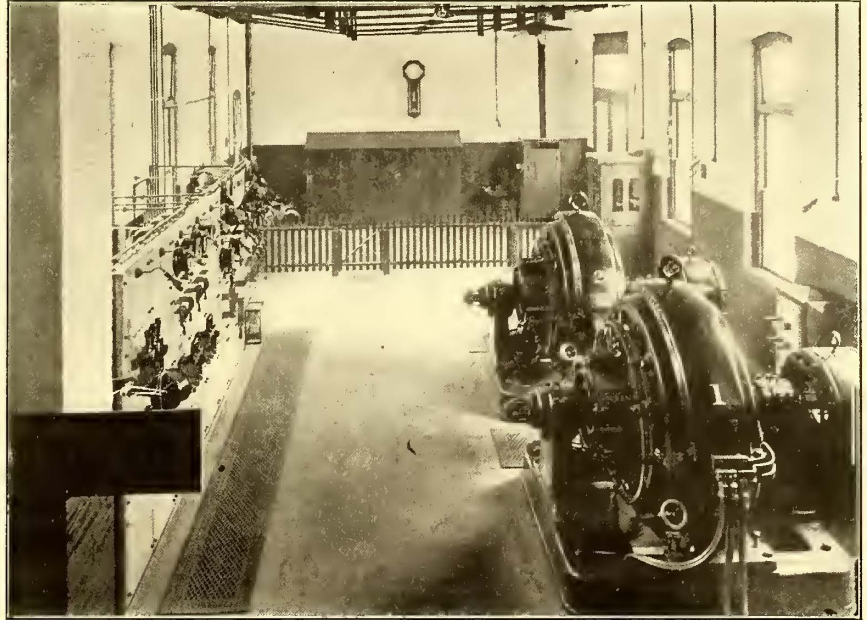


steel and concrete wood-covered platform immediately above the transformer floor. The incoming wires and the disconnecting switches of the 22,000-volt transmission line, the lightning arresters and choke coils are placed on the top floor of the tower. This floor is provided with ample light and ventilation through a skylight in the center of the roof. Access to the lower platform and the top floor is had by convenient, light stairways. Additional light for the high-tension circuit breaker platform is provided by small windows just above the roof of the machine room.

The machine room is furnished with ample windows on both sides so that the back of the switchboard receives as much light as the remainder of the room. The large door for handling apparatus in and out of the building is placed on the track side. It is worth noting that in this building neither a crane nor a depressed track for moving transformers in and out of the tower was installed. These features were purposely omitted because the experience of this company for five years with transformers and rotaries of the types used here have shown that facilities of this kind are of value only at the time of installation and therefore the fixed charges on them would not be justified.

The end of the machine room next to the freight station has no openings and has been made a fire wall. The lower floors and the roofs are of concrete and steel and the only woodwork which could serve as a possible fire menace con-

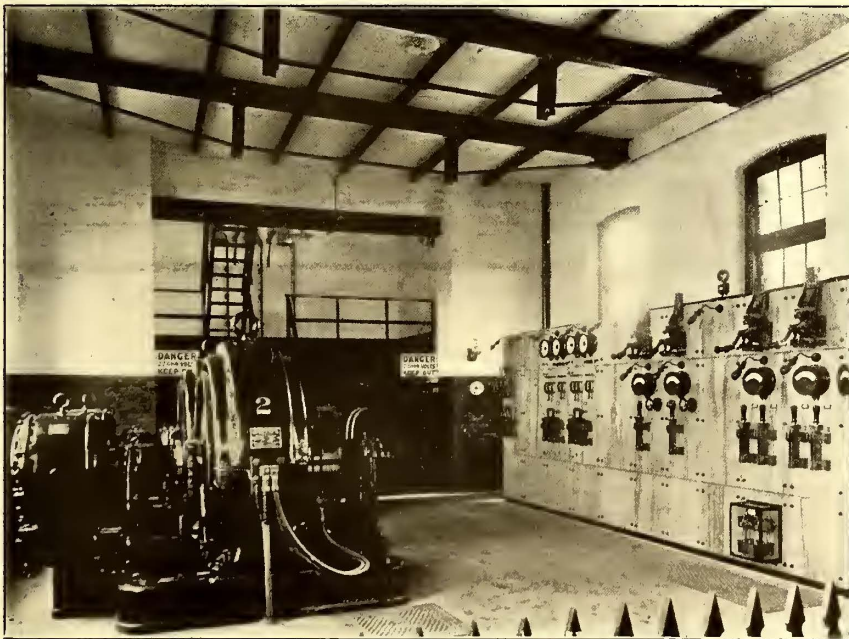
switchboard to the third-rails and feeders as well as the return cables from the track rails are run in the same kind of conduit, but at different elevations, connecting means being provided by manholes. One of the latter is just outside the building, another in the center of the right-of-way between the tracks and the last is at the base of the feeder pole. The bottom rows of ducts are laid in the manholes in such fashion that they serve as drains as well as cable



INTERIOR OF SUBSTATION, AS SEEN FROM THE TRANSFORMER ROOM

ducts. Any water from washing floors that might find its way into the cable trench back of the switchboard would immediately free itself through these ducts and manholes.

The 22,000-volt transmission wires are of No. 4 bare hard-drawn copper and are dead-ended on Locke strain insulators No. 605 just outside the tower. Inside the building this circuit consists of rubber insulated, flameproof No. 4 wires mounted on Locke porcelain insulators No. 2, which in turn are carried by locust wood pins driven into the wall. The wires enter the building through heavy glazed porcelain tubes furnished by Pass & Seymour. The three wires are led to single pole, single throw selector type front connection hook switches designed for 300 amps., and insulated for 22,000 volts. Leads of No. 6 insulated wire are brought from the middle connection of these switches to 55-amp., 25,000-volt choke coils with low-equivalent lightning arresters attached, thence to high potential fused circuit breakers. Upon leaving the circuit breakers the circuit is led to the plug switches, where the high potential delta connection is effected.



INTERIOR OF SUBSTATION, LOOKING TOWARD THE TRANSFORMER ROOM

sists of the yellow pine racks for mounting the plug switches over the transformers, the light stairways in the tower and the yellow pine framework upon which the choke coils and lightning arresters are mounted.

The cables connecting the transformers and rotaries with the switchboard are run in 3½-in. bituminous fiber conduit laid in the concrete floors. The cables leading from the

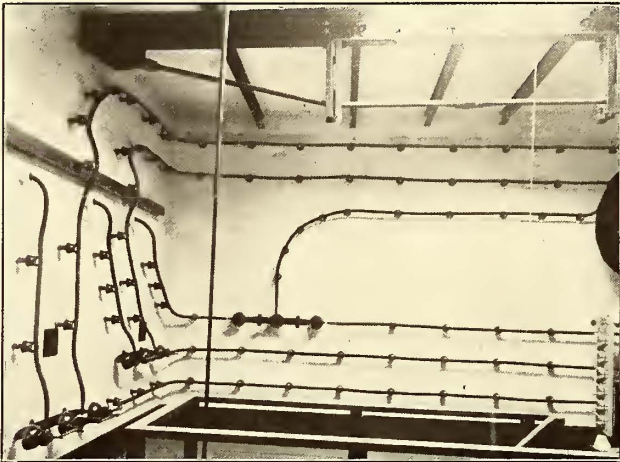
The transformers at present in place comprise three 375-kw, 22,000/403-volt, 25-cycle, oil-insulated, self-cooling transformers. Space has been left for three additional units and corresponding provision made for bringing a second set of transmission wires into the tower.

The machine room now contains two 500-kw, 390-volt a. c. to 650-volt d. c. rotaries with induction starting motors.



The foundation for the third rotary converter is installed ready for use.

The switchboard is of blue Vermont marble consisting of ten panels sufficient for the present and future apparatus. The order of the panels is as follows: No. 1 for the 390-volt connections from the transformers and on which the delta connection is produced; No. 2 is blank for the future transformers; Nos. 3 and 4 each control the a. c. end of a rotary and are each provided with an ammeter having three receptacles for switching in on any phase, a power



VIEW OF HIGH-TENSION WIRES ENTERING TOWER AND LEADING TO CHOKE COILS AND LIGHTNING ARRESTERS

factor meter, a synchronizing lamp, starting motor switch, synchronizing resistance switch and the main switch; No. 5 is blank for the a. c. control of the future rotary; Nos. 6 and 7 are each arranged for the d. c. end of the rotaries and carry a 1000-amp. type C circuit breaker, a type D 1500-amp. ammeter, a 1000-amp. positive switch, a rheostat face plate and a voltmeter receptacle; No. 8 is blank for the d. c. control of the third rotary; Nos. 9 and 10 carry the third-rail and feeder switches together with circuit breakers, ammeters and a d. c. integrating wattmeter. Two 750-volt d. c. voltmeters are mounted on a swinging arm bracket at this end and the synchroscope on a similar bracket at the opposite end of the switchboard.

When this station was started the two feeder cables were cut and the ends led to the feeder panels where a tie switch also is mounted. This arrangement, in connection with the section switches installed in the third-rail on either side of the sub-station, enables the two sections of the line to be operated independently in case of trouble.

The switchboard is provided with bracket lamps and the circuit breakers with an alarm bell attachment. The wiring for both the lamp and signal circuits is run in conduit. The busbars are made of  $\frac{1}{8}$  in. x 3 in. copper strap. The small connections back of the board is wired with underwriter's slow-burning insulated wire, while the cable connections from the transformers and rotaries to the switchboard are of 600,000 circ. mil paper insulated, lead covered cables. The starting motor connections are of 50,000 circ. mil cable and the shunt field connections of No. 6 wire.

The rotaries are arranged to equalize on the negative side and both the negative and equalizer switches are mounted on pedestals placed against the wall near the corresponding rotary. This arrangement calls for the minimum amount of material for equalizer and negative bus cables and places only one d. c. potential on the switchboard. Thus the connections are greatly simplified and the d. c.

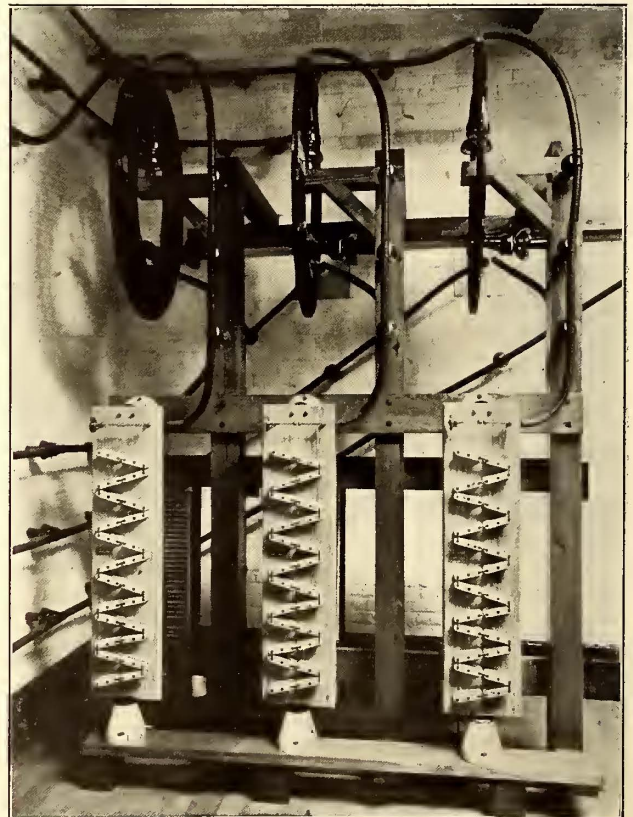
end of the board is rendered less liable to short circuits when repairs or changes are being carried out.

The station lighting is controlled from a small auxiliary board on the wall behind the main board. This switchboard may take its current either from the third-rail or the sub-station bus. To provide for emergencies when the high tension current may be off, several oil lamps are mounted on brackets at convenient points in the building.

The auxiliary board also carries a switch for controlling a motor compressor. The latter is used to furnish compressed air to blow out rotary converter windings, switchboard wiring and the like. The pump governor of this compressor is arranged to cut the pump out of circuit at 30 lb. and to cut in at 20 lb. pressure. The air is led from a reservoir to wall connections conveniently located for the attachment of rubber hose and nozzle.

The station is provided with running water, toilet, supply cabinet and attendants' lockers. The building was erected by E. T. Long & Co., Wilkes-Barre, Pa.; the choke coils, lightning arresters, transformers, rotaries and switchboard were furnished by the Westinghouse Electric & Manufacturing Company; the motor compressor and appurtenances by the Westinghouse Traction Brake Company, and the cables by the Standard Underground Cable Company and the Hazard Manufacturing Company.

The substation was designed in all its details by Chester P. Wilson, superintendent of the Lackawanna & Wyoming



VIEW OF CHOKE COILS AND LIGHTNING ARRESTERS IN THE TOWER

Valley Railroad Company. Mr. Wilson also was responsible for the selection of the equipment and the entire construction.

A comparison made between the Dublin tramway system and some of the large British municipal systems shows that in Dublin there was one mile of tramways to every 11,949 of the population; in Leeds, 9066; Liverpool, 14,434; Manchester, 8355; while in Dublin a mile served 7662 people.



**ELECTRIC EXPRESS SERVICE AT BIRMINGHAM, ALA.**

An extensive electric express service at freight rates has within the last few years been developed by the Birmingham Railway, Light & Power Company, serving the city of Birmingham, the steel and iron plants at Ensley, Bessemer, North Birmingham and other suburban points.



TYPICAL DISTRICT FREIGHT STATION AT ENSLEY

The extreme length of the territory from East Lake to Bessemer is about 20 miles, and its maximum width is about 6 miles. Closely adjacent to the great coalfields of Alabama, with vast deposits of iron in the neighboring mountain ranges, the city of Birmingham is in an unusually strong industrial position and the field for manufacturing is being rapidly developed. The street railway system comprises 112 miles of track, of which 32.3 miles are double track. The maximum ride on a 5-cent fare is 14.78 miles and the average daily passenger traffic is 60,000.

and Wylam. At the Birmingham station are the offices of the freight traffic manager, T. G. Brobston. Two side tracks and a transfer platform are provided at Birmingham for the receipt and delivery of express freight. As far as possible all storage of freight is avoided at this point. Freight is brought to the station by the shippers and is accepted for transportation up to within fifteen minutes of the leaving time of the train. Each car is then locked and cannot be opened until it reaches the proper authorized



ONE OF THE LOCOMOTIVE BOX CARS

agent of the company. Clerical supplies for the district agencies are stored at the Birmingham office.

The agency at Ensley is a typical district freight station. It is a combined power substation and express depot, the express section being about 85 ft. long x 44 ft. wide, two stories in height and of brick and timber construction. Two tracks are provided for the reception and dispatch of freight and the general freight room is approximately 41 ft. square, with three 7-ft. doors on each of the sides parallel to the tracks, and another similar door on an



THE MAIN FREIGHT STATION AT BIRMINGHAM, SHOWING LOADING AND UNLOADING PLATFORM

The general express offices of the company are located near the center of the business district, on First Avenue, in Birmingham, and are combined with the company's emergency station. Freight stations with agents giving their exclusive time to the business are also located at Bessemer, Ensley, East Lake, East Birmingham, Gate City, North Birmingham, Pratt City, Thomas, Woodlawn, Woodward

alley side of the building. Besides a commodious lobby for the use of the public are offices for the freight agent, cashier and electrician. The cashier also handles local lighting and power bills, and space is provided in the lobby for an exhibition of electrical apparatus for use on central-station circuits. On the upper floor are a storeroom and the substation switchboard gallery.





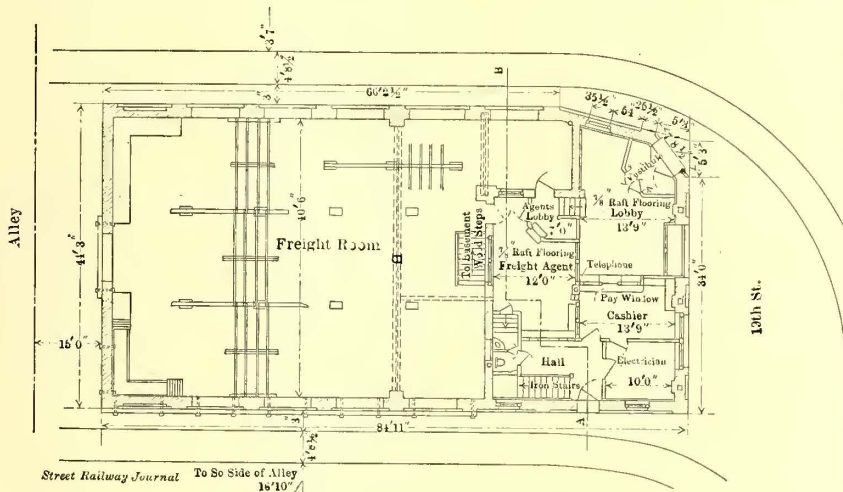


Practically all the service is handled in trains of from four to five cars. The company has four motor locomotive box cars, each equipped with four General Electric 57 motors and hand control. Each motor car has a carrying capacity of 50,000 lb. Double trolley poles are provided and straight air (up to four cars) controlled from the motor car is used throughout each train. There is also a flat motor car with a cab on each end. This car is denominated the "battleship" by the company and is equipped with automatic air brakes for use when handling standard steam railroad freight cars, four GE-57 motors, a single trolley on a center post and has a capacity of 60,000 lb. The company also owns seven gondola cars for sand, coal and coke service, each having 40,000 lb. capacity, and twenty box cars, 32 ft. 7 in. long, 8 ft. 6 in.

coupler and the link and pin type. The heads of the draw-bars are of cast steel with tongues extending from each head. The tongues lap over each other and form a solid



TRAIN OF FREIGHT CARS IN BIRMINGHAM

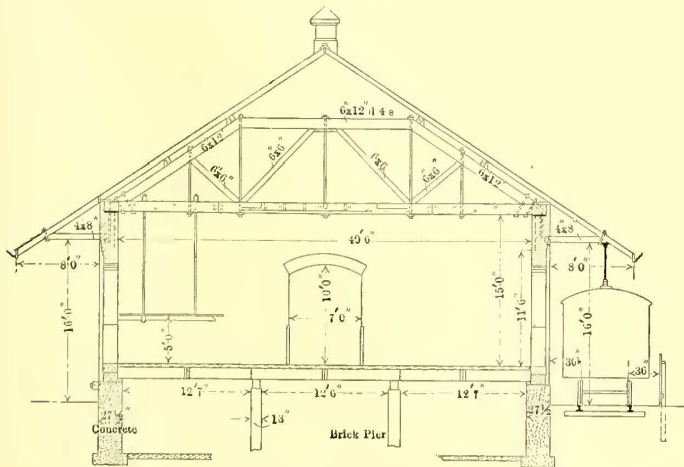


PLAN OF ENSLEY FREIGHT HOUSE AND SUBSTATION

wide, all of which were built by the company. The locomotive car 752 shown is 40 ft. long over bumpers, 9 ft. wide and 8 ft. high, inside measurement. It is equipped with

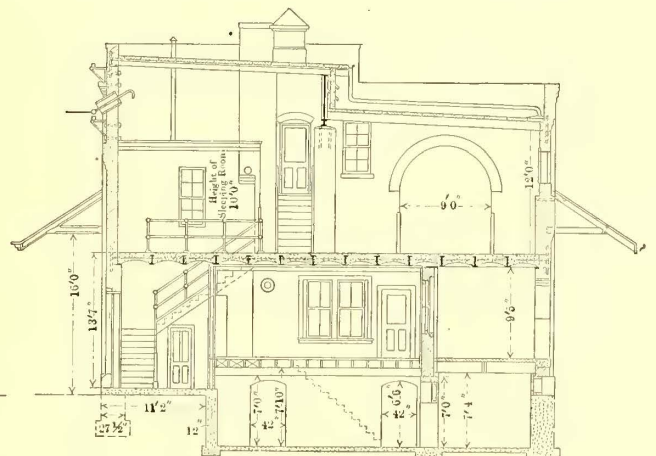
coupling. Another feature is the increase of space inside by the absence of the usual vestibule bulkhead. The car was designed by W. A. McWhorter, formerly master mechanic of the company, along lines suggested by Mr. Brobston.

One of the tables on page 816 shows the express schedule in force at Birmingham. Trains are run three times a day to the more important points, but no Sunday service is given. Trains are operated at passenger-car speeds and as sections of the passenger-car movements. The company has about 30 side tracks leading into industrial establishments. In December, 1907, over 4,700,000 lb. of loose freight were handled, not including steam railroad tonnage. In times of normal business activity this figure is much increased. The running time from Birmingham to Bessemer, 15 miles, is 1 hour; from Birmingham to Ensley, 7 miles, 45 minutes; from Birmingham to East Lake, 7 miles, 45 minutes, and to North Birmingham, 3.5 miles, 30 minutes. Among the large movements



Street Railway Journal

CROSS SECTION AND ELEVATION OF ENSLEY FREIGHT HOUSE AND SUBSTATION



two St. Louis M. C. B. 23A trucks and weighs 45,000 lb. For this air equipment a National AA1 air compressor is used. The drawbar is a compromise between an automatic

of traffic are castings, oil, tar and cotton between Bessemer and Ensley; from North Birmingham the products of pipe and iron foundries, hosiery, coffin and turnbuckle factories



and general merchandise, packing-house products and fruit from Birmingham business houses and cold-storage plants outside. Trunks are checked to any point on the system

BIRMINGHAM RAILWAY, LIGHT & POWER COMPANY  
OFFICE OF FREIGHT TRAFFIC MANAGER  
SCHEDULE OF FREIGHT TRAINS LEAVING BIRMINGHAM.

For Bessemer.....	6:15 A.M.	10:15 A.M.	2:15 P.M.
For Ensley, Pratt C., Thomas.....	6:30 A.M.	10:00 A.M.	3:00 P.M.
For Wylam.....	6:30 A.M.	.....	12:45 P.M.
For East Lake, Woodlawn.....	8:30 A.M.	11:00 A.M.	3:00 P.M.
For East Birmingham, Kingston, Gate City.....	8:30 A.M.	.....	3:00 P.M.
For N. Birmingham.....	8:30 A.M.	.....	2:00 P.M.
For Boyles.....	.....	.....	2:00 P.M.

SCHEDULE OF FREIGHT TRAINS LEAVING BIRMINGHAM

for 50 cents each. This has been found to be a great convenience in connection with the steam railroad stations.

The company's rates are the same between all points on

RATES ON CAR LOAD SHIPMENTS BETWEEN ALL STATIONS ON THE BIRMINGHAM RAILWAY, LIGHT & POWER COMPANY.  
(For List of Stations See Pages 4 to 6)

CAR LOAD RATES—Per 100 pounds	Rates in Cents
1—Building material—consisting of brick, sand, stone, lime, cement, limestone, screenings, clay, slag, lumber, laths and shingles—straight or mixed carloads, 40,000 lb minimum; excess in proportion.....	1 1/4
2—Iron—40,000 minimum.....	1 1/4
3—All other commodities—30,000 lb minimum; excess in proportion.....	2 1/2

CAR LOAD FREIGHT RATES

its system, the Southern classification being followed, with a few commodity exceptions noted in the table on this page. The carload rates are also shown on this page. The latter

RATES ON

\*General Merchandise when in less than Car Load Quantities BETWEEN ALL STATIONS ON THE

Birmingham Railway, Light and Power Co.

(FOR LIST OF STATIONS SEE PAGES 4 TO 6)

CLASSIFICATION	PER HUNDRED POUNDS											Per Bbl.	
	1	2	3	4	5	6	A	B	C	*D	E		H
RATE	10	10	10	10	8	6	8	10	6	4	9	9	10

\*D—Class to Woodlawn 5 cents per hundred pounds.

MINIMUM CHARGE.

On shipments 50 pounds and under..... 10 cents  
On shipments over 50 pounds..... 15 cents

COMMODITIES	Cents per 100 lbs.	CENTS EACH
1—Bread in baskets, barrels or boxes.....	15	15
2—Beer in barrels.....	30	30
Beer in 1/2 barrels.....	10	10
Beer in 1/4 barrels.....	5	5
3—Bananas, loose in bunches.....	75	75
4—Coffins, full size.....	25	25
Coffins, 4 feet in length and under.....	15	15
5—Eggs (single case 15 cents) 2 or more cases.....	10	10
6—Empties returned.....	5	5
7—Bread baskets, laundry baskets, egg cases (prepared).....	5	5
8—Empty Beer Packages—Returned— Barrels.....	10	10
1/2 Barrels.....	7 1/2	7 1/2
1/4 Barrels.....	5	5
9—Empty Coops (returned).....	10	10
10—Fish and Oysters, fresh.....	15 1/2	15 1/2
11—Jugs and Jars—2 gallons and under.....	15 1/2	15 1/2
Over 2 gallons.....	20	20
12—Laundry, in baskets.....	25	25
13—Mattresses.....	30	30
14—Manufactured Iron in this district.....	5	5
15—Organs.....	100	100
16—Pianos (boxed).....	200	200
17—Poultry in coops, 150 pounds or less.....	35	35
Over 150 pounds.....	50	50
Large turkey coops.....	50	50
18—Sewing Machines (crated).....	15	15
Sewing Machine (not crated).....	25	25
19—Trunks or Tool Boxes (filled).....	25	25
Trunks or Tool Boxes (empty).....	15	15
20—Vegetables and Produce (over 500).....	6	6
21—Watermelons.....	25 1/2	25 1/2

GENERAL MERCHANDISE RATES

apply only when shipments are loaded at the point of origin by shippers and unloaded at destination by the consignee. The switching tariff on railroad cars varies in general from \$2 to \$3 per car.

The billing is unusually simple. One of the illustrations shows the freight bill from which the clerk at the forward-

ing station copies from the original way bill. The freight bill (red) when made out is copied three times automatically by an Egry autographic register and is then sent to the consignee. The second copy (white) is used as the receipt, the third goes to the auditor's office and the fourth to the station files. From the way-bills the agent at the receiving station fills out a blank showing "Abstract of Freight Received," a corresponding blank being used for forwarded freight. The agent can deliver freight usually in about 10 minutes after arrival. His monthly report of the money received and due is also straightforward in its make-up and is essentially a balance sheet for each station. The freight business is vigorously advertised, an excellent example being shown herewith for distribution in the company's passenger cars.

EXTENDING TRANSFER PRIVILEGES IN LOUISVILLE

Early in January of the present year a joint committee, composed of the Mayor and members of the Council and Board of Aldermen of Louisville, was appointed to confer with the Louisville Railway Company regarding an extension of the transfer system. It was suggested by the committee that the system be adjusted so that a passenger could board a car at any point in the city and by the use of as many transfers as necessary reach any other point for one fare. The company said that while the object of a transfer system is to enable a passenger to reach his destination

**W. CHEST.**  
If searched for transfer to other than an Interstate Line, 15th St. or Shelby St., Conductor will advise this Company and register it on Ticket Register and return ticket to passenger for use at point indicated.

**NOT GOOD IF DETACHED**

**Mar. 6, '08**

**001998**

LAST BOUND ONLY	10	15	30	45
At 4th St. North	6	10	30	45
At 5th St. North	7	10	30	45
At 6th St. North	8	10	30	45
At 7th St. North	9	10	30	45
At 8th St. North	10	10	30	45
At 9th St. North	11	10	30	45
At 10th St. North	12	15	30	45
At 11th St. North	13	15	30	45
At 12th St. North	14	15	30	45
At 13th St. North	15	15	30	45
At 14th St. North	16	15	30	45
At 15th St. North	17	15	30	45
At 16th St. North	18	15	30	45
At 17th St. North	19	15	30	45
At 18th St. North	20	15	30	45
At 19th St. North	21	15	30	45
At 20th St. North	22	15	30	45
At 21st St. North	23	15	30	45
At 22nd St. North	24	15	30	45
At 23rd St. North	25	15	30	45
At 24th St. North	26	15	30	45
At 25th St. North	27	15	30	45
At 26th St. North	28	15	30	45
At 27th St. North	29	15	30	45
At 28th St. North	30	15	30	45
At 29th St. North	31	15	30	45
At 30th St. North	32	15	30	45
At 31st St. North	33	15	30	45
At 32nd St. North	34	15	30	45
At 33rd St. North	35	15	30	45
At 34th St. North	36	15	30	45
At 35th St. North	37	15	30	45
At 36th St. North	38	15	30	45
At 37th St. North	39	15	30	45
At 38th St. North	40	15	30	45
At 39th St. North	41	15	30	45
At 40th St. North	42	15	30	45
At 41st St. North	43	15	30	45
At 42nd St. North	44	15	30	45
At 43rd St. North	45	15	30	45
At 44th St. North	46	15	30	45
At 45th St. North	47	15	30	45
At 46th St. North	48	15	30	45
At 47th St. North	49	15	30	45
At 48th St. North	50	15	30	45
At 49th St. North	51	15	30	45
At 50th St. North	52	15	30	45
At 51st St. North	53	15	30	45
At 52nd St. North	54	15	30	45
At 53rd St. North	55	15	30	45
At 54th St. North	56	15	30	45
At 55th St. North	57	15	30	45
At 56th St. North	58	15	30	45
At 57th St. North	59	15	30	45
At 58th St. North	60	15	30	45
At 59th St. North	61	15	30	45
At 60th St. North	62	15	30	45
At 61st St. North	63	15	30	45
At 62nd St. North	64	15	30	45
At 63rd St. North	65	15	30	45
At 64th St. North	66	15	30	45
At 65th St. North	67	15	30	45
At 66th St. North	68	15	30	45
At 67th St. North	69	15	30	45
At 68th St. North	70	15	30	45
At 69th St. North	71	15	30	45
At 70th St. North	72	15	30	45
At 71st St. North	73	15	30	45
At 72nd St. North	74	15	30	45
At 73rd St. North	75	15	30	45
At 74th St. North	76	15	30	45
At 75th St. North	77	15	30	45
At 76th St. North	78	15	30	45
At 77th St. North	79	15	30	45
At 78th St. North	80	15	30	45
At 79th St. North	81	15	30	45
At 80th St. North	82	15	30	45
At 81st St. North	83	15	30	45
At 82nd St. North	84	15	30	45
At 83rd St. North	85	15	30	45
At 84th St. North	86	15	30	45
At 85th St. North	87	15	30	45
At 86th St. North	88	15	30	45
At 87th St. North	89	15	30	45
At 88th St. North	90	15	30	45
At 89th St. North	91	15	30	45
At 90th St. North	92	15	30	45
At 91st St. North	93	15	30	45
At 92nd St. North	94	15	30	45
At 93rd St. North	95	15	30	45
At 94th St. North	96	15	30	45
At 95th St. North	97	15	30	45
At 96th St. North	98	15	30	45
At 97th St. North	99	15	30	45
At 98th St. North	100	15	30	45
At 99th St. North	101	15	30	45
At 100th St. North	102	15	30	45

NEW TRANSFER IN USE IN LOUISVILLE

by a continuous journey, the unlimited use of transfers without any restriction as to direction of travel would defeat the real purpose of the transfer by making it possible for a person to return to the starting point. The company expressed its willingness to do all that was consistent, its desire being only to protect itself against the unscrupulous, and as a result gave approximately 130 additional transfers, making use of the coupon form of transfer. The lines of the company run very largely east and west and north and south, and the new transfer is one devised by S. G. Boyle, secretary-treasurer of the company, to meet the conditions imposed. The idea of the coupon transfer is to do away with the issuing of a transfer on a transfer, and still allow the passenger to ride upon two lines besides the one on which he pays his fare. By its use a passenger may, for instance, ride north or south on a line on which he pays his fare and receives his transfer, and east or west on an intersecting line, giving up his coupon, and then south or north on the third line, giving up the main transfer ticket. When it is remembered that nearly all lines are north and south and east and west, it will be seen that this plan enables a passenger to reach any point desired. The system is working satisfactorily, and has the advantage of doing away with the issuing of a transfer on a transfer, which is sometimes objectionable. White transfers are for east and west lines and orange for north and south lines. Each transfer is issued on condition that should any controversy arise as to its validity the holder shall pay his fare and call at the company's office for correction.



**THE ACCOUNTING SYSTEM OF THE MEMPHIS STREET RAILWAY COMPANY**

The several electric railway properties of the Newman interests, including those of Nashville, Memphis, Little Rock and other Southern cities, are using one standard accounting system, based in general upon that of the Accountants' Association. The general plan followed has been developed by the constant selection from the several roads of the best features of their accounting systems. The final details are left to be developed by the local accountants of the properties to fit the conditions at each city. One of the most interesting of these systems is that in use by the Memphis Street Railway Company. Checks upon different totals and balances, promptness in the getting out of reports, and a minimum amount of clerical work characterize the methods here followed.

The company uses a standard double-fare register, recording cash fares on one side and tickets on the other; all forms of paper, whether transfers, passes or 5-cent tickets, being rung up on the latter side. When the cars are turned in at night the readings of the registers are taken on a sheet provided for that purpose by one man employed as a register reader. These sheets are about 19 in. long by 12

the register taken out of service, the time, car number, date, reading when taken out and put back on both cash and transfer sides, the name and number of the employee handling the register. The total of the differences on the regular register report represents the number of passengers, revenue and others carried during the day; and this is taken as the basis of the daily earnings report, since the readings are taken independently of every other item.

Against the total of the cash register readings are balanced the trip reports of the conductors, the duplicates of cash receipts issued to conductors by the receiver at the car-house and the money taken in by the receiver. Against the total of the ticket register readings are balanced the conductors' reports and the tickets, transfers and passes turned in by them.

**DEAD HEAD RECORD.**

Trip No.	Police	Firemen	Sisters of Charity	Employee Badge No.	CARD PASSES	
					No.	NAME
1						
11						
12						

**INSTRUCTIONS**

Be careful to show whether a.m. or p.m.  
 Enter car number and badge number correctly.  
 At end of each one-half trip enter in column headed "Closing Transfer No." the number of next transfer to be issued from pad then in use.  
 Transfers enclosed in envelopes for the purpose, number marked thereon, must agree with column upon trip sheet.  
 When for any reason, the register is taken out, start a new trip report for the new register.  
 Start a new trip sheet for each time on a car and end it when getting off.  
 Police, Firemen, Sisters of Charity, Employees riding on Badge and Card Passes to be reported on back of sheet in columns for that purpose.

**REMARKS**

Station Number.	Station Number.
1 Barn.	48 End Dbl. Tk. Lane Avenue.
2 Custom House.	49 Lane and Decatur.
3 Main and Virginia.	50 Winchester Crossover.
4 Main and Railroad Avenue.	51 End Beale Line.
5 Main and Calhoun.	52 Grove and Dunlap.
6 Main and Vance.	53 Grove and Neptuna.
7 Union and Beale.	54 Beale and S. Third.
8 Main and Union.	55 End Suburban (Cal.)
9 Main and Madison.	56 Passing Track Suburban (Cal.)
10 Main and Jefferson.	57 End Dbl. Tk. Suburban (Cal.)
11 Main and Poplar.	58 Cedar Grove.
12 Main and Sycamore.	59 McLemore and Latham.
13 Thomas St. and Chelsea.	60 End Lauderdale.
14 End Dbl. Tk. New Raleigh Road.	61 Passing Tk. Lauderdale.
15 Bell R. R. New Raleigh Road.	62 End Dbl. Tk. Lauderdale.
16 End New Raleigh Road.	63 Lauderdale and Kerr.
17 End Thomas Street.	64 Buntn.
18 End Dbl. Tk. N. Second Street.	65 Passing Tk. Buntn.
19 End N. Second Street.	66 End Dbl. Tk. Buntn.
20 Florida and Jackson Mound Ave.	67 Montgomery Park.
21 End Kansas Street.	68 Cooper and Central.
22 End Dbl. Tk. Florida Street.	69 Lenox.
23 Passing Tk. Florida Street.	70 East Edj Park.
24 Y. & M. V. Crossing & Florida St.	71 Madison Heights.
25 End Florida Street.	72 Madison and Somerville.
26 End Poplar Avenue.	73 Ball Park.
27 Poplar and Evergreen.	74 Madison and Third.
28 Poplar and Bellevue.	75 Raleigh Springs.
29 Poplar and Manassa.	76 Spears.
30 End Lamar.	77 Finne's.
31 End Dbl. Tk. Lamar.	78 Highland Heights.
32 End Annesdale.	79 Binghamton Store Yard.
33 End Dbl. Tk. Annesdale.	80 Binghamton.
34 Central and Lamar.	81 Overton Park Loop.
35 Pauline Loop.	82 End Union Ave. Line.
36 Vance and Walnut.	83 End Dbl. Tk. Union Ave. Line.
37 Vance and Orleans.	84 Peabody and S. Bellevue.
38 Vance and Lauderdale.	85 End Jackson Mound Line.
39 End Jackson Avenue.	86 End Dbl. Tk. Jackson M'nd Line.
40 End Dbl. Tk. Jackson Ave.	87 Calhoun and Kentucky.
41 Jackson and Union.	88 End Davis Avenue Line.
42 Jackson and L. & N. R. R.	89 End Dbl. Tk. Davis Avenue Line
43 Jackson and Alabama.	90 S. Third and Beale Avenue.
44 End Linden Line.	91 S. Third and Union.
45 End Dbl. Tk. Linden.	92
46 Elmwood Crossover.	93
47 End Lane Avenue.	94

Form 60. S.C.T.&Co. 6-07-100m

**The Memphis Street Railway Co.**

Time out of Station							Beginning	
TRIP SHEET							No.	
Trip No.	Time Arriving	At Station No.	Cash Fares	Transfers	Passes	One Fare Tickets	Total Ticket Reg.	Closing Transfer No.
1								
14								
15								
<b>TOTALS</b>								
<b>CASH FARE REGISTER</b>				<b>TICKET AND TRANSFER REGISTER</b>				
Register Ending				Register Ending				
" at start				" at start				
TOTAL				TOTAL				
AMOUNT CASH \$				Receipt for Register, by relief Conductor				
ERRORS				Motorman <input type="checkbox"/> Badge				
OVER				Conductor <input type="checkbox"/> Badge				
SHORT				Ron No. Car No.				
Transfers				Date 190				
Passes				LINE				
Tickets								
Cash Fares								
TOTAL								

**PART OF FRONT OF CONDUCTOR'S SHEET FOR FIFTEEN TRIPS**

in. wide, and show the number of each car on the system. The cash and ticket register readings and the difference between the last reading and the reading of each part of the register at the end of the preceding day. The registers were formerly read by one of the barn men after all cars had been turned in, but it was found much more satisfactory to read them as they came into the house. During the day the timekeeper on duty takes the readings of the registers in cars, crippled or changed, and turns these over to the register reader when he comes on duty at night. In case any fares are rung up by the register repair man in the shop, or by the car-house force while the rolling stock is in the barn, the readings are reported on a 7 3/8-in. x 5 3/8-in. blank provided for the purpose. This shows the number of

**PART OF CONDUCTOR'S TRIP SHEET COMPLETE**

The trip report used by the company was adopted after experimenting for a number of months, and is got up with the object of getting all the necessary information and giving each conductor as little clerical work to do as possible. The trip sheet is about 10 1/2 in. x 5 in., printed on manila paper from a copper plate. The front contains blanks for entering the receipts from 15 trips, arriving times at each end of the route, cash and other fares, register readings, closing transfer numbers and signatures. One of these trip sheet blanks is shown herewith. As the mileage is figured from the trip cards, it was found necessary to indicate the ends of the lines, turn-back points and cross-overs by numbers. These station numbers are all listed on the back of the trip sheet, so that the exact route



traveled daily can be shown for each car. Conductors are supplied with separate trip sheets for each run, and these sheets are kept by the men to whom they are issued and turned in at night. When relieved by another conductor, the latter, by signing the trip sheet of the relieved conductor, receipts for the register readings. The earnings clerk, having the distance between all stations tabulated, can easily compute the mileage by referring to the station numbers shown by the conductor on the face of his report.

Conductors are also required to make out a separate report each time they are on a car, closing the report as soon as they leave the car. Transfers, tickets and passes are enclosed in an envelope at the end of each half trip, the envelope being retained by the conductor until settlement is made. At night when the conductor comes in to make his settlement, he first hands in his trip sheets, unissued transfers and envelopes containing transfers taken up. The unissued transfers are checked off. Differences between register readings are balanced against passengers carried as shown by the trip card. The envelopes are then totaled and balanced against the trip sheet, after which they are turned over to the transfer counters and the trip cards returned to the conductor, who can make up his money while the transfers are being counted. If the transfers, tickets,

primary balances are obtained before 4:30 a. m. After the settlements are made the money is placed in vault. The day force takes the summaries and register reports and balances them, after which the mileage is computed and tabulated, together with the car hours reported; and the daily earnings statement is the result. The latter is a 9½-in. x 15-in. sheet, and shows the earnings of each line, revenue per car mile and car hour, car movement and traffic handled for the date given, for the month to date and the year to date. The daily summary of the trip sheets is a blank 8¾ in. x 11 in., showing the different classes of traffic, fares and tickets handled by each line. The data of the daily earnings statement is copied in the daily earnings record book by lines, from which the information is drawn for the monthly report. In addition to computing the car mileage by lines it is figured for each car daily for the information of the mechanical department. The daily earnings statement is usually completed the morning following the day for which it is made. Before Monday night the statements for Saturday and Sunday are usually completed. In the receiver's office is a Johnson coin counter, which, it has been found, is very accurate, and does the work from 5 to 25 times faster, depending on the denomination counted, than it can be done by hand.

The crews of all cars on leaving the car-house are supplied with a time card, on which is registered, by a recording clock, the exact time the car leaves the house. This card stays with the car until it comes into the house, and all crews record their time "on" or "off" the car on it, the last crew or the one bringing the car in turning the card in to the timekeeper before putting the car into the house. The day timekeeper issues the cards in the morning and during the day, and he takes up the cards from such cars as may be turned in during the day. The night timekeeper issues cards on all cars sent out late in the evening and takes up all cards as the cars come in from their last runs, balancing the cards, approving them and making out a report of the car-hours by lines and in total. This report is in duplicate, one copy going to the auditing office and the other to the general superintendent. Through the use of the recording clock the company has a check on the outgoing and incoming cars, and the elapsed time is also registered. From the cards thus made out and balanced the timekeeper in the office makes up the payroll for conductors and motormen. In checking the time in the office the motormen's and conductors' time on each card is added separately and must check with each other and with the time as indicated by the clock. The totals of all the cards as obtained from the motormen's and conductors' records and from the clock record must also check.

The time of the different departments of the car shops, the power house, the construction forces and trackmen is made up and distributed by each department and is sent to the accounting room on special time report blanks. From these it is transferred to the payrolls, which are made up every two weeks. The payroll sheets are of practically the same form for all departments, and when made up are put into a current loose-leaf binder. Every six months they are bound permanently. Time checks are made out for every man whose name is on the payroll, regardless of whether or not he may have been discharged previous to the time the roll is made up. When a man's services are dispensed with before pay-day, a discharge slip is given him, which is cashed by the treasurer, who holds it as a cash item for petty cash. Afterward this cash item is taken up by the regular pay check.

Conductor Badge Number			FORM 18 The Memphis St. R'y Co.				Dollars		Cents					
0	0	0	Received from the Conductor whose number is punched on the left the amount punched on the right for the line punched in the bottom, for the date stamped. This receipt is issued in duplicate, the original to be given to the Conductor.				0	0	0	0				
1	1	1					No 12104				1	1	1	X
2	2	2									6	6	6	X
3	3	3									3	3	3	X
4	4	4									4	4	4	X
5	5	5									5	5	5	5
6	6	6									6	6	6	X
7	7	7									7	7	7	X
8	8	8									8	8	8	X
9	9	9									9	9	9	X
			Beale & Lane	Kansas Ave.	Raleigh Springs	Vance & Poplar								
			Davie Ave.	Linden & Johnson	So. Memphis	Binghamton								
			East End	Main St.	Suburban	Base-Ball								
			Jackson M'd	No. Second	Union St.	Special								

RECEIPT ISSUED TO CONDUCTORS FOR MONEY TURNED IN

etc., are correct, he can then make his settlement for cash fares. If not correct he is required to settle the shortage before leaving the window. When the conductors turn in their cash the separate amounts as shown by the trip sheets are not considered, but one receipt is given for all the cash turned in, whether it be accounted for on one or on several trip sheets. These receipts are issued in duplicate by the receiver, who sends one-half to the accounting department. They each provide for the indication of the amount of money turned in by punching out figures in the margins. One of these sheets is shown herewith. The company's experience with this method of turning in and settling for other than cash fares collected has so far proved very satisfactory, as, except when the conductor makes an error in taking his register, all the shortage can be collected and the settlement made on the spot. There are two transfer counters, one man to receive the transfers and one cash receiver. The last of the money is turned in about 2:30 a. m.

While the money is being counted the cash receipts are being listed by lines and summarized. The totals must, of course, balance. If they do not, reference has to be made to the trip sheets and the discrepancy run down. In the meantime the trip sheets are assorted by lines and summarized, and the differences for the register readings for the day are totaled. These totals must balance both for cash and for tickets and transfers. All of these



The pay checks for the motormen and conductors are sent down to the money receivers and are given out by them. The checks for all the conductors that are short are held up and can only be obtained by applying to the cashier, who, before paying them, makes the necessary deductions. As the checks are paid they are stamped with the date, and after pay-day the payroll is stamped paid from them. In some cases the checks are not cashed or the wages collected for some time after the regular pay-day. At intervals of about 30 days the payrolls are gone over, and wherever wages have not been paid, the paid column is marked "unclaimed" and the amount is then turned over into the unclaimed wages account. The payroll is then regarded as paid and is put away.

At the end of each month a report is made showing the exact condition of the property. Both the earnings and expenses are analyzed closely and are compared with those of the corresponding month of the previous year. In making this report, the general idea or form of the standard report is followed as far as local conditions permit. Therein are shown the passenger and all other receipts, gross earnings, operating expenses in detail and in total, fixed charges and surplus earned, car miles and car hours by lines, amounts paid for damages and passengers carried, the funded debt and the floating debt of the company and the general balance sheet. The whole is summarized and shown in condensed form on the first page, so that the president can see at a glance the results of the month's operation. Expenses are distributed in accordance with the standard classification of the American Street & Interurban Railway Accountants' Association, of which the company is a member. The car mile and car hour are used as the units in figuring earnings and expenses.

## A REVIEW OF THE PRESENT PRACTICE AND ECONOMICS OF TIMBER PRESERVATION\*

BY EUGENE P. SCHOCH,  
University of Texas.

The problem before us in its simplest terms amounts to this: "Is wood preserving profitable?" This is not a simple problem to solve. So many factors enter into the final calculation of the cost that one general answer cannot be given. Granted that a wood preserver is certain to lengthen the life of a tie, the question becomes: How much may we spend for a preservative in order to gain a certain increase of life? Evidently the preservative which would lengthen the life of the tie to the greatest extent is not necessarily the most economic preservative to use, because it is possible that the extra cost of the best preservative over some cheaper, but less effective, article or method is not balanced by the extra length of life of the tie. In this calculation must be included the calculation for the relaying of the tie, which would seem to give the advantage again to the preservative that insured the greatest gain in the life of the tie. On the other hand, however, we may be confronted with the difficulty that the tie may be destroyed through mechanical wear or influence other than decay before the expiration of its assumed life, and for this reason a cheaper method again may be preferable. And so one consideration after the other must be duly weighed before a final answer can be given.

### CAUSES OF DECAY

The causes of decay are bacteria and fungi which attack the fibers of the wood. These fungi and bacteria grow best when they have an abundant supply of food and cer-

tain conditions of heat, moisture and air. In the absence of one of these growth is inhibited. The effort in timber preservation should be directed as much toward prevention of the best conditions for the growth of the fungi and bacteria as it should be directed toward poisoning these organisms. Thus, green timber, containing in its sap an ample supply of readily assimilated food, as well as a proper amount of moisture, presents in that state splendid conditions for the development of bacteria and fungi, whereas well-seasoned wood presents unfavorable conditions—the sap has dried out and the fibers and remaining portions are not in a form in which they are as readily assimilated for food as they were before the sap was dry. Also the absence of moisture retards the growth of bacteria and fungi. Hence, wood may be said to be extensively preserved by proper seasoning.

The advisability of seasoning rests not only upon this point, but furthermore upon the fact that preservative liquids cannot be injected into the wood unless the space occupied by the sap had been previously made vacant by the removal of the latter. Furthermore, the preservative liquids in general penetrate only a part of the wood, and if in the parts not reached the conditions for the development of fungi and bacteria are suitable, decay will set in there and continue, although the outer portions may be completely preserved. The baneful effects of preservative treatment without preliminary seasoning of some sort or other are well known to all practical wood preservers, and as the result of general experience it may be said that the most essential first step in the preservation of timber is proper seasoning.

### PRESERVATIVES

If through proper seasoning the interior of the timber has been rendered practically free of conditions for the development of bacteria and fungi, all future attack becomes possible only through the entrance of moisture from without. If, then, the moisture entering the wood is thoroughly saturated with poisonous substances which inhibit the growth of bacteria and fungi, decay is effectively prevented. This is the basal idea of the preservative treatment. Many substances have been used as antiseptics for this purpose. At present there are four distinct kinds of substances used as wood preservers. First of all, coal tar distillates—creosote; second, poisonous salts of metals—zinc chloride, corrosive sublimate; third, crude oil; and fourth, wood tar distillates. These substances are far from being equally successful. They are mentioned here merely as the substances that are actually thought of to-day as possible preservatives. In some processes combinations of several of these substances are used.

Of the substances that are admittedly good wood preservatives the tar oil distillates hold the highest rank. The mixture of tar oils known as creosote has been used as a preservative for such a great length of time that there is now no question as to its efficiency. However, it is a very complex substance and the question arises: "Are all of these components of equal value for purposes of wood preserving or are some of lesser and others of greater value?" An answer to this question was sought by means of analyzing timber that had successfully withstood decay for a long number of years, to determine which ingredients of the original creosote remained in the wood to preserve it. Such investigations were carried out by Charles Coisne in 1862 for the Belgian Government; again in 1882 by S. B. Boulton for the London & Northwestern Railway; recently again by Gellert Alleman for the United States Department of Agriculture, and by Von Schrenk, Fulks & Kammerer.

\*Abstract of paper read before the Southwestern Electrical & Gas Association at El Paso, Tex., May 7, 8 and 9, 1908.



The observations and conclusions of all these investigators agree in the following: (1) That the tar acids, such as carbolic acid, which formerly were considered to be the most valuable constituents of creosote, are soon lost, either washed out or evaporated from the wood, and hence do not serve permanently to preserve the wood. (2) Naphthalene and the low boiling oils are markedly evaporated from the wood during the early years of exposure. (3) The high boiling tar oils, notably the portions boiling from 270 deg. and upward, are the substances that permanently remain in the wood. All investigators agree in pronouncing these high boiling oils the most valuable portions of creosote.

The following approximations may be of interest here: Creosote as found in the market contains from 15 to 30 per cent of the high boiling oils. Also 30 to 60 per cent of the oil is lost by evaporation during the first 8 or 10 years of exposure, the loss being confined to the low boiling constituents, including naphthalene. For the most up-to-date detailed discussion on the grading of creosotes see Forest Service Circular No. 112, "The Analysis and Grading of Creosote," which has just been issued.

#### ACTION OF PRESERVATIVES

Opinions differ somewhat with regard to the theory of the action of these preservatives. Of course, all have agreed that the preservatives must be germicides, and hence that their action is to poison, or at least inhibit the growth of, bacteria and fungi by their mere presence. With such substances as zinc chloride or corrosive sublimate the mode of action is simple enough: The germicides dissolve in the moisture that enters the wood, forming a solution of the proper germicidal value. Wherever such moisture may penetrate bacteria and fungi cannot live. While this action is the only one possible with zinc chloride or corrosive sublimate, there is an additional one possible with oil such as creosote, namely, the utter exclusion of moisture.

If moisture is effectively excluded bacteria and fungi cannot grow. Merely coating the surface of wood with what might be assumed to be an impervious coat is ineffective. This is shown by the comparative inefficiency of a coat of hot tar applied to timber, a procedure which, though known to be inefficient, yet is resorted to frequently by engineers and others who should know better. Yet, even soaking for 24 hours in crude oil is not economically efficient, as has been pointed out elsewhere. While it is probable that in piles creosoted for marine exposure in which 20 lb. or more of creosote per cubic foot are injected, the action of the oil tending to exclude water does as much to preserve the wood as is due to its germicidal power, yet with creosoting for land exposure, by the Rueping process, in which not exceeding 5 lb. per cubic foot are left in the wood, the action is mainly or entirely germicidal. It must be remembered that in all these cases of creosoting for land exposure large central portions of posts and ties receive really no oil and yet decay does not set up in these portions unless the surface is removed, exposing large portions of untreated wood, in which case decay will readily set in at these exposed places.

These facts lead to the conclusion that in most cases the detail of the preservative action is as follows: Moisture may enter through the layers containing the creosote, in a sense filtering through these portions, and saturate itself with the oil. The moisture is then strongly germicidal, a fact that has been ascertained by direct laboratory experiment by shaking up water with creosote oils. This moisture in its passage to inner untreated portions of the wood prevents decay. While moisture may actually enter the

wood during wet seasons, it may just as readily pass out again, because the outer layer of the oil does not prevent evaporation, thus leaving room for other portions of moisture introducing in turn more of the preservative. Any slight quantity of moisture which may probably be present when the wood is treated may thus evaporate after treatment, and at some time or other be replaced by other moisture which contains the germicide. It is readily seen that with a layer of tar this action will not effectively take place. Moisture may enter through cracks in the tar, which cracks will be certain to occur, and hence the entrance of moisture cannot be prevented, yet such moisture has little or no chance to absorb any of the tar. The evaporation of moisture, on the other hand, is effectively hindered because the surface in general is closed by the tar, and hence, under some conditions, an impervious coating of paint or tar may actually hasten decay.

The germicidal power of high boiling tar oils has scarcely been stressed enough so far. The quantity of oil which will dissolve in water, it is true, is exceedingly small, and hence the amount of the oil used up in the course of time is practically negligible, yet that small amount renders the water absolutely germicidal to a degree only attained by a comparatively large concentration of zinc or mercury salts.

We have, then, as the first important property of preservatives their germicidal power. Next to this comes their lasting power. Reference has already been made to the fact that portions of creosote, such as the tar acids, carbolic acid, naphthalene and, in general, all oils boiling below 270 deg., are either so readily volatilized, or are so readily dissolved in water, that they gradually disappear from the wood, hence it is primarily the high boiling oils which give creosote its value as a wood preserver, because besides being highly germicidal they are quite permanent. Zinc and mercury salts have their greatest defect in their solubility, on account of which they are readily washed out of the wood, particularly in wet localities.

#### WOOD PRESERVERS

I would advise parties who contemplate the purchase of a wood preserver to ascertain the composition of the substance, and then judge its value with reference to the points discussed above, namely, its germicidal value and its power to resist atmospheric influences, considering in connection the amounts to be injected per cubic foot or per square foot surface. Much valuable advice may be obtained in this connection from the United States forest service. The value of a certain brand lies mainly in the assurance it gives of furnishing uniformly the article it claims to furnish, and if everything else is favorable this assurance has a considerable market value.

If we bar unusually favorable or unfavorable local climatic conditions, and remember that individual pieces of timber may show results differing considerably from the averages, then the following few statements regarding the life of timber in its natural state and as treated with different preservatives based on a large number of observations may be ventured. Life of white oak and cedar ties, untreated, 10 years; inferior woods, such as tamarack, loblolly pine, etc., 4 to 5 years. Inferior wood ties treated as follows: Burnettizing, 12 years; creosoting, very light treatment, about 4 to 5 lb. per cubic foot, 16 years; 12 lb. creosoting, 20 years; 18 lb. or more creosote, 25 to 30 years. In addition the following, found by the railroads of the United States, may be considered as particularly reliable: Pine ties treated with zinc chloride, east of the Mississippi,



to  $2\frac{2}{3}$  years; west of the Mississippi,  $11\frac{2}{3}$  years; treated with creosote, even with light treatment, the life is greater than with zinc chloride. Reference has already been made to the fact that wood tar distillates and crude oil used in moderate quantities have not increased the life of timber to a satisfactory degree.

#### QUANTITY AND COST

Considering next the quantity of preservative used and the cost of the operation, I may offer the following as general averages obtained in the operation of the large "pressure" plants and as actual cost conditions, to which a reasonable amount of profit must be added before a commercial price can be arrived at: Cost of Burnettizing, 5 cents per cubic foot, or 15 cents per tie of 3 cu. ft.; cost of Wellhouse zinc tannin process, 6 cents per cubic foot, or 18 cents per tie; cost of the zinc chloride-creosote process, 9 cents per cubic foot, or 27 cents per tie; creosoting, light treatment, enough for 16 years' life, 10 cents per cubic foot, or 30 cents per tie; 12 lb. creosote, 18 cents per cubic foot, or 55 cents per tie; heavy treatment, enough for 30 years, 28 cents per cubic foot, or 85 cents per tie. The operating cost of large pressure plants is from 5 to 8 cents per cubic foot of timber. The efficiency of the pressure treatment, using a sufficient quantity of a good creosote, is beyond question and needs no further comment. In some cases, for instance, piles for marine exposure, nothing else will answer. It appears to be the conclusion of the railroads that pressure treatment is the most efficient. Doubtless this is partly due to the fact that they own and operate their own plants and operate on a large scale. The high price of creosote led the railroads to try zinc chloride extensively. The substance is comparatively readily washed out of the wood, so that its use in moist regions is inadvisable. In dry regions it appeared to be serviceable, particularly because the ties are destroyed by wear and tear in about 10 years, and zinc chloride is able to prevent decay for this length of time. Since the introduction of tieplates and of the Rueping process, which uses only small quantities of creosote, the tendency is to abandon zinc chloride treatment. I should add that the use of zinc chloride for poles gives little promise of success, because the salt is so readily washed out.

Purchasers of treated timber are confronted with the same difficulties in a sense that they are confronted with in buying a commercial brand of wood preserver. In the first place, the word "treated" is entirely too vague—the details of treatment must be specified. In good pressure treatment the following amounts are injected: Zinc chloride, from  $\frac{1}{4}$  lb. to 1 lb. per cubic foot of timber; creosote, from 5 lb. to 15 lb. per cubic foot (the latter is the maximum that should be asked for for land exposure). The zinc-creosote process treats first with 12 lb. of 2 per cent zinc chloride solution per cubic foot, then allows the timber to dry for 10 days, and subsequently injects 3 lb. of creosote per cubic foot. With the stipulation of the amount of injection should go the specification for the kind of creosote.

The railroads have come to the conclusion that it is profitable to use the best creosote only. Their standard specification for coal-tar creosote runs as follows:

Specific gravity at 38 deg. C., 1.03; no distillate below 200 deg. C.; up to 210 deg. not more than 5 per cent; up to 235 deg. not more than 25 per cent; residue beyond 355 deg., if it exceeds 5 per cent in quantity, must be soft.

#### APPLICATION

The open-tank method for the treatment of timber, which was developed recently by the United States Forest Service,

has so far not been in practical use, and hence it is difficult to say whether or not it will be economically efficient. We pass then to the consideration of wood preserving by so-called superficial applications. These methods are usually not considered by the large users of wood which can use pressure treatment, because at first sight they seem to give little hope for success. Yet the unprejudiced observer must admit that the proper substances "superficially" applied add greatly to the life of timber.

A few figures of cost for labor for superficial application may not be out of place here. From figures obtained by the United States Forest Service it is seen that the cost of painting the butts of poles for the length of 6 ft. with as much of the preservative as the wood would absorb with two coats, the cost per pole is about 8 cents for labor. (See United States Forest Service Circular 136, page 18.) Cedar, chestnut and arbor vitæ poles during this treatment will take up about  $2\frac{1}{2}$  lb. to 3 lb. of tar oils per pole for 20 sq. ft. surface. Ties may be dipped into a preservative liquid and allowed to remain there for a sufficient length of time to absorb from 2 lb. to 6 lb. per tie at a cost of 3 cents to 5 cents per tie for labor.

Returning now to the question: "Does it pay?" I feel that I cannot do better than to quote two estimates furnished by the forest service, adding, however, that the estimates are exceedingly conservative, and could safely be made much more striking. A hemlock tie as furnished and laid in the track cost 75 cents. Its treatment in the railroad's own plant cost 12 cents. Using the formula,

$$r = R [(1.0 p)^n \times 0.0 p] \div [(1.0 p)^n - 1],$$

in which  $r$  is the annual charge,  $R$  the initial expenditure,  $p$  the rate of interest and  $n$  the years of the recurring period, we find that the annual charge on the untreated tie with the assumed life of five years and interest at 4 per cent gives us 16.8 cents. For the treated tie, if it lasts only one year additional, the annual charge is 16.6 cents. This shows that the added life of a single year pays for the cost of treatment. Since zinc chloride treatment adds five years at least to the life of the tie, and since the annual charge for 10 years' time is 10.7 cents, we see that the treatment secures even a saving of 36.3 per cent on the annual charge.

The following is quoted from United States Forest Service Circular 136, page 20:

"Assuming the life of an untreated pole to be 12 years, its cost \$9 set in the line, the rate of interest on the investment at 6 per cent and the cost of the carbolineum brush treatment 45 cents, it is found that the treatment will have to add about one year to the life of the pole to pay for itself. The forest service considers that the treatment will add at least three years to the life of the pole. Even with these figures, which are high for the quantity and cost of material used, and extremely low for the added life, the treatment makes 200 per cent profit on its cost."

In conclusion I may safely say that the question, "Does it pay?" has received such a positive affirmative answer that the real question confronting every timber user is: Which treatment is the most economical? This is a problem that every man must figure out for himself as given in the preceding examples. It is safe to say that future market conditions will add largely to the calculated profit.

Conductors of the Public Service Corporation of New Jersey will hereafter wear four-button single-breasted coats, while motormen's coats will be double-breasted. Conductors will wear gold-plated buttons and motormen nickel-plated ones.



## PRODUCER GAS FOR ENGINE USE: ITS MANUFACTURE AND CHARACTERISTICS\*

BY W. B. TUTTLE,

Vice-President and General Manager San Antonio Gas & Electric Company.

It is not my intention to go into the details of gas-engine operation, except in so far as it is necessary to deal with the action of producer gas in gas engines. This paper is intended mainly to deal with gas producers.

Almost all gas producers follow the same general form. There is first a generator. This is usually a round shell, lined with fire brick and provided with a grate near the bottom and a charging door at the top. To the generator is usually connected an economizer. The economizer is frequently in the form of a small boiler with tubes connected to the flue leading from the generator. The scrubber, usually connected to the economizer, is an iron shell, which is filled with checker work of coke or some other substance over which water is sprayed. To the scrubber is usually connected a tar extractor. This may be either a rotary tar extractor or one of the P & A type. In the latter type the gases pass through holes in a plate and impinge on the surface of another plate. Again, simply a box filled with shavings may be used. Some producers also have a purifying box in which oxide of iron is used to remove the sulphur from the gas. This, however, is not common.

There are various modifications of the generator part of the producer. Different styles of shaking grates have been used, and in some cases down draft is used instead of an up draft. There are two general types of producers in use: (1) Positive pressure producers, (2) suction producers.

The positive-pressure producer receives its air supply from a blower, usually either a centrifugal blower or a Koerting steam blower. The producer works under pressure all the time, and the gas, after leaving the tar extractor, is conveyed to a small holder or gas tank, from which it is supplied to the engine. The suction producer, as its name implies, is not under pressure at any time, and this producer is connected direct to an engine without an intervening holder, and the air necessary for combustion is drawn into the producer by the suction of the engine.

### METHOD OF OPERATION

In either type of producer the method of operating is about as follows: The generator is filled with fuel in some form, either coke or coal, and when this fuel has been ignited air is supplied to the fuel bed, usually from below. This air passes into the incandescent fuel bed, and combustion immediately takes place. Most of the air unites with the carbon from the fuel and burns to carbon dioxide, so that at the top of the zone of combustion almost all the air has been formed into carbon dioxide and nitrogen. The fuel bed, however, is deep and the carbon dioxide and nitrogen have to pass through additional incandescent fuel. In this passage the carbon dioxide is converted into carbon monoxide, the nitrogen remaining unchanged, so that we have emerging from the top of the fuel bed a gas composed of carbon monoxide and nitrogen. This is the theoretical result if air only is used, and if all the carbon dioxide is converted into carbon monoxide in the fuel bed. As a matter of fact, however, in most producers the fuel bed becomes so hot that the ash and fuel form clinkers, unless some means is taken to prevent it. Most producers are therefore arranged so that steam generated in the economizer can be introduced into the fuel bed along with the air. This steam helps to keep the fuel bed below the tem-

perature at which clinkers form readily, but the steam in passing through the fuel is decomposed and carbon monoxide and hydrogen are both formed, together with some carbon dioxide.

As will be explained further on, the formation of hydrogen has an important effect on the operation of an engine running on producer gas. The fuel itself contains more or less moisture, and this also adds to some extent to the formation of hydrogen. Besides this, particularly where bituminous and lignite coals are used, there is a certain amount of volatile matter driven off of the fuel, and a part of it passes over in the gas in the form of methane, while some is condensed out as the gas is cooled in the form of tar. This tar has been one of the serious obstacles which has confronted those that have attempted to use lignite or bituminous coals for producer gas, but it may, however, be satisfactorily extracted by passing the gas through a tar extractor.

### FUEL

Almost all kinds of coal can be successfully used in gas producers. The following results taken from a report of the testing plant of the United States Geological Survey would indicate the relative values of Illinois and Indian Territory coals and Texas lignite:

#### ANALYSIS OF FUEL

	Illinois	Ind.	
		Ter.	Texas
Moisture (per cent).....	12.43	5.00	33.50
Volatile matter (per cent).....	32.65	36.51	32.34
Fixed carbon (per cent).....	45.70	49.98	23.80
Ash (per cent).....	9.22	8.51	10.36
Sulphur (per cent).....	1.41	1.43	0.63

#### ANALYSIS OF GAS BY VOLUME

	Illinois	Ind.	
		Ter.	Texas
Carbon dioxide (per cent).....	9.72	8.25	11.10
Oxygen (per cent).....	0.12	0.11	0.22
Carbon monoxide (per cent).....	15.12	19.39	14.43
Hydrogen (per cent).....	9.98	7.69	10.54
Methane (per cent).....	6.00	4.92	7.48
Nitrogen (per cent).....	59.06	59.65	56.22

#### COAL CONSUMED IN PRODUCER

	Illinois	Ind.	
		Ter.	Texas
Pounds per hp per hour per e. hp at switchboard—			
Coal as fired.....	1.76	1.77	2.98
Coal, dry .....	1.55	1.69	1.99
Combustible .....	1.38	1.53	1.68

	Illinois	Ind.	
		Ter.	Texas
Pounds per hp per hour per b. hp at engine—			
Coal as fired.....	1.50	1.50	2.54
Coal, dry .....	1.31	1.43	1.69
Combustible .....	1.17	1.30	1.43

#### GAS PRODUCED

	Illinois	Ind.	
		Ter.	Texas
Cubic feet, standard, per pound consumed in producer—			
Coal as fired.....	51.1	51.6	28.4
Coal, dry .....	58.4	54.1	42.7
Combustible .....	65.3	59.4	50.6
B.t.u. per cubic foot of gas.....	151	159	169

### RESULTS

These figures show that Texas lignite can be used to advantage in gas producers.

#### THE EFFECT OF HYDROGEN

In the operation of gas engines using producer gas it is extremely desirable to keep the amount of hydrogen at a minimum. This can readily be accomplished where a positive-blower producer is used; the steam can be added just in sufficient proportion to take care of the fuel bed, thus keeping the amount of hydrogen at a minimum. In the suction type of producer, where the load varies, it is extremely difficult to prevent having an excess of hydrogen in the gas at times, and much of the trouble that has been

\*Abstract of paper read before the Southwestern Electrical & Gas Association, El Paso, Tex., May 7, 8 and 9, 1908.



experienced in the operation of small gas engines equipped with suction producers comes from this source.

Hydrogen and carbon monoxide both have approximately the same calorific value—about 320 B.t.u. per cubic foot. Carbon monoxide, however, when it burns, forms carbon dioxide, while hydrogen burns to water. The temperature of a gas engine is such that this water invariably leaves the engine in the form of steam, carrying with it a large amount of latent heat. This heat so lost amounts to about 15 per cent of the calorific value of hydrogen. Besides this, hydrogen gas burns very quickly, while carbon monoxide burns slowly. As a result of this it is impossible to set the igniter, on an engine using producer gas containing a large proportion of hydrogen, at a point where the greatest efficiency can be obtained. If the igniters are set "early" enough, so that the carbon monoxide will be completely burned up in the explosion, the hydrogen will be exploded too quickly, while if the igniters are set at a point where the hydrogen explodes at the proper time, the carbon monoxide will not be entirely burned up before the exhaust valves are opened, and, as a consequence, it will pass out burning through the exhaust valves and into the exhaust pipe. The result is a loss in economy in the engine and, furthermore, the exhaust valves and pipes are burned out.

These troubles are particularly noticeable in engines running on suction producers because the per cent of hydrogen in the gas varies with the load on the engine, and it is very difficult to set the igniter so as to get fairly economical results. As a matter of fact, a gas may be very high in heat units, and yet it may be impossible to put full load on the engine on account of a high per cent of hydrogen.

The troubles resulting from the presence of a large amount of hydrogen in producer gas have led up to the invention of a method of operation in which, instead of a jet of steam introduced under the fuel bed to keep down the temperature of the fuel, a part of the exhaust gas is returned and so introduced. The exhaust gas is composed principally of carbon dioxide and nitrogen. The mixture of the air and exhaust gas passes into the hot fuel bed and the carbon dioxide which is thus introduced takes the place of the steam. Carbon dioxide unites with the carbon in the fuel and forms carbon monoxide. In this process heat is taken up and compensates in part for the heat given off, as the air and fuel burn to carbon dioxide, so that the fuel bed is kept at such a low temperature that the fusion of ash and the formation of clinkers does not take place.

The following analyses show the difference in the gas made in this way and ordinary producer gas:

(The mixture of air and exhaust gases entering the producer includes: Carbonic acid (CO<sub>2</sub>), 3.3 per cent; oxygen (O<sub>2</sub>), 18.9 per cent; carbonic oxide (CO, 0.1 per cent.)

ANALYSIS OF SUPPLY GAS (PER CENT)

	Using exhaust gases	Ordinary system
Carbonic acid (CO <sub>2</sub> ).....	1.8	5.8
Oxygen (O <sub>2</sub> ) .....	1.2	1.3
Carbonic oxide (CO).....	26.2	19.8
Hydrogen (H <sub>2</sub> ) .....	0.4	15.1
Marsh gas (CH <sub>4</sub> ).....	0.7	1.3
Nitrogen (N) .....	69.7	56.7
B.t.u. per cubic foot by gas calorimeter		
(high value) .....	103.7	136.0

As a result of this method several advantages are gained. In the first place, the igniters of the engine may be properly timed for the complete combustion of the carbon mon-

oxide, and thus the greatest economy can be obtained; second, very little energy is lost through the latent heat carried off when steam forms at the time of the explosion; third, the gas leaves the producer at a lower temperature, and less water is required in the scrubber, and less heat is lost from the producer; fourth, the economy of the engine may be very largely increased by increasing the compression. The compression of the engine may be raised up from 140 lb., which is about the maximum that is used in ordinary practice, to 200 lb., and not only is the efficiency of the engine very materially improved, but the capacity of the engine is also increased. Certain tests have been made showing that an increase of 38 per cent in efficiency was gained, and that 25 per cent increase in load-carrying capacity was also gained. It might be well here to call attention to the fact that this process is patented and the patent is held by the Combustion Utilities Company, of New York.

The following is a record showing the results obtained on the same engine, which in one case was run on ordinary producer gas, and in another case on gas made without the presence of steam, and with the exhaust gas introduced:

Date of test, 1906—	Exhaust gases used.	Ordinary system.
	March 28-29	April 5-6
Duration, hours.....	25.5	14.05
Total time engine was running, hours....	25.5	13.17
Maximum brake horse-power developed...	110.5	99.8
Minimum power developed, horse-power..	50.0	7.6
Average brake horse-power developed for engine period .....	102.5	78.7
Average brake horse-power for running period .....	102.5	84.1
Total weight of dry coal consumed, pounds.	2,927.0	1,988.0
Total ash and refuse, pounds.....	391.0	317.0
Percentage of ash and refuse in dry coal..	13.5	15.9
Weight of dry coal per hour, pounds.....	114.8	141.5
Dry coal consumed per brake horse-power per hour, pounds.....	1.12	1.8
Combustible consumed per brake horse-power per hour, pounds.....	0.97	1.51

The reliability of the service of gas engines operating on producer gas has been established, but in this connection it is well to call attention to the fact that all gas engines require greater care on the part of the operators than do steam engines. Steam engines, if they are supplied with steam and oil, will run in some sort of fashion as long as the load is not so great as to stall them; but gas engines will not run at all unless every part is in good working order, and, while careful attention should be given to a steam plant, it must be given to a gas-engine plant.

HONGKONG ELECTRIC TRACTION

The report of the Electric Traction Company, of Hongkong, shows as a result of the year's working, after paying debenture and all other charges a profit of \$29,750. For depreciation and renewals the directors have added \$30,000, raising the reserve fund to \$60,000. Steady progress is reported for the year, the receipts amounting to \$213,525, as against \$205,315 for the previous year, an increase of 4 per cent. The board regrets the loss of \$22,000 in respect of subsidiary coinage, representing over 16 per cent of the total working expenses. Last year a committee appointed by the Governor was asked to advise remedial measures, but could come to no decision. The board is reluctant to raise the fares, but unless something is done it will do so in self-defense.



**COST OF CAR WIRING ON THE METROPOLITAN ELEVATED**

In an article describing the car-wiring practice of the Metropolitan West Side Elevated Railway Company, of Chicago, which was printed in the STREET RAILWAY JOURNAL June 15, 1907, some costs were given of installing the conduit piping and wiring for Westinghouse multiple-unit control under 50 new elevated motor cars. The remarkably low cost stated was questioned by a number of motive-power officers who had had experience in similar work, but the figures are substantiated in every detail by cost records of a subsequent order of 20 cars built at Pullman and delivered in December, 1907.

These last cars were alike in details of wiring and piping with the earlier order, which proved so satisfactory that no changes were attempted. The following table gives the costs for the cars delivered last December:

	Cost per car	
	Material	Labor
Bending, placing and hanging conduit for trolley and control wiring.....	.....	\$26.75
Installing control equipment.....	\$68.87	32.08
Installing trolley wiring on car bodies and trucks .....	18.71	2.90
Total .....	\$87.58	\$61.73
		87.58
Total cost of material and labor per car		\$149.31

The charge for material on the earlier order of cars reported last year was \$85.14 and for labor \$73.52, or a total of \$158.66. The costs for the last lot of 20 cars compared with these figures show an increase in cost of material of \$2.44 and a decrease in cost of labor of \$11.79, making a net decrease in the cost per car of \$9.35. The amount of material used was exactly the same; the difference in cost is attributable to higher prices prevailing this year than last. The saving in labor, which amounts to \$11.79, is attributed to the experience gained by the men in installing and maintaining the piping and wiring on the older cars which made them familiar with the exact size, shape and location of every part.

J. W. Hulme was inspector on the 20 cars during their construction and also acted as foreman of electrical work in installing the wiring.

**BALDWIN PRIZE ESSAYIST DISCUSSES BOSTON ELEVATED SYSTEM**

The Baldwin prize of \$100 for the best essay on municipal relations has been awarded by the National Municipal League of Philadelphia to A. E. Pinanski, of the Harvard Law School. The thesis presented is perhaps the most thorough study of the history of rapid transit in the Boston Metropolitan District that has thus far been brought within the compass of a single volume, and its value is much enhanced by the author's plan of citing the sources of information consulted in the preparation of the essay. The early steps leading gradually to the consolidation of horse-car lines and the employment of electricity, with the gradual coalescing of the surface lines into the West End system, are set forth in detail, and the growth of public sentiment in favor of public ownership of the Boston subway lines without public operation and in favor of controlled monopoly rather than wasteful competition, is fully discussed.

Mr. Pinanski's conclusions set forth the spirit in which the management of the company is trying to meet the

problems of service in the territory in which the company operates. In its desire to be understood in this attitude the company inserted the conclusions of the thesis in the principal Boston daily papers as follows:

**BOSTON ELEVATED RAILWAY COMPANY.**

**SUMMARY OF THE BALDWIN PRIZE ESSAY ON THE STREET RAILWAY SYSTEM OF METROPOLITAN BOSTON.**

The Baldwin prize of \$100, offered by the National Municipal League for the best essay on municipal relations, was awarded to Mr. A. E. Pinanski, of the Harvard Law School, for an unusually able thesis on "The Street Railway System of Metropolitan Boston."

Mr. Pinanski, who was reared and lives in Boston, based his thesis on an exhaustive study of official reports, public documents, monographs and magazine articles by authoritative writers, newspaper articles and discussions published during the past 38 years, and interviews with public and corporation officials and with private individuals who have had occasion to make a special study of the local transportation system.

The conclusions to which the writer arrives as a result of his investigations are summed up in the following language:

"In spite of remarks to the contrary (for there will always be those persons who are too ready to attack public service corporations), it must be admitted that the Boston Elevated Railway Company to-day puts its great resources and facilities at the service of the public in the most efficient way, and in absolute good faith. The position which it now holds in the community may be attributed in a large degree to the high standard of its officials, who have endeavored to meet all questions in a public-spirited way. The company has continued its liberal policy toward its employees in respect to their wages, as well as in other manners. It is only because of this fact that we are able to say that the street railway employees of the Boston company compare favorably with those of any other large city in the world, in matters of politeness and efficiency, and some enthusiasts say that the standard of the employees is unsurpassed in any other city. In continuing the policy of introducing semi-convertible cars to parts of the urban and suburban system which will properly admit of their use, the Boston Elevated Railway Company is continuing the traditions of the Hub's leadership in street railroading. These cars, involving the latest improvements in construction, are characterized by an easy access arrangement, the opening and closing of the doors by compressed air power under control of the motorman, folding cabs in which the motorman operates the car free from the jostling and comments of the passengers, and the most improved and modern system of ventilation. Thus it seems that the city of Boston at the present time has very little cause for complaint. The last report of the Boston Elevated Railway Company shows that 11 per cent of its net earnings are returned to the city in taxes and other assessments. This is a better dividend to the municipality than is given by any of the municipally-operated roads in Europe, including Glasgow. The road gives good service, has no water in its stock, pays dividends to its stockholders and pays the city (which has none of the expense or trouble of management) for the privilege of doing business a million and a half dollars a year."

**SECOND SWISS SINGLE-PHASE RAILWAY—16-MILE LINE**

The Locarno-Pontebrolla-Bignasco is the second single-phase railway to be constructed in Switzerland. It has a total length of 16.9 miles, with four tunnels, the total length of which is 939 ft. The line crosses several small bridges and there are 12 stations and stopping places. The track is laid with 50-lb. rails and the gage is 39.37 in. The Pontebrolla power house furnishes the 5000-volt, single-phase current. Each car is equipped with four 40-hp, single-phase series motors capable of hauling a 55-ton train over the heaviest grade on the line at a speed of 11.2 miles an hour and on a level at 18.7 miles. The Maschinenfabrik Oerlikon furnished the equipment.



**MEETING OF THE COMMITTEE ON STANDARDIZATION**

Upon the call of Chairman Evans a meeting of the Committee on Standardization of the American Street & Interurban Railway Engineering Association was held at the Fort Pitt Hotel, Pittsburg, May 7 and 8. Those in attendance were: W. H. Evans, master mechanic, International Railway Company, Buffalo, chairman; M. O'Brien, master mechanic, United Railways Company, of St. Louis; J. M. Larned, engineer maintenance of way, Pittsburg Railways Company; L. E. Gould, editor, *Electric Railway Review*; C. B. Fairchild, Jr., editor, *Electric Traction Weekly*, and H. W. Blake, editor, *STREET RAILWAY JOURNAL*. By invitation F. W. Sargent, chief engineer of the American Brake Shoe & Foundry Company, and E. Sidney Lewis, of the Standard Steel Works, were present.

The meeting was called principally to decide upon the detailed information from the different companies which the committee requires properly to carry on its work, and to decide upon a data sheet. The program of the committee this year, as outlined by the executive committee of the association, was as follows: (1) Standard height of couplers for city cars; (2) standard height of couplers for interurban cars; (3) standard automatic couplers for interurban cars and radial draft rigging; (4) standard height of platforms; (5) standard height of car steps; (6) standard height of bumpers. Although the committee was given latitude to depart from these subjects if it should consider it desirable, it was decided to follow these lines. The committee also decided that no changes from the standards recommended at the Atlantic City Convention were necessary.

The session lasted two days. On the evening of May 7 the committee was entertained at dinner at the University Club by F. Uhlenhaut, Jr., chief engineer of the Pittsburg Railways Company, and on the evening of May 8 was taken for a trip over the lines of the Pittsburg Railways Company in the special car to East Pittsburg, where the works of the Westinghouse Electric & Manufacturing Company and of the Westinghouse Machine Company were inspected. The next meeting will be held at Niagara Falls, Ont., on June 29, the day previous to the meeting of the Street Railway Association of the State of New York.

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**CARS WITH SIDE RODS IN PITTSBURG**

An account was published in the *STREET RAILWAY JOURNAL* for Dec. 14, 1907, of an experiment conducted in that city of equipping a two-motor car with side rods. Each truck carried a motor, but all eight wheels were used for traction, as corresponding pairs of wheels were connected with rods on each side. The car was put in service on a line with steep grades and showed marked economy in power consumption over a car equipped with four motors. Since that time two other cars similarly equipped have been put in service and with such satisfactory results that fifty more cars are being equipped.

The general plan illustrated in the issue of Dec. 14 is followed, but the company is now using for these cars axles of hammered steel with a content of from 0.35 to 0.45 carbon, instead of cold-rolled steel. It was found that the latter metal showed a tendency to roll over and break down at the keyway of the crank. The crank pins are lubricated by means of a wick in an annular groove,  $\frac{3}{4}$  in. wide, surrounding the pin behind the brass liner. The oil is introduced into the groove to saturate the wick through a 1-in. hole which tapped in the top of the solid end of the connecting rod, and has a screw cover.

**VISIT OF THE CONVENTION COMMITTEE TO DENVER**

The joint committee of the American Street & Interurban Railway Association and of the American Street & Interurban Railway Manufacturers' Association, which has been appointed to decide upon the next convention city for the National Electric Railway Association, reached Denver Sunday, May 3. The representatives of the Railway Association were: President Calvin G. Goodrich and Secretary B. V. Swenson, and of the Manufacturers' Association President J. R. Ellicott, Charles C. Peirce and Arthur S. Partridge. These gentlemen were welcomed to Denver by President W. G. Evans and Vice-President John A. Beeler, of the Denver City Tramway Company, and W. F. R. Mills, secretary of the Denver Convention League. The committee received every possible courtesy and spent Monday and Tuesday looking around the city, visiting hotels and going over the Auditorium. On Wednesday the party made a trip in a special train over the Denver, Northwestern & Pacific Railway, popularly known as the Moffatt line.

In their investigation of convention conditions the committee found the city to be well prepared to handle large numbers of people. There are many fine hotels which in the aggregate can furnish 1100 rooms without bath and 700 rooms with bath. The Auditorium, which is a well-constructed building located in a very desirable district, has a floor area of 36,000 sq. ft. and is well suited for exhibits. In addition it contains four large rooms suitable for meetings of the associations.

The representatives of the Denver Convention League agreed to submit to the association a proposed plan of arrangement in case the convention is held in Denver. Upon receipt of this proposition the committee which went to Denver will confer either in New York or Chicago, with the full committee on conventions of the Street Railway and Manufacturers' associations. This meeting will be held in about a week or ten days. It is also understood that Washington and Atlantic City desire the convention. A decision between the three cities will therefore probably be announced in about two weeks.

The committee was favorably impressed with the conditions in Denver as well as with everything connected with the city and the sentiment among the members was that the association would surely have to go West within a year or two in case it did not do so this year.

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**INTERURBAN TRAFFIC AT SPRINGFIELD, ILL.**

Figures compiled by B. R. Stephens, general traffic manager of the Illinois Traction System, show that during the month of March, 1908, a total of 28,191 one-way and round-trip tickets into Springfield, Ill., were sold at the regular ticket office of the company in the outlying towns on its three divisions, as far east as Decatur, as far north as Lincoln and as far south as Staunton, a radius of approximately 35 miles. This does not include passengers carried into or through Springfield who paid cash fares on cars, used mileage, commutation books or passes, or who bought tickets at stations beyond the radius included. More than 1000 mileage and commutation books were sold in the Springfield territory during the month and it is estimated that at least one-third of the passengers carried into the city paid cash on the cars. Any city of the size of Springfield would offer every inducement to an industrial plant employing 1000 men to locate within its boundaries, yet the interurban daily brings into the city more than 1200 persons who spend more than the average daily wage of a mechanic.



### THE MESTA GAS ENGINE

The important position in the power field now occupied by the modern heavy duty gas engine has received careful consideration by the Mesta Machine Company, and after several years of close observation of the various types developed both here and abroad, this company has actively taken up gas-engine design and construction along with its regular established heavy duty Corliss and piston-valve-reversing steam engines. Since this company has been engaged for years in designing and building engines of the largest sizes to meet the exacting requirements of rolling-mill and blast-furnace work, it enters the gas-engine field under most favorable auspices. The company has air furnaces to supply iron of high-tensile strength; open-hearth furnaces for steel castings containing nickel or vanadium, and a brass foundry.

The company is now building a 600-hp, 400-kw, direct-connected unit at West Homestead, which typifies the series of sizes called for in the designs as at present laid down. While natural gas as a source of power is at present a very attractive proposition, it has been kept in mind that producer gas will eventually supplant it, and, accordingly, very careful attention has been given to the development of a design suitable to the use of producer, blast-furnace or other by-product gases.

These engines, which are for operation on the four-cycle principle, are built either tandem or twin tandem. This method of placing the two double-acting cylinders in tandem results in two power strokes per revolution, giving very close regulation and making it perfectly feasible to operate 60-cycle generators in parallel without the use of any form of flexible coupling. Where the twin tandem type is employed, the power strokes are doubled and result in the same effective torque as in a cross-compound steam engine.

Following the American custom, the overhung crank construction is used, and, owing to the tandem arrangement, very careful attention has been given to the matter of longitudinal expansion, the cylinders being permitted to expand or contract with the varying temperature, while in no way affecting the engine alignment. Simplicity and reliability are attained in the valve gear first, by doing away with the spiral-gear drive for the lay shaft, and, second, by operating both inlet and exhaust valves from a single eccentric. All parts subject to wear are fitted with adjustable devices of proved effectiveness, the aim being to produce an engine well suited to the demands of 24-hour service.

For the development of this line of engines, ranging in capacity from 500 hp to 4000 brake hp, the Mesta Machine Company has secured the services of Frederick Ottoson, who has had wide European and American experience in gas-engine design and has spent over a year in the development of designs particularly adapted to the American requirements.

### NATURAL RESOURCES

The convention of governors invited by President Roosevelt to consider the preservation of the natural resources of America began in Washington on May 13, being preceded on Tuesday evening by a dinner at the White House. On Wednesday the conference was opened by the President in the East Room. There were sessions also on Thursday and Friday. Among the addresses was one by Andrew Carnegie on the mineral resources of the country. J. J. Hill also spoke, and H. St. Clair Putnam read a paper on water power.

### ELECTRIC RAILWAYS TO GIVE SPECIAL RATES TO OHIO G. A. R.

The electric railways of Ohio, Indiana and Michigan are preparing to make special rates for the encampment of the Department of Ohio, G. A. R., to be held at Lima in June, as well as for the Grand Encampment, which will be held in Toledo this summer. The steam roads have, so far, declined to make a rate of 1 cent a mile for a distance greater than 100 miles and this places the electric railways in a position to secure a large amount of business, as the members of this organization will favor those lines which are willing to give them the advantage of reductions from any points they reach. Both towns may be conveniently reached from Indiana, Ohio and Michigan. With the completion of the Lima & Toledo Railway there will be a continuous line from Toledo to Cincinnati. To the east the Lake Shore Electric reaches Cleveland and has extensions reaching to many sections of the central portion of the State. On the north the Detroit, Monroe & Toledo Short Line, with its connections, touches almost every important city in eastern and southern Michigan, while on the west the Schoepf lines, with connections in Indiana, will be able to handle the traffic from Indianapolis and many other large cities in that State. It is not known what rate the traction lines will make, but in all probability the figures will be satisfactory to the members of the G. A. R.

### SPEED RECORD IN OHIO

On Sunday, May 3, the Ohio Electric Railway established a new record for a long-distance run at a high speed with a chartered car of Zanesville baseball enthusiasts going to Dayton. The run of 135 miles was made in four hours flat. The 10 miles over the city tracks of Zanesville, Newark, Columbus, Springfield and Dayton consumed 1 hour and 30 minutes, so that 125 miles were actually covered in 2 hours and 30 minutes, or an average of 50 mph. To maintain this average a speed of 70 mph had to be maintained through long stretches. No regular cars were delayed despite the fact that the Columbus-Zanesville and Dayton-Columbus divisions, over which the car was operated, were crowded with their usual heavy Sunday business. The run from Zanesville to Columbus was made in 1 hour and 40 minutes, which is 20 minutes faster than the limited schedule on this division. Deducting 35 minutes for the 6 miles in Zanesville, Newark and Columbus, the average maintained was 53.5 mph. After 10 minutes' lay-over in Columbus, the run to Dayton was made in 2 hours and 10 minutes. With 45 minutes deducted for 4 miles over the city tracks in Columbus, Springfield and Dayton, the distance of 67 miles was covered at an average speed of 53.6 mph. This time includes numerous slow-downs through towns and villages, where ordinances prohibit higher speed than 8 or 10 mph. There were 11 grade crossings over steam roads, with as many derrails, besides a long crossing over two steam roads.

A report has been received by the United States Department of Commerce and Labor from an American Consul in South Africa, in which he states that an inquiry has been received at his office from a local business man for the addresses of dealers in electric railway supplies, such as overhead wires, cars, steel and iron rails, etc. The business man in question also desires the names of contractors engaged in electrical railway construction.



## FINANCIAL INTELLIGENCE

WALL STREET, May 13, 1908.

**The Stock and Money Markets**

The stock market continues to broaden out and strengthen in a manner which by many close observers is regarded as little short of remarkable in view of the fact that there are in the present situation several elements which would ordinarily tend to restrict business, if not to bring about a greater or less reaction. However, for the time being these matters are being almost entirely ignored and during the past week the demand for stocks of practically all classes has been quite active and prices in numerous instances have attained a higher level than at any time since the panic of last fall. Apart from the uncertainties prevailing in connection with the presidential candidates to be selected at the approaching conventions of the two great political parties of this country, perhaps the most discouraging factor in evidence just now is the unusually large number of idle freight cars on the railroads. At latest accounts, April 29 last, the number of idle freight cars showed a net increase of 37,714 over the previous report, made as of April 15, and in consideration of this state of affairs the advancing tendency of security values is looked upon by many as rather inconsistent. However, this matter, together with the possibility of an early resumption of gold exports to Europe, is exerting not the slightest influence on the market, presumably for the reason that such a condition is viewed as only temporary and because of a prevailing belief that the future holds out much brighter prospects for all the industries of this country, including the railroads.

As a matter of fact there is already in evidence a marked improvement in at least one very important industry—the copper metal trade. Not only has there been a decided betterment in the demand for that metal for export, but there are also increasing signs of a considerable growth in home consumption, which, if continued, will quicken production and in the natural order of things cause a greater or less advance in prices for that commodity. But above and beyond this is the existing great plethora of money and the very favorable outlook for the crops. In the face of the withdrawal of some \$45,000,000 of government funds from the national banks, the Clearing House institutions of this city continue to pile up their reserves and at this time they amount to the almost unprecedented sum of over \$63,000,000, which is 10 times in excess of the figure for the corresponding period last year. This immense accumulation of money at this center, which is mainly the result of an enormous flow of currency from cities all over the country, has not alone kept the rates for money on an extremely easy basis, but has also led to the inevitable demand from investors for high-class securities, as witnessed in the overwhelming success of the several large recent bond offerings by railroads and municipalities. This demand has now spread to the Stock Exchange and the activity and strength of the bond market there is now one of the most encouraging features of the situation.

Although the final government figures of the winter wheat crop have not yet been published, enough is known to create the impression that the yield of this cereal will be fully up to, if not above, that of last year. The official returns as of May 1 of this year placed the condition of winter wheat at 89, which compares with 91.3 on April 1, 1908; 82.9 on May 1, 1907; 91 on May 1, 1906, and a 10-year average of 85.8. The winter wheat acreage on May 1 was reported as 29,751,000, against 28,132,000 on May 1, 1907, so that on this basis of reckoning the indicated yield of that cereal is 428,414,000 bushels, which compares with an indicated yield on April 1 of this year of 411,110,000 bushels and on May 1, 1907, of 405,101,000 bushels. It would thus appear that the outturn of winter wheat will be ample, which will, of course, supply plenty of tonnage for the railroads and soon bring into active employment the exceptionally large number of cars now idle on their tracks. Considerations such as these adequately explain the prevailing optimism in the securities markets, while in addition the wide-

spread movement on the part of business interests generally to place this country on its former high plane of prosperity has by no means been without influence.

In the general enhancement that has occurred in security values, the shares of local traction companies have played a somewhat conspicuous part, although there has been no apparent undue effort to advance prices for these securities in the market. The season of largest earnings for all these companies is now at hand, and the prospects for record breaking revenues were never brighter. The opening of bids for the new Fourth Avenue subway in Brooklyn and the prospect of the early starting of construction work have directed renewed attention to the entire local traction situation.

**Philadelphia**

There was a decided improvement in the market for traction issues during the past week. Trading was upon a much larger scale and was accompanied by a generally higher range of prices. Philadelphia Rapid Transit held strong at 18¼, while Philadelphia Traction advanced 2 to 91, and Union Traction rose from 54¾ to 55¾. American Railways was substantially higher at 44¾, and Consolidated Traction of New Jersey gained a point to 70¾. Frankfort & Southwark Passenger sold at 391, and United Companies of New Jersey gained more than a point to 242. Philadelphia Company common, after an early display of strength, reacted from 40¾ to 39½, and the preferred, after selling at 41¼, dropped to 40, but later recovered about all of the loss.

**Chicago**

There was a revival of interest in the Chicago traction shares during the past week, trading being considerably larger than for many weeks past, and in most instances prices ruled substantially higher. City Railway sold at 170 to 175. North Chicago Railway receipts brought 44 to 45, and West Chicago receipts sold at 31. Union Traction receipts for the common brought 3¾ @ 3¼, while the preferred receipts sold at 11½ @ 11¾. The elevated railroad issues displayed decided strength. Metropolitan common advancing to 17½, and the preferred from 45 to 49, while sales of the extension gold 4s and the gold 4s were made at 84¼ and 87 respectively. Northwestern Elevated moved up from 53 to 55¾ and South Side advanced from 55 to 59½. During the week announcement was made that the Chicago Railways Company had sold to Chicago institutions \$1,200,000 6 per cent collateral notes. This is in addition to the \$5,000,000 notes sold by the company earlier in the year, and makes a total of \$6,200,000 collateral notes due in five years.

**Other Traction Securities**

Trading in the Baltimore market was moderately active and prices generally ruled firm. United Railway 4s sold at 84¾ @ 85¼, the incomes at from 50½ @ 52, and the refunding 5s at 77½, while the stock sold at 10½. Norfolk Railway & Light 5s brought 90; Norfolk Street Railway 5s, 104; Baltimore City Passenger at 100½ @ 100¾ and City & Suburban 5s at 110. The Boston market was quiet and firm. Boston Elevated sold at 135¼; Boston & Suburban at 11; Boston & Worcester at 10, the preferred at 54; Massachusetts Electric at 9½, and the preferred at 44 @ 45.

**Security Quotations**

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

	May 5.	May 12.
American Railways.....	44¾	44½
Boston Elevated.....	136	135
Brooklyn Rapid Transit.....	—	50¾
Chicago City.....	160	170
Cleveland Electric.....	—	52¾
Consolidated Traction of New Jersey.....	65	70
Detroit United.....	33	35
Interborough-Metropolitan.....	97½	11¾
Interborough-Metropolitan (preferred).....	27½	31¾
International Traction (common).....	—	33
International Traction (preferred).....	—	55
Manhattan Railway....	134	135¼



Massachusetts Elec. Co. (common).....	9¾	9½
Massachusetts Elec. Co. (preferred).....	44½	44½
Metropolitan Elevated, Chicago (common).....	a17	a18
Metropolitan Elevated, Chicago (preferred).....	48	a49¾
Metropolitan Street.....	25	29
North American.....	57	61½
Philadelphia Company (common).....	40¾	39
Philadelphia Rapid Transit.....	18	18
Philadelphia Traction.....	89	90
Public Service Corporation, certificates.....	—	68
Public Service Corporation, 5 per cent notes.....	—	90
Twin City, Minneapolis (common).....	86½	—
Union Traction (Philadelphia).....	54¾	55½

a Asked.

**Metals**

There has been no material improvement in the iron and steel situation, but the general opinion among manufacturers seems to be that the prospects are somewhat better than for some time past. The uncertainty in the pig-iron market continues one of the greatest drawbacks, and efforts are being made to bring about a satisfactory settlement regarding prices. The outcome of the meeting of the various steel interests to be held this week, is awaited with more than usual interest and it is believed that steel prices will be maintained. Some improvement in the copper trade is reported, there being a better inquiry for the metal from both foreign and domestic consumers. Prices, however, are unchanged at 12½ @ 12¾ for lake, 12¾ @ 12½ for electrolytic and 12¼ @ 12¾ for castings.

**SAO PAULO TRAMWAY REPORT**

The Sao Paulo Tramway, Light & Power Company has issued its full pamphlet report for the year ended Dec. 31, 1907. The income account compares as follows:

	1907.	1906.
Total gross earnings.....	\$2,111,523	\$2,018,703
Expenses and taxes.....	715,650	650,541
Net .....	\$1,395,873	\$1,368,162
Charges .....	359,422	359,882
Surplus .....	*\$1,036,451	\$1,008,280
Dividends .....	691,476	599,970
Surplus .....	\$344,975	\$408,310
Contingent account.....	100,000	.....
Surplus for year.....	\$244,975	\$408,310

\*Equal to 12.19 per cent on the \$8,500,000 paid in capital stock.

The general balance sheet of the Sao Paulo Tramway, Light & Power Company, as of Dec. 31, 1907, compares as follows:

ASSETS.		
	1907.	1906.
Plants, tram. lines, real estate, railways, etc..	\$16,032,672	\$15,288,800
Stores in hand.....	755,072	514,668
Accounts received.....	232,895	127,698
Cash in hand.....	208,444	327,681
Total.....	\$17,229,083	\$16,258,847
LIABILITIES.		
Capital stock.....	\$8,500,000	\$8,026,636
Bonds .....	6,000,000	6,000,000
Accrued interest.....	25,000	25,000
Accounts and wages payable.....	131,159	271,008
Unredeemed tickets.....	1,620	489
Dividends .....	189,229	149,996
Reserve fund.....	1,000,000	1,000,000
Suspended account.....	247,808	257,810
Contingent account.....	74,097	106,171
Bills payable.....	389,333	.....
Injuries and damages, insurance fund.....	13,938	9,813
Profit and loss surplus.....	656,899	411,924
Total.....	\$17,229,083	\$16,258,847

In presenting his report, President McKenzie refers to the increased demand for current for both lighting and power, and tells what is being done by the company to anticipate the situation. For instance, a seventh unit has been ordered and will be ready for service by December, 1908. The Santa Amora plant has been delayed, but the land titles are now all clear and the reservoir will be ready for the storage of water by June 1 next. The demands upon the railway lines have been growing, and last year 12 cars were built in the company's

shops to keep up the rolling stock. In addition, material has been ordered for 25 cars and they will be built during the coming year. The Santa Anna Railway, a short mule line, was purchased and will be equipped with electricity. The company has secured an exclusive 30-year contract for the distribution of light and power in San Bernado, 10 miles from Sao Paulo.

**FINANCING THE CHICAGO & MILWAUKEE COMPANY**

Announcement has been made in Chicago that arrangements have been perfected by the Chicago & Milwaukee Electric Railway Company with the Investment Registry, Ltd., of London, for taking the entire issue of \$1,000,000 receiver's certificates, with the proceeds of which the Chicago & Milwaukee Electric Railway will be pushed to completion. In connection with the announcement of the placing of the bonds it has also been announced that Geo. C. Moore, of Detroit, has been appointed a receiver of the road to succeed H. A. Haugan, president of the State Bank of Chicago, resigned. Mr. Moore is one of the financial directors of the Michigan United Railways Company, which controls a number of interurban lines in Michigan, and generally is regarded as being exceptionally well qualified for the position to which he has been appointed. The plans for carrying on the work of completing the road are said to be well matured. According to report, the work will be carried on during the summer and will be finished probably some time in the fall. Estimates made by the engineers of the company say that it will take at least three months to finish the work on the road. According to figures of B. J. Arnold, of Chicago, the cost of completing the road is placed at \$806,000. It is said that the bonds were negotiated at 95, thus making available for the company \$950,000.

**THE CHICAGO ELEVATED CONSOLIDATION**

The return of Samuel Insull, president of the Commonwealth-Edison Company, of Chicago, to that city, has again given rise to the talk of a consolidation of the elevated railway companies. For more than six years this subject has been in the public prints, but the general opinion now seems to be that the deal is likely to be effected. The total mileage of the combined systems would be 166. Last year they carried 143,000,000 passengers and earned gross \$7,900,000. Putting the roads together means harmonizing the owners of more than \$103,000,000 of stocks and bonds. Nothing official has been given out about this latest move of the owners. The following table shows the capitalization and miles of track of the different lines:

	Cap. stock.	Bonds.
Metropolitan "L".....	\$16,500,000	\$14,500,000
South Side "L".....	10,323,800	8,000,000
Northwestern "L".....	10,000,000	18,926,000
Chicago & Oak Park.....	10,000,000	6,000,000
Union Loop.....	5,000,000	4,624,000
Totals.....	\$51,823,800	\$52,050,000
	Total capitalization.	Miles single track.
Metropolitan "L".....	\$31,000,000	50.50
South Side "L".....	18,323,800	37.75
Northwestern "L".....	28,926,000	*50.50
Chicago & Oak Park.....	16,000,000	23.50
Union Loop.....	9,624,000	4.32
Totals.....	\$103,873,800	166.57

\*Includes 20 miles of leased road from Wilson Avenue to Evanston, which will soon be opened.

The passenger traffic of the lines has increased in the last year, owing to the opening of branches by the Northwestern and the South Side Elevated. The latter now has covered all the territory deemed available. The following table gives further financial statistics. The years for the first three are those ended Dec. 31, 1907. For the Oak Park line the statistics are those of the year ended June 30, 1907.

	Gross earnings.	Surplus.	Passengers carried.
Metropolitan "L".....	\$2,878,588	\$1,320,291	54,280,888
South Side "L".....	2,105,192	1,426,484	40,438,620
Northwestern "L".....	2,100,315	1,649,013	31,022,575
Chicago & Oak Park.....	892,569	*207,115	17,446,945
Totals.....	\$7,976,664	\$4,395,788	143,189,628

\*Deficit.



## DECISION AGAINST NEW HAVEN HOLDING TROLLEYS

What the New York, New Haven & Hartford Railroad will do with its electric railway holdings in Massachusetts, now that the Massachusetts Supreme Court has adjudged such holdings are illegal, is a question that has been causing much comment since the decision. In default of any statement from the company's officers, there was an impression in Massachusetts legislative circles that the railroad would undertake a general reorganization of its electric railway properties in Massachusetts, and would very likely seek a charter for a holding company of some sort from the Massachusetts Legislature. President Dewey, of the Worcester Consolidated Street Railway, a company dominated by the New Haven, but not named in the recent proceedings, was quoted as saying that the legal difficulties could be readily overcome by putting the companies now held directly into the hands of the New England Investment & Securities Company. It was conceded that the New Haven could not be expected to undertake the disposal through the market of companies representing a capital investment of something like \$21,000,000, but that it would lay the case before the Legislature and ask for legislation to preserve the financial interests of the properties while meeting the requirements of Massachusetts law. The decision in the case of the electric railway properties establishes the fact that no device of a holding company alone, without a change of personnel and interest, is sufficient to meet the requirements of the law. The court decision was by full bench, unanimously, and ran in part as follows:

In reference to subscribing, taking or holding stock or bonds of corporations in Massachusetts or guaranteeing the bonds or dividends of such corporations, the defendant is restrained by the statute, like other railroad corporations organized under the laws of this state.

Upon the question whether the defendant corporation has directly or indirectly subscribed for, taken and held the stock and bonds and has guaranteed the bonds and dividends, and is now directly or indirectly holding the stock and bonds and guaranteeing the bonds and dividends of certain domestic corporations as alleged in the information, the master made a summary of facts found by him.

It is important to determine what is meant by the words 'shall not directly or indirectly subscribe for, take or hold the stock or bonds,' etc. Doubtless, one purpose of the provision was to protect minority stockholders from the risk of detrimental acts of a corporation *ultra vires*.

But a more important purpose was to prevent a railroad corporation from obtaining, without legislative permission, the control of another corporation so situated that competition between the two might conserve the interest of the public. While combinations of connecting railroads have been encouraged by many enactments, our laws are intended to prevent the consolidation of railroad corporations which are natural competitors for the same business, except when authority therefor is obtained from the Legislature.

The words 'subscribe for, take or hold' are intended to include legal ownership of every kind. The word 'indirectly' covers other modes of holding than by taking or holding the legal title. The words together cover every kind of proprietary interest in the stock or bonds referred to.

It is immaterial how or where the legal title is held directly, if indirectly the railroad corporation is the equitable or beneficial owner of it. What the Legislature was seeking to prevent was influence in the management of the subordinate corporation by the other corporation, however exercised, and whether extending to absolute control or falling short of it. With this in view, language was used in the statute to include every kind of beneficial ownership, however indirectly held.

It seems plain that the Consolidated Railway Company is indirectly a holder and owner of everything belonging to the Springfield Railway Companies, subject to its relations to the New England Investment & Security Company. As the defendant owns all the stock of the Consolidated Railway Company, it is indirectly the holder and owner of the 19,253 preferred shares of the Springfield Street Railway Company, in the hands of the trustees of the Springfield Railway Companies, as well as of the right to redeem the preferred shares in the hands of the purchasers.

The Court then shows how the New England Investment & Security Company was created by directors of the Consolidated Railway Company, which guaranteed its preferred shares at the request of the New Haven Company. The decision continues:

The Consolidated Railway Company sold to the New England Investment & Security Company all the stocks and bonds which it held in the Worcester & Southbridge Street Railway Company, the Worcester & Blackstone Valley Street Railway Company, the Worcester Railway Investment Company, the Springfield Street Railway Company and the Springfield Railway Companies for \$10,000,000, which was paid by the promissory note of the New England Investment & Security Company. In the last analysis, in view of the ownership of one corporation by the other, the only party that had any interest in the matters covered by the contract was the defendant corporation.

From the findings and evidence in the very voluminous report of the master, and notably from the testimony of Mr. Mellen, the president of

the voluntary association and the corporations, and of Harmer, the secretary and controller of the New England Investment & Security Company, it is plain that all the street railway companies mentioned in the information are indirectly held, controlled and managed in the interests of the defendant, as absolutely and completely as it holds and manages its line of railroad between Springfield and New York.

The allegations of the Attorney General in this particular are fully sustained by the evidence. The Attorney General contends that the defendant is directly or indirectly guaranteeing the bonds and dividends of these corporations. It is indirectly guaranteeing the dividends on the preferred shares of the two associations—of the first association through the Consolidated Railway Company, which it owns and controls, and of the second association in the same way, with an additional express guaranty to the Consolidated Railway Company for its protection from loss by its guaranty.

These shares represent the ownership of the stock of these street railways. The guaranty is not of the dividends to be declared on the stock of the street railway corporations themselves, but only of the dividends to be declared on the shares of the holding company, issued to represent the stock in the corporation. Whether this should be deemed an indirect guaranty of the dividends of the corporations, we do not deem it necessary at this time to determine, for it seems that if the defendant ceases to hold directly or indirectly any proprietary interests in the stock of the street railway corporations this will involve a termination of its relation as guarantor of these dividends.

There was no unreasonable delay on the part of the public authorities in directing the attention of the defendant to the statute as soon as its conduct in Massachusetts in reference to these corporations became publicly known. The defence of laches cannot prevail.

Directly or indirectly subscribing for, taking and holding stocks or bonds or guaranteeing the bonds and dividends of another corporation in this commonwealth, by a railroad corporation organized under our laws, is the exercise of that which would be a franchise, if authority to do it had been granted by the Legislature. It is within the provision of statute 1906, chapter 372, and may be restrained by injunction under this statute.

Decree for informant.

In a statement of the Legislative Committee on Railroads on Monday, May 11, Charles F. Choate, Jr., counsel for the New York, New Haven & Hartford Railroad, said that the principle enunciated by the Supreme Court in its decision on Friday against the holding of the stock of the several railway lines by the New Haven Company applies as well to the holding of Boston & Maine stock, and it will be necessary for the New Haven Company also to dispose of this stock unless the Legislature decides that it is consistent with the interests of the Commonwealth that it should be retained. Mr. Choate declared that the company would promptly obey the decree of the court.

## MEETING OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

The bi-monthly meeting of the Central Electric Railway Association will be held in the Boody Hotel, Toledo, Ohio, May 26. This being the last regular meeting until Sept. 24, a large attendance is anticipated. The committee appointed to establish a traffic association in connection with the Central Electric Railway Association will make a report of the progress made and take further steps to complete the association, so that the work may be carried on during the summer.

At the forenoon session a paper will be read on the subject of "Insulation of High-tension Transmission Lines," by Francis S. Denneen, of the Ohio Brass Company, of Mansfield, Ohio. During the afternoon session the following papers will be read: "Merit and Demerit System of Discipline," by Frank Hardy, superintendent of the Fort Wayne & Wabash Valley Traction Company, of Huntington, Ind.; "Tickets as a Fare Medium for Street and Interurban Railway Traffic," by John F. Ohmer, president of the Ohmer Fare Register Company, of Dayton, Ohio; "Employees' Mutual Benefit Association," by H. E. Vordermark, auditor of the Fort Wayne & Wabash Valley Traction Company, of Fort Wayne, Ind.

## STAMFORD-NEW HAVEN ELECTRIC LINE NEXT

With regard to future electrification of the steam lines of the New York, New Haven & Hartford Railroad system, it is semi-officially stated that the next step will probably be the electrification of the line from Stamford to New Haven. This will probably have to wait both for the end of the present business depression and for the working out of the present problems in the operation of the present system installed between Stamford and New York City.



## ADVERSE DECISION BY MASSACHUSETTS BOARD IN FARE INCREASE CASE—REASONS FOR DECISION

Some idea of the limits beyond which Massachusetts street railway companies cannot expect to have the movement to increase fares in that State countenanced by the Railroad Commissioners was evidenced by the recent decision in the case of the Connecticut Valley Street Railway Company in the town of Montague. Although this recently-consolidated company operates its lines in four divisions, namely, Northampton to Amherst, Northampton to Greenfield, Greenfield to Turners Falls and Turners Falls to Millers Falls, it raised the fares only on the Millers Falls division. Here the trackage is like a large Y, with the base at Turners Falls, the ends of the arms at Montague village and Millers Falls, and the crotch marked by Lake Pleasant, and all four points here mentioned lying within the limits of the town of Montague. The company formerly charged two five-cent fares for the ride between Turners Falls and Millers Falls, giving a free transfer at Lake Pleasant for Montague village. April 1 it raised the price to three fares, and for the sake of convenient application of the increase, petitioned the Railroad Commission for the right to withdraw the Lake Pleasant transfer. If this transfer had not been involved, there would have been no need for the company to have called in the Board.

The Board has decided not only that the withdrawal of the transfer shall not be approved, but that the fares on this division are excessive and ought to be reduced. It intimates that, notwithstanding the fact that the company since its amalgamation of several local companies has not earned satisfactory returns on its investment, more time will be needed than has yet elapsed to prove that it cannot earn proper returns on the present basis of fares. Moreover, the Board intimates that if a need had existed of increasing fares the company should have undertaken to spread the burden more equably over all its division. Finally the Board says that a schedule that exacts as much as fifteen cents over a mere part of the line comprised within the limits of a single town, and allows the collection of even a twenty-cent fare within town limits, is unjustified by Massachusetts procedure or by comparative rates elsewhere within the State. This attitude is doubtless based largely upon the fact that until the unit of fare was advanced by some companies from five cents to six cents, the Board had customarily regarded five cents as a sufficient charge for a ride that began and ended in a single town without involving the lines of more than one company. In view of the wording of the decision it seems a fair inference that, granted that the Connecticut Valley Company situation demanded increased returns, it might better have sought to raise the unit for all its lines to six cents than to have put an excessive burden on the town of Montague alone.

## TOLEDO COMPANY TO REFUND BONDS

In order to refund the issue of \$12,000,000 bonds, due a year from the coming July, the Toledo Railways & Light Company has co-operated with a number of bankers and financial men in securing the appointment of a committee to formulate plans to that end. The company is in good shape so far as income is concerned, but finds it necessary to continue this loan. While it has more than \$1,000,000 bonds in the treasury, there would be no advantage in making a short-time loan under present conditions. The main franchises of the company expire in 1914 and in connection with the issue of new bonds to take the place of the old ones an effort will probably be made to have the franchises renewed so that the security will be ample and that no trouble be encountered in placing them. The committee selected to formulate the plan for arranging the bond issue consists of Norman B. Ream, of Blair & Company, of New York; W. B. Hale, of Chicago, and Myron T. Herrick, John Sherwin, H. R. McIntosh and J. R. Nutt, of Cleveland.

E. W. Moore, vice-president of the company, states that the committee was appointed at this time in order to have plenty of time to formulate plans and take care of the refunding before the bonds become due. The arrangements made will include the Toledo Railways & Light Company and allied corporations as follows: The Toledo & Western Railroad Company, the Maumee Valley Railways & Light Company; the Toledo, Ottawa Beach & Northern Railway Company, the

Adrian Street Railway Company, and the Toledo Gas, Electric & Heating Company. The heating and lighting business so far the present year shows excellent returns, but the railway business has fallen off to some extent as a result of the business depression. As a whole, the reports from month to month make a good showing. Last year the company earned a net surplus of \$314,700 or 2.27 per cent on the capital. This was somewhat smaller than the year before, as a result of taking over the heating and lighting business of the Toledo Gas, Electric & Heating Company and the Toledo & Western Railway Company. There is no reason why the surplus to stock should not be fair for the present year and the prospects for business, with the improving financial conditions, are very favorable. The appended table will give a very good idea of the business of the company from 1901 to 1907 inclusive:

	Operating				Interest Paid.	Net Surplus for year.	P.C. of Capital.
	Gross earnings.	Operating expenses.	Net P.C. earnings.	Net P.C. earnings.			
1901...	\$1,311,084	\$636,407	48.54	\$674,677	\$415,167	\$259,509	2.16
1902...	1,459,091	726,779	49.81	732,312	459,037	273,275	2.27
1903...	1,663,794	856,526	51.48	807,267	488,200	319,067	2.66
1904...	1,752,833	923,208	52.67	829,624	499,874	329,749	2.75
1905...	1,913,456	972,994	50.85	940,461	510,307	430,154	3.58
1906...	2,047,610	1,071,773	52.34	975,837	509,607	466,230	3.89
1907...	2,565,200	1,542,333	60.13	1,022,867	708,166	314,700	2.27

The above earnings include interest income, and operating expenses include taxes.

## THE GENERAL MANAGERS' ASSOCIATION OF McAFEE PROPERTIES

Brief mention was made in the STREET RAILWAY JOURNAL of May 2 of the recent meeting at Fort Wayne of the general managers of the Norfolk, Ft. Wayne, Lexington, Newport News and Pomeroy properties, all of which are controlled by the same interests. The managers' association of these properties is similar in organization to that of the managers of the Newman properties, and is maintained primarily to secure to its members the advantages that accrue through association and to afford every facility for the free discussion of questions peculiar to some one property, or to conditions that may affect all of them.

The board met at nine o'clock April 21, with John Blair MacAfee, chairman, and I. L. Oppenheimer, secretary. The members present were Mr. Gay and Mr. Palmer, purchasing agent and chief engineer, respectively, of the Norfolk & Portsmouth Traction Company; W. W. S. Butler, general manager of the Newport News & Old Point Railway & Electric Company; John B. Crawford, general manager of the Lexington & Interurban Railways Company; C. D. Emmons, general manager of the Ft. Wayne & Wabash Valley Traction Company, and I. L. Oppenheimer, general superintendent of the Ohio River Electric Railway & Power Company.

Much time was consumed in the investigations of propositions submitted to the board covering the sale of supplies to associate properties and numerous contracts were closed. A portion of the time was also devoted to a number of representatives of various supply houses. Some of these gentlemen demonstrated their products. The Ohio Brass Company showed the operation of the Tomlison coupler, Harold P. Brown the installation of his semi-plastic bond, the Electric Service Supply Company the installation of bond and cross bond by use of hydraulic punch and compressor, the Westinghouse Air Brake Company the automatic air control of single car equipment. The National Brake & Electric Company also showed the operation of its single car automatic air brake by auxiliary reservoir and valve.

Wednesday and Thursday the board's entire time was occupied on the private care "Lawton," with regular routine business while the party were en route to various Indiana towns. The properties inspected included Spy Run turbine station, the Anderson shops of the Indiana Union Traction Company and the Muncie terminal station.

The next place of meeting is still undecided, but in all probability either Norfolk or Old Point Comfort will be selected.

Announcement was made in Toledo last Saturday of the sale of the Toledo, Urban & Interurban Railroad and the Toledo-Maumee Railway. The name of the purchaser was not divulged.



## AFFAIRS IN NEW YORK

Receiver Whitridge, of the Third Avenue Railroad, in a report to the bondholders of that company, made public Monday, May 11, says that it will cost about \$4,000,000 to pay for necessary repairs and for improvements which he thinks ought to be provided for immediately. Included in the \$4,056,000 which the receiver estimates ought to be spent upon the property are \$300,000 for repair of cars, \$436,000 for repair of tracks, \$300,000 for new cars already ordered, and \$1,500,000 for additional rolling stock which the receiver thinks necessary. The amount also includes over \$1,300,000 for new construction, including several miles of railway on the Bronx and Pelham Parkway lines. The receiver announces that he proposes to ask the court for permission to issue \$2,500,000 receivers' certificates to cover part of these proposed expenditures. The unpaid franchise taxes due by the Third Avenue system amount on their face, the receiver states, to \$1,600,000. The company paid only the taxes for the first year the special franchise tax was in effect, and the tax for the last eight years is still in litigation.

The Interborough Rapid Transit Company, of New York, is sustained in a decision handed down by the Appellate Division, Third Department, in its claim that it is exempt from taxation for special franchises. The company appealed from the action of the State Board of Tax Commissioners in assessing the special franchises at \$9,000,000 for the year 1905, on the ground that it was exempt from this class of taxation under the provisions of the Rapid Transit act under which the subways in New York City were constructed and are now operated by the company.

The Appellate Division of the Supreme Court has denied the application of Attorney General Jackson for leave to bring an action against the Interborough-Metropolitan Company to vacate the company's charter and annul its corporate existence on the ground that it was a monopoly. The decision was written by Justice Clarke, and in it he takes occasion to point out that the precise thing of which the Attorney General complains has been expressly authorized by the laws.

Bids for the construction of the proposed Fourth Avenue (Brooklyn) subway were opened Friday, May 8, at noon, by the Public Service Commission. The lowest bids were as follows:

For first section: Nassau to Willoughby Street, Jas. P. Graham; for railroad work, \$1,020,476; for pipe galleries, \$101,374.

For second section: Willoughby Street to Ashland Place, William Bradley; for railroad work, \$3,436,019; for pipe galleries, \$58,695.

For third section: Ashland Place to Sackett Street, William Bradley; for railroad work, \$3,392,091; for pipe galleries, \$208,135.

For fourth section: Sackett to Tenth Street, E. E. Smith Contracting Company; for railroad work, \$2,283,553; for pipe galleries, \$206,672.

For fifth section: Tenth to Twenty-seventh Street, James P. Graham; for railroad work, \$1,413,635; for pipe galleries, the lowest bid was E. E. Smith Contracting Company, \$303,512.

For sixth section: Twenty-seventh to Forty-third Street, Remington & Sherman Company and F. W. Carlin Contracting Company; for railroad work, \$2,799,000; for pipe galleries, \$299,000.

Westinghouse, Church, Kerr & Company submitted a bid which was not in accordance with the specifications, but owing to its business-like features will be considered by the Public Service Commission. Briefly, this company offers to perform on a unit basis certain classes of work, such as earth excavation, rock excavation, steel work, concrete work, etc. Instead of offering to do any or all of this work for a lump sum, the company prefers varying compensations for each class of work. Where bids made up on a unit basis would be impracticable, as for station construction, the company is prepared to confer with the Public Service Commission regarding the actual cost of labor and material and for the deciding upon the proper compensation for installing and superintending the work. Another feature of Westinghouse, Church, Kerr & Company's bid is the suggestion that any saving in labor and material over that estimated by the joint committee should be equally divided, and in case the labor and material exceed the estimated cost this contractor will be willing to give up 10 per cent of the compen-

sation originally agreed upon. The compensation feature of this company's bid was erroneously understood by several newspapers, who inferred that the compensation figures included labor and material.

John B. McDonald, the contractor who built the subway, has written a long letter to Comptroller Metz on the subject of subway extensions. He condemns the proposed Broadway and Lexington Avenue line and the Fourth Avenue extension in Brooklyn as now planned, and says that those lines if built will never earn enough to pay interest on the cost of construction and equipment. Mr. McDonald estimates the total cost of the proposed Broadway and Lexington Avenue line, construction and equipment, at \$127,000,000. The total cost of the Fourth Avenue extension in Brooklyn, he says, will be \$44,000,000, and neither line will ever pay. Mr. McDonald suggests extensions of the present system.

## THE PROGRESS OF THE MUNICIPAL TRACTION COMPANY OF CLEVELAND

The changes made by President Du Pont, of the Municipal Traction Company, in the schedules and routing of cars, seem to meet the approval of very few of the road's patrons. Three temporary restraining orders now stand against the company, East Cleveland having been granted the right to 3-cent fare by Judge Babcock until a final hearing of the injunction case brought by Mayor McQuigg and City Solicitor Clum can be had. Attorneys for the Municipal Traction Company made the defense that the officers had no right to bring suit for an injunction in behalf of the village, but that this should have been done by some other resident of the place. The second order relates to the tearing up of Euclid Avenue for railway tracks between East 22d and East 40th Streets, and the third prevents the company from continuing the construction of tracks on East 118th Street north of Wade Park Avenue in front of the property of William A. Jones.

At the meeting of the executive committee of the street railway union and the officials of the Municipal Traction Company Thursday, the latter attempted to inject the agreement with the Forest City Railway employees into the arbitration arrangement. This the committee refused to sanction, saying that they had nothing to do with that agreement and that the employees of that company have no union since their charter has been revoked. About the only point settled was that the legality of the contract between the Cleveland Electric and the men should be left to the decision of three attorneys. The committee insists that the arbitration include only matters relating to the men who belong to the old Cleveland Electric branch of the union.

The conference between the officers of the Municipal Traction Company and the street railway men adjourned on Friday with every appearance of a disagreement, but on Saturday the executive committee of the union expressed a willingness to take the matter up again, and endeavored to reach an agreement of some kind.

Several changes have been made in the routing of the cars within the past week, but on Saturday President Du Pont stated that this work was completed and that cars would hereafter be run as at present, except where slight changes are necessary in order to permit improvements.

The Municipal Traction Company has placed orders for steel rails and ties enough to build nineteen miles of track. This material will be used on Woodland Avenue, beyond East 55th Street, and in repairing the St. Clair Avenue line, the remainder to go toward building additional track on Superior Avenue.

It was announced on Tuesday, May 12, that Mayor Johnson himself would personally manage the Municipal Traction Company, for a time at least, by absenting himself from the Mayor's office for two months. It is said he will act as managing director and treasurer of the company.

Ordinances were introduced in the City Council Monday, May 11, to provide for widening Euclid Avenue to permit the operation of a street railway between East Twenty-second and East Fortieth Streets, and also for widening Superior Avenue for the proposed four-track system. This work will cost the Municipal Traction Company \$500,000, it is said.

Several resolutions were introduced at the instance of Democratic Councilmen calling for an improvement in the service on various streets and asking that more liberal transfer privileges be granted. General dissatisfaction has arisen all over the city because of the limited service the company has been giving in



its effort to reduce the expense and make it possible to operate at the fare charged. Mayor Johnson reported that the average daily receipts of the company had been \$13,000. He said that on Saturday 7 per cent of the passengers had purchased transfers and that this small proportion shows that the transfer privileges given by the old company had been abused. On the other hand it is argued that mill employees and other working men have been walking a part of the distance in order to save the additional expense of transfers and that this accounts for the reduction in the number of transfers issued.

A new arbitration agreement was entered into Monday between the company and the employees. The members of the board of arbitration were chosen Tuesday and three days will be given in which to arrive at a conclusion. The questions to be arbitrated are the bearing of the low-fare labor agreement upon that of the Cleveland Electric, the effect upon a labor agreement with a local union when the national union cancels the local's charter, and the binding force of the Cleveland Electric agreement upon the Municipal Traction Company.

### RECEIVER FILES REPORT OF CHICAGO UNION TRACTION PROPERTIES

Marshall E. Sampson, receiver of the one-time Union Traction properties in Chicago, has filed in the United States Circuit Court his report of monthly receipts and disbursements of the system under the receivership from May 10, 1905, to and including March 31, 1908. The report for the final month, March, 1908, shows that the receiver's balance of funds at the close of business March 31 was \$27,280.48. A recapitulation of the first three months of the period shows these figures:

MAY, 1905.	
Balance May 10, 1905.....	\$263,444
Receipts in May.....	633,602
Total .....	897,046
Disbursements .....	482,913
Cash on hand May 31.....	\$414,132
JUNE, 1905.	
Balance June 1, 1905.....	\$414,132
Receipts in June.....	911,961
Total .....	\$1,326,093
Disbursements .....	763,372
Cash on hand June 30.....	\$562,721
JULY, 1905.	
Balance July 1, 1905.....	\$562,721
Receipts in July.....	977,142
Total .....	\$1,539,864
Disbursements .....	1,177,936
Cash on hand July 31.....	\$362,827
A similar recapitulation of the last three months of the period follows:	
JANUARY, 1908.	
Balance Jan. 1, 1908.....	\$114,682
Receipts in January, 1908.....	1,143,466
Total .....	\$1,258,148
Disbursements .....	1,205,211
Cash on hand Jan. 31.....	\$52,937
FEBRUARY, 1908.	
Balance Feb. 1, 1908.....	\$52,937
Receipts in February.....	482,617
Total .....	\$535,555
Disbursements .....	485,923
Cash on hand Feb. 29.....	\$49,631
MARCH, 1908.	
Balance March 1, 1908.....	\$49,631
Receipts in March.....	691,003
Total .....	\$740,634
Disbursements .....	713,354
Cash on hand March 31.....	\$27,280

### STREET CAR STRIKE THREATENED IN CHICAGO

By an almost unanimous vote the trainmen of the Chicago Railways Company decided on May 10 to quit work unless about 20 men who were formerly members of the union are discharged. Some months ago these men resigned from the union and have since refused to pay their dues. Under the rules of the organization members are not permitted to resign unless they leave the railway service, but the delinquents have remained at work. President Roach, of the Chicago Railways Company, is quoted as saying in regard to the threatened strike:

"I should be very glad if the men would join the union, but I have no right to compel them. We have made members pay their dues in the past, because I think it is right for every member of the union to pay his just dues. If a man resigns from the organization, however, it would not be right for the company to force him back into it. They can take all the strike votes they want to on that point."

The chances of an actual walkout are somewhat remote, as the question must be submitted to a general meeting of the local union and the strike approved by the officers of the national association. The agreement of the union with the company contains an arbitration clause, and President Roach has declared that he is quite willing to have the matter settled by a joint arbitration board.

### WASHINGTON RAILWAY & ELECTRIC REPORT

The Washington Railway & Electric Company, of Washington, D. C., has issued its annual report for the year ended Dec. 31, 1907. The income account compares as follows:

	1907.	1906.
Gross receipts.....	\$3,385,748	\$3,133,240
Operating expenses.....	1,748,752	1,613,096
Net earnings.....	\$1,636,996	\$1,520,144
Other income.....	42,353	44,595
Total income.....	\$1,679,349	\$1,564,739
Fixed charges.....	1,107,228	1,041,118
Surplus .....	\$572,121	\$523,621

The profit and loss account shows as follows:

Surplus Dec. 31, 1906.....	\$737,961
Surplus for the year 1907.....	572,121
Total .....	\$1,310,082
Preferred dividends.....	425,000
Discount on consolidated mortgage bonds.....	52,700

Profit and loss surplus Dec. 31, 1907..... \$832,382

Surplus for the year, \$572,121, as above, is equal to 5 per cent earned on the \$8,500,000 preferred stock and 2.26 per cent on the \$6,500,000 common stock.

The general balance sheet of the Washington Railway & Electric Company as of Dec. 31, 1907, compares as follows:

ASSETS.		
	1907.	1906.
Cost of property.....	\$27,871,483	\$27,743,475
Stock and consolidated mortgage bonds.....	439,350	439,350
Construction bonds.....	500,000	227,000
Investments .....	416,071	416,071
Real estate and funded securities.....	24,659	25,421
Materials and supplies.....	88,516	72,974
Accounts received, subject companies.....	131,619	107,558
Accounts received and miscellaneous.....	24,875	22,745
Prepaid insurance.....	5,792	5,192
Cash .....	197,234	361,854
Total .....	\$39,699,596	\$29,421,640
LIABILITIES.		
Preferred stock.....	\$8,500,000	\$8,500,000
Common stock.....	6,500,000	6,500,000
Funded debt.....	13,073,708	12,913,439
Depreciation reserve.....	516,290	516,290
Accounts payable.....	89,732	63,508
Accrued interest and taxes.....	110,736	109,912
Reserve for rentals and damages.....	76,747	80,530
Profit and loss surplus.....	832,382	727,961
Total .....	\$39,699,596	\$29,421,640



## THE QUESTION OF STATIONS FOR THE CAMBRIDGE SUBWAY

Several more hearings have taken place before the Massachusetts Railroad Commissioners within the last few days in an effort to decide whether the proposed Cambridge subway shall have one station or four in addition to the terminals at Harvard Square, Cambridge, and Park Street, Boston.

A new consideration was brought into the discussion by the statements of physicians to the effect that with only one station, as indicated in the Boston Elevated Railway Company's present plans, the  $\frac{3}{4}$  miles of tube would become so charged with mephitic exhalations as to present serious danger to the health of the traveling public. It was stated that experiences in the London underground system had demonstrated that passing trains merely stir up the air in the tube, without renewing it; that infrequency of openings to the outer air would prevent proper ventilation, and that in periods of epidemic, the subway would tend to breed disease. It was also asserted by one physician that the need of easily accessible exits in case of collision or fire in subway trains was sufficient basis for requiring stations to be placed as frequently as at least one in every half mile.

The commission received notice at these sessions that Mayor Wardwell, on behalf of the city of Cambridge, is still in favor of the four-station plan, and that, despite the Supreme Court decision against his claim of authority to determine the number and location of stations for this line, he intends to appear before the commission with a plea for four stations. When this announcement was made by the Cambridge city solicitor, G. A. A. Pevey, several Cambridge men present, including one or two aldermen, demurred, questioning by what right the Mayor could undertake to state the attitude of the city, when the City Council had given him no direct instructions. But Mr. Pevey allowed it to be understood that the Mayor would continue to urge his view merely under the general authority entailed by his official position; and the commissioners will hear him. They fixed May 25 for his appearance, contingent on the city solicitor's ability to be present at that time.

## RAILROAD ACCIDENTS IN INDIANA

The third accident bulletin of the Indiana Railroad Commission, issued May 7, shows 83 people killed on the railroads of the State during the first quarter of 1908. Of this number 74 were killed by the steam railroads and 9 by the electric railways, compared with 99 deaths during the first quarter of 1908, and 107 during the last quarter of 1907. The total number of persons injured on the railroads during the quarter was 369, of whom 298 were injured on the steam railroads and 71 on the electric railways. This compares with 478 persons injured during the last quarter of 1907. The commission calls particular attention to the fact that 39 of the 83 people killed during the quarter were trespassers. Only two passengers were killed during the quarter—one on a steam railroad and one on an electric railway. Three trespassers were killed while on the tracks of electric railways and 36 while trespassing on steam railroads. There were five collisions on the electric railways, in which one conductor and five motormen were injured. The interurban cars struck seven travelers at grade crossings of highways, five of whom were killed. In all, 57 passengers were injured and one killed by interurban trains during the quarter.

The bulletin says that the death roll of trespassers will continue to increase until the power of the law, backed by strong public pressure and sentiment, is directed against the fatal nuisance. Trespassing on railroad tracks is not only conducive to a fearful loss of life, but is a constant menace to the convenience, safety and pleasure of lawful travelers, and an illegal and unjust burden on the railway companies. The commission takes occasion to urge the necessity of separation of grades and the general use of warning signs. According to the report of the inspectors of the commission, people do not approach grade crossings with sufficient care. Travelers inclose themselves in vehicles with glass storm curtains which cut off from them the view and sound of approaching trains. Especially to this cause are attributed the many fatalities during cold weather. Of the 9 persons killed during the quarter on interurban railways five were attempting to cross at grade, three were employees and one a passenger.

## ITHACA SECTION A. I. E. E. MEETING

Dr. Charles P. Steinmetz visited the Ithaca Section on April 17 and delivered an address on "The Alternating-Current Commutator Motor." The speaker described the various types of alternating-current commutator motor, and explained the difficulties of commutation in such motors. He pointed out that compensation for the reactance and transformer voltages involved is a complicated problem, and showed the latest inventions and devices for insuring satisfactory commutation at various loads and various speeds. The lecturer stated that the alternating-current commutator motor is not by any means new. One of his first tasks upon his arrival in this country in 1889, after joining Rudolph Eickemeyer at Yonkers, N. Y., was the designing of an alternating-current commutator motor. Professor Elihu Thomson had two years before invented and patented the repulsion motor.

Dr. Steinmetz while at Ithaca delivered a most interesting reminiscent address before the annual dinner of Sibley College, at which about 350 students and members of the faculty were present. The speaker described his early experience in Germany and Switzerland, as well as his later work with Mr. Eickemeyer at Yonkers, N. Y., and compared the different fields of electrical engineering in their relative attractiveness and promise.

## EXPRESS COMPANIES WILL TEST THE RULING OF THE INDIANA RAILROAD COMMISSION

Six express companies doing business in Indiana have brought suit in the United States District Court against the Railroad Commission of Indiana, to enjoin it from taking steps to reduce express rates in the State from 10 to 12 per cent. On March 30 the Railroad Commission issued an order to reduce on an average of from 10 to 12 per cent the express rates in the State. The new schedule was to have been adopted last Friday. The opinion and order followed an investigation into express rates instituted by the commission several months ago. The total annual business of all express companies in the State is about \$1,000,000, and the reduction in rates would mean a decrease of more than \$100,000 a year in the money to be paid for express service. The action, it is declared, is to test the validity of the action of the Indiana Railroad Commission in arbitrarily reducing the rates of express companies in interstate commerce and to enjoin it from taking steps to put its intentions into action. The officials of the express companies say that they cannot do business with the reduction of rates as prescribed by the railroad commission.

## A PLAUSIBLE IMPOSTOR

The STREET RAILWAY JOURNAL has called attention upon various occasions during the past five or six years to the fraudulent practices of a young man about 30 years old, 5 ft. 8 in. high, slender build, light complexion, crooked teeth. He speaks with an English accent, claims to be connected with various important men engaged in the electrical and mechanical field in England, generally has a hard luck story and borrows money, which is never returned. He is using a number of aliases and has operated all over the country. According to reports, he is at present in New York. He has been recently heard from in Philadelphia, Rochester and other Eastern cities and readers of this paper are hereby warned against him.

## STREET RAILWAY PATENTS

UNITED STATES PATENTS ISSUED APRIL 28, 1908.

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

885,750. Track-tamping Implement; Able F. Hart, Hickory, N. C. App. filed Jan. 17, 1908. Provides an implement for tamping and packing ballast under the cross ties of a railroad track. Means for fixing the implement with relation to the track and the tie during the tamping operation.

885,776. Trolley Pope Head; Garret Mott, New York, N. Y., and Adolph G. Koenig, Weehawken, N. J. App. filed April 25, 1907. The trolley harp has a swivel connection with the pole, so that the harp has a spring-controlled movement through a limited arc to either side.

885,863. Concrete Railway Tie; William H. Pruyn, Jr., Chi-



cago, Ill. App. filed Oct. 29, 1906. The tie has a plurality of openings along its sides beneath the rail seating part, a series of longitudinal reinforcing rods in the body of the tie on each side above the openings, a series of reinforcing rods running longitudinally through the body of the tie near the bottom thereof, the central rods of said series being arched up in the middle of the tie.

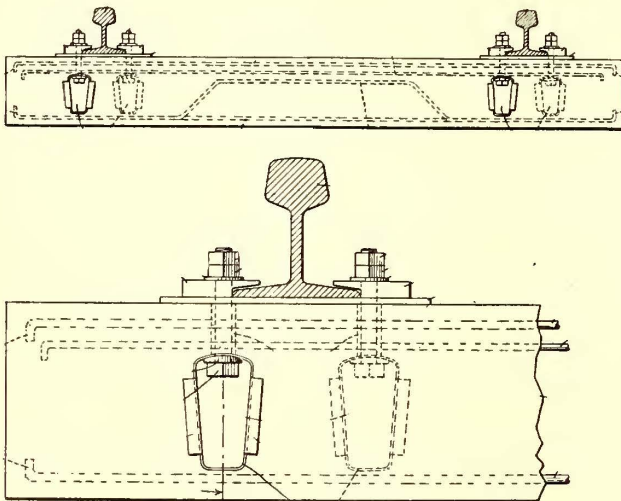
886,082. Power-Driven Vehicle; Robert H. Simpson and William Park, Rugby, England. App. filed Dec. 31, 1907. A railway vehicle having a single-axle "bogie" truck connected thereto by a swivel connection to enable the axle to assume a radial position with respect to the curvature of the rails, and mechanism for normally centering the "bogie" truck with respect to the car body, in combination with differential gearing between the axle and wheels, whereby the wheel on the outer side of the curve may run faster than the wheel on the inner side of the curve and radiation is assisted.

886,093. Contact Post System for Transmitting Electric Power; George E. Titcomb, Philadelphia, Pa. App. filed Feb. 29, 1908. Specially constructed contact rods depend from spring arms on the body of the car so as to engage stationary contacts at spaced intervals along the side of the track.

886,105. Rail Joint; Benjamin Wolhaupter, New York, N. Y. App. filed Sept. 12, 1907. The joint bars each have an upright member and a continuous flange-receiving pocket for the rail base flanges, the upper and lower sides of said pocket having clearance faces respectively spaced from and out of contact with the upper and lower sides of the rail flange contiguous to and at the outer edge thereof.

886,134. Spacing Device for Railway Tracks; Joseph Klinkhammer, Hopkins, Minn. App. filed Nov. 4, 1907. Details of construction.

886,160. Means for Establishing Electrical Communication with Moving Trains; Joel Ames, Montrose, Ia. App. filed Sept. 16, 1907. A collector shoe extends throughout the length of the car and engages vertical contacts in the roadbed, such vertical contacts being attached to a conductor.



PATENT NO. 885,863

886,176. Trolley Harp; Percy C. Bliven, Danielson, Conn. App. filed May 23, 1907. The harp is transversely hinged to permit the wheel to be readily removed and replaced.

886,239. Trolley Wheel; William W. Neighbour, Denison, Tex. App. filed July 13, 1907. The wheel consists of a pair of insulating plates constituting a supporting web for the tread portion thereof, and have runways for ball bearings, so that the current does not pass through the latter. The contact is made by spring cones at the center of the wheel.

886,244. Fare Indicator for Carriages; René Picard, Neuilly, Seine, France. App. filed Nov. 21, 1905. Provides a device of the character adapted to indicate to a passenger the time consumed by the trip and the distance traveled, and the amount to be paid accordingly.

886,248. Rail Lock and Tie-Plate; William N. Reynolds, Litchfield, Conn. App. filed Aug. 6, 1907. A tie-plate adapted for attachment to a sleeper, having bearings for the outer edges of the rail flange, the tie-plate being provided with transversely arranged apertures adapted to receive fastening devices for securing the outer and inner edges of the flanges of the rails

of said tie-plate, and rail-locks, including brace sections and a guard section, both having interlocking engagement with the tie-plate.

886,315. Appliance to Prevent Railway Track Rails from Spreading; James M. De Witt, Bloomsburg, Pa. App. filed July 25, 1907. Comprises a pair of clamps engaging the outer webs and flanges of the rails, and passing thereunder to the center of the trackway, where they are locked together by a wedge-shaped key, the insertion of which puts tension on the clamps.

886,319. Support for Electric Contact Shoes; Ed. W. Farnham, Chicago, Ill. App. filed Aug. 2, 1905. Relates to means for maintaining the contact shoe of a train in spring-pressed engagement with the under side of a conductor rail. Spring impelled link arms depend from the truck frames.

## CLEVELAND PUBLICITY BUREAU

A general traffic promotion, information and publicity bureau has been established by the interurban railroads entering Cleveland, under the management of Henry R. Gall, formerly head of the publicity department of the Cleveland Electric Railway, with headquarters in the American Trust Building, Cleveland. It will be known as the Interurban Railways Publicity Bureau and will aim to popularize the use of interurban railroads for passenger, freight and express traffic. Cleveland will be boomed as a shopping and amusement center as well as a summer vacation resort. An effort will be made to educate the merchants within a radius of 60 miles of Cleveland in the use of electric railways for quick shipments of both large and small orders of merchandise. The bureau will also give information as to summer boarding and living places in the country where people may enjoy suburban life through the hot season and at the same time get to their work in the city.

## RELIEF IN SIGHT FOR THE CHICAGO ELEVATED LOOP

At a meeting of the Council Committee on local transportation in Chicago last week, representatives of the four elevated roads were asked to state their objections to the recommendations contained in the report on the Union Loop problem made by the city's engineer, George Weston. All expressed their willingness to have their engineers meet Mr. Weston and discuss the plans proposed in the report for increasing the capacity of the Loop and tacitly pledged themselves to put into effect any changes in operation which might be agreed upon by this joint meeting of engineers. The engineers held their first meeting on May 11 and will endeavor to come to some conclusions as speedily as possible. They are considering routing, lengthening of station platforms, universal transfers and reduction of noise on the Loop.

## PERSONAL MENTION

MR. HENRY A. HAIGH, of Detroit, has been elected president of the Cincinnati, Georgetown & Portsmouth Railway Company, of Cincinnati, to succeed the late Mr. A. W. Comstock.

MR. HUGH J. MCGOWAN, president of the Traction & Terminal Company, and head of the Indiana traction syndicate, who has been seriously ill at his home in Indianapolis, is reported greatly improved and anxiety over his possible recovery is no longer felt.

MR. L. R. GAW, for the past year master mechanic of the Ohio Central Traction Company, at Gallion, Ohio, has resigned to accept a similar position with the Saginaw-Bay City Railway & Light Company, at Saginaw, Mich., succeeding Mr. William Long, resigned. Mr. Gaw formerly was with the Toledo & Indiana Railway.

MR. WILLISTON FISH has been appointed assistant to the president of the Chicago Railways Company. Mr. Fish has been connected with the law department of the former Chicago Union Traction Company since 1899 and took a prominent part in the recent reorganization plan. He is a graduate of West Point.

MR. D. W. PONTIUS, of Riverside, Cal., on May 1 became traffic manager of the Los Angeles-Pacific Railway, vice F. A. Short, who has been assigned to other duties. Mr. Pontius, who has been employed by the Southern Pacific for the last seventeen



years, has been the company's commercial agent at Riverside since April, 1906.

MR. WALTER DOMNICK, engineer of the Prussian State Railways, is planning to tour the principal cities of the United States and Canada to study electric railway operation, particularly repair shop practice. He will return to Germany by way of San Francisco, Australia and India. Mr. Domnick has been closely identified with the experimental single-phase work which the Prussian State Railways have been conducting at Oranienburg, near Berlin.

MR. J. B. HANNA has resigned as president of the Chicago, Lake Shore & South Bend Railway Company, owing to the fact that the construction work has been completed and other interests are demanding his time. Mr. Hanna has given close attention to this road since the construction work was commenced and is greatly pleased to see it nearing completion, with most excellent prospects for the future. His successor has not yet been chosen.

MR. R. W. COOKE has been appointed superintendent of the Municipal Traction Company, of Cleveland, Ohio, to succeed Mr. George L. Radcliffe, of the Cleveland Electric Railway, which has been leased to the Municipal Traction Company. Mr. Cooke has been superintendent and chief engineer of the Forest City Railway. Mr. Lawrence Creelius has been appointed superintendent of power. Mr. Terrance Scullin, master mechanic of the Cleveland Electric Railway, has been retained by the Municipal Traction Company.

MR. H. H. ADAMS has resigned as superintendent of motive power of the United Railways & Electric Company, of Baltimore, Md., to become superintendent of rolling stock and shops of the New York City Railway Company. Mr. Adams has been connected with the Baltimore Company since 1902 and did an immense amount of valuable work for that company, especially during the trying experiences following the recent disastrous fire. He was formerly master mechanic of the North Jersey Street Railway Company. As superintendent of rolling stock and shops of the New York City Railway Company, Mr. Adams will be in direct charge of the entire rolling equipment and shops of the company, which operates all the surface lines in the Boroughs of Manhattan and the Bronx. The superintendent of equipment and master mechanic will both come under Mr. Adams' jurisdiction and will report directly to him. Mr. Adams himself will be responsible in turn to Mr. Oren Root, general manager for the receivers of the company. Mr. Adams' long experience in the mechanical end of the business should make him a very valuable acquisition to the company, especially as the rehabilitation of the rolling equipment is the work planned for the near future.

MR. HARRY B. IVERS, whose appointment as general manager of the Lewiston, Augusta & Waterville Street Railway, of Lewiston, Me., was announced in the last issue of the STREET RAILWAY JOURNAL, has long been connected with street railway and lighting interests in New England. His experience dates from the spring of 1893 when he entered the employ of the Hyde Park Electric Light Company, of Hyde Park, Mass., under the management of Mr. Thomas T. Robinson. During that year the Norfolk Suburban Street Railway was built, and during the two following years the West Roxbury & Roslindale Street Railway and the Norfolk Central Street Railway were built. These lines were also under Mr. Robinson's management, and Mr. Ivers was connected with the railways and the lighting company in different capacities in and about the power station and the carbarns and in the treasurer's office. The companies were later acquired by the Massachusetts Electric Companies, and Mr. Ivers assisted in consolidating the accounts and in operating the railways, which were organized as a division of the Old Colony Street Railway Company. Mr. Ivers subsequently acted as superintendent of what was known as the West Roxbury division of the Old Colony Street Railway; later he was transferred to Brockton in the interest of the consolidation and assisted in consolidating and systematizing the accounts of the separate companies in and surrounding Brockton. He later was given headquarters at Taunton, in the general superintendent's office, which developed to be the general office of the Old Colony Street Railway Company, after the consolidated properties had been divided into five divisions with only a division office in the places above mentioned. After being connected with these properties for nine years, he was elected treasurer and manager of the Westerly Railway & Lighting Company, of Westerly, R. I., a holding company controlling the stock of seven corporations, which supplied under their re-

spective charters several towns in Rhode Island and Connecticut with railway, electric lights and gas. After about four years' successful operation of these properties, he accepted the position of assistant to Mr. John R. Graham, president and general manager of the Bangor Railway & Electric Company, and a few months later was made treasurer of that company and of the Bar Harbor & Union River Power Company, which constructed the famous water power plant upon the Union River at Ellsworth, Me. About a year thereafter Mr. Ivers was tendered the position of general manager of the Lewiston, Augusta & Waterville Street Railway, with headquarters at Lewiston. This company has in operation about 83½ miles of track, 55 of which are in and about Lewiston, and 28 in and about Augusta. It is constructing 50 miles of new road to connect Lewiston, Augusta and Waterville, which, when completed, will be operated as one system and make a total of about 145 miles of railway. This is the first time in Mr. Ivers' experience that his official connection with a company has not extended over the lighting service, all the other companies with which he has been connected having operated central stations.

MR. THOMAS F. MULLANEY, who has resigned from the General Electric Company to become chief engineer of the Third Avenue Railroad of New York, was tendered a complimentary dinner Wednesday evening, May 6, at the Engineers' Club, by his friends in the General Electric Company. More than 50 attended the dinner. Mr. W. J. Clark, of the General Electric Company, acted as toastmaster, and in a



T. F. MULLANEY

most felicitous speech, presented Mr. Mullaney with a handsome watch, chain and charm on behalf of his old associates in the company. Mr. Mullaney's appreciation of this testimonial was gracefully expressed in a speech of thanks for such assurances of high regard, friendship and good wishes for the future. The dinner was enlivened by many informal addresses, some of the most notable being those of Messrs. Maher, Lieb, Katte, Hirt, Doyle and Armstrong. Mr. Mullaney, as before stated, is severing the business ties of more than twenty years to assume the position of chief engineer of the Third Avenue Railroad in this city. In the early days of the electrical business he was connected with the Thomson-Houston Electric Company, and later with the General Electric Company. For many years his work has been confined to New York City, where the largest installations of electrical machinery have been made under his direction. His successes in former years were at Chicago, St. Louis and Boston. Among the guests at the dinner were Messrs. Edward A. Maher, general manager of the Third Avenue Railroad; John W. Lieb, associate general manager of the New York Edison Company; Edwin B. Katte, chief engineer of the electrical department of the New York Central Railroad; M. G. Starrett, consulting engineer of the New York City Railway Company; Louis Hirt, engineer of the Mexican Tramways and other foreign properties; J. S. Doyle, superintendent of equipment of the Interborough Rapid Transit Company, of New York; J. R. C. Armstrong, electrical engineer of the New York City Railway; W. H. Sawyer, of Ford, Bacon & Davis; Alex. McIver, superintendent of equipment of the New York City Railway; J. S. McWhirter, superintendent of equipment of the Third Avenue Railroad. Among those present from the General Electric Company were Messrs. Hinsdill Parsons, vice-president; W. J. Clark, manager of the heavy traction department; W. B. Potter, chief engineer of the traction and railway departments; W. L. R. Emmet, engineer of the lighting department; T. Beran, manager of the New York office; and Mr. J. J. Mahony, of New York, and Mr. A. L. Rohrer, of Schenectady. Letters of regret filled with the strongest expressions of esteem and of warmest affection were received from the prominent officials of the General Electric Company who were unable to be present. Mr. Mullaney has a host of friends whose good wishes go with him in assuming his new duties and responsibilities.



# NEWS OF THE WEEK

## CONSTRUCTION NOTES

Items in this department are classified geographically by States, with an alphabetical arrangement of cities under each State heading.

For the convenience of readers seeking information on particular subjects, the character of the individual item is indicated as follows:

- \* Proposed roads not previously reported.
- o Additional information regarding new roads.
- † Extensions and new equipment for operating roads.

Numerals preceding these signs indicate items referring to:

1. Track and roadway.
2. Cars, trucks and rolling stock equipment.
3. Power stations and substations.
4. Car houses and repair shops.
5. Parks and amusement attractions.

oPELIKA, ALA.—Judson C. Chapman, attorney-at-law, 223 Century Building, Atlanta, Ga., states that the Alabama Railway & Electric Company proposes to build this year an electric railway for the transportation of passengers and freight from Opelika, Ala., to Eufaula, Ala., after which it will be extended southward to the Gulf coast. It will touch the Central of Georgia Railway and the Western of Alabama Railroad at Opelika, and about 30 miles south of there will cross the Central of Georgia at Hurtsboro, and again at Eufaula. All negotiations for material, contracts, labor and equipment should be made for the present with Mr. Chapman at the above address. The officials of the company are A. M. Buchanan, Opelika, Ala., president; Judsen C. Chapman, Atlanta, Ga., general counsel and vice-president; John M. Shelly, also of Atlanta, secretary and treasurer.

oPASADENA, CAL.—President Adrian King, of the Pasadena, Verdugo & San Fernando Company, is said to be organizing the Pasadena-Eagle Rock Electric Railway Company, to build several miles of road at once.

oREDLANDS, CAL.—W. D. Larrabee informs the STREET RAILWAY JOURNAL that the Redlands & Yucaipa Electric Railway Company is arranging to begin work on its line immediately. The railway system will connect Redlands, Yucaipa and Oak Glen and will be about 22 miles in length. The company proposes to erect a power station and repair shop at Redlands. Amusement parks will be operated at Cherry Croft and Oak Glen. In addition, Mr. Larrabee states that the company will furnish power for lighting. The authorized capital stock is \$1,000,000, of which \$420,000 has been issued. The officers are: J. M. Neeland, Grosse Building, Los Angeles, Cal., president; C. S. Chestnut, Redlands, Cal., vice-president; C. D. Myers, Redlands, secretary; M. N. Newmark, Los Angeles, Cal., treasurer, and W. D. Larrabee, Redlands, general manager.

†RIVERSIDE, CAL.—The Huntington interests have just completed arrangements whereby their line here operated by the Riverside & Arlington Railway Company will build a five-mile road out of Riverside toward Los Angeles.

‡SAN FRANCISCO, CAL.—The United Railroads has closed a contract with the General Electric Company for a Curtis steam turbine to be direct connected to a 5000-kw General Electric 3-phase generator. The turbo-generator will be installed in the North Beach power station.

†SAN FRANCISCO, CAL.—The Southern Pacific Company has opened up its new cut-off to Los Gatos via Los Altos from Mayfield, which shortens the distance by more than seven miles and reduces the running time to one hour and a half. The new cut-off is double track as far as Congress Junction, a distance of 13½ miles from Mayfield. While operated by steam now, these tracks will also be used by the Peninsula electric system, which connects with it at Monte Vista, Congress Junction and Los Gatos. The system will also be extended northward from Los Altos through the Stanford University grounds to San Mateo. The service begins with five trains each way between Los Gatos and San Francisco. The distance to Los Gatos is reduced to 51 miles.

‡SAUSALITO, CAL.—The new electric cars of the Northwestern Pacific Railway, which arrived recently from the East, have been placed in operation on the North Shore third-rail system between Sausalito and San Rafael. The new rolling stock consists of two motor cars, two combination and eight trailers or passenger coaches. Preparations are also being made all along the line for the new electric system, in which the current will be carried on high potential poles, from which the rails will be fed at regular intervals, instead of transmitting the power through aluminum feeders and a third-rail, as is now the case. Intermittent switches will also be installed, which will have a tendency to equalize the current and prevent leakage, thereby greatly increasing the speed of local trains.

†HARTFORD, CONN.—The Railroad Commissioners have formally approved the proposed layout and method of construction of the electric railway which the Connecticut Company is to build between Hartford and Middletown. The Connecticut Company has not yet announced when construction operations will begin.

oSMYRNA, DEL.—John D. Thompson, of Wilmington, Del., is said to be preparing plans for a power plant to be constructed at St. Georges, for the Diamond State Rapid Transit Company, Smyrna, Del.

†CANTON, ILL.—The Illinois Central Electric Railroad opened five miles of its system from Canton to St. Davids on May 10.

oPLYMOUTH, IND.—The commissioners of Marshall County have granted a franchise to the South Bend & Logansport Interurban Railway Company to cross the county. P. J. Hanlihan is one of the directors of the company.

oTERRE HAUTE, IND.—The directors of the Terre Haute, Robinson, Olney & Southwestern Railway at their first meeting accepted a contract of Charles B. Duffy, of St. Louis, Mo., for the construction of the road from the Wabash River in Crawford County, the work to be started 60 days after the right of way is secured, and to be completed within 18 months.

†COUNCIL BLUFFS, IOWA.—The Omaha & Council Bluffs Street Railway Company has finally decided upon a route for the line from Council Bluffs to the School for the Deaf, which lies about three miles southeast of Council Bluffs. The line will be constructed due east from the present terminus of the Lake Manawa line and will be about two miles in length. The surveys have been completed and the contract for the work will be let in a few weeks. The officials of the company state that the line will be constructed and ready for operation by Oct. 1, 1908.

oIOLA, KAN.—The City Council has granted an extension of time to the Kansas Southern Electric Railway until October 1, 1908. F. V. Crouch, of Iola, is president of the company.

oPADUCAH, KY.—John J. Freundlich, general manager of the Kentucky & Ohio River Interurban Railroad Company, Paducah, Ky., writes that the length of the line will be about 39 miles and it will connect Paducah, Cecil, Grahamville, Ingleside, Bandana, Oscar, Holloway and East Cairo, Ky., and Cairo, Ill. The railway will connect at Paducah with the Illinois Central Railroad and the Nashville, Chattanooga & St. Louis Railway; at Joppa with the Chicago & Eastern Illinois Railroad of the Frisco system, and at Cairo with the Mobile & Ohio Railroad, St. Louis Southwestern Railway, the Missouri Pacific system, the Big Four and the Illinois Central roads. It will be a standard gage road and it is proposed to install the overhead trolley system. The power station and repair shops will be located at Paducah. In addition the company plans to open two amusement parks, and furnish power for lighting to the towns along the road. The contractor is the Western Engineering & Construction Company, 605 Globe Building, Minneapolis, Miss. This concern has the entire contract for construction and equipment. The officers of the railroad company are: Charles F. Crump, Columbus, Ind., president; F. N. Whitesides, Franklin, Ind., vice-president; George O. Ingram, Paducah, Ky., treasurer; L. B. Whitesides, Franklin, Ind., secretary; John J. Freundlich, Paducah, Ky., general manager. The officers are also directors, as are S. Lehmayr, 840 Broadway, New York City, and Charles W. Thompson, Paducah, Ky. This company has an authorized capital stock of \$1,000,000, of which \$28,000 has been issued. Bonds have also been authorized to the amount of \$1,000,000.

†BALTIMORE, MD.—The Baltimore & Annapolis Short Line has been opened as an electric railway. The company gets current for the line from the Consolidated Gas, Electric Light & Power Company and the cars are being drawn into the city by locomotives until the company can complete about a mile of track which will give the line its own entrance into Camden Station.

\*OAKLAND, MD.—It is understood that the Swallow Falls Electric Light & Power Company, in which H. P. Tasker, of Oakland, Md., is interested, is to generate current at Swallow Falls, about eight miles north of Oakland, and it also contemplates building an electric railway between the two points named for the purpose of handling coal, lumber, fire-clay, etc.

†BOSTON, MASS.—Progress on the construction of the new "L" terminal of the Boston Elevated Railway Company in Forest Hills Square, Boston, has been temporarily checked by the failure of the Boston Board of Aldermen to grant the permit for relocation of the surface tracks in the Square in such a manner as to facilitate transfer of passengers to and from the overhead lines. But most of the concrete foundations are in, and it is expected that matters can shortly be arranged so that the work will proceed. Changes at the Dudley Street station are about being renewed, following a delay pending the arrival of steel. Some work has already been started looking to a shifting of some of the surface car traffic on the east-side loop to the west-side loop.

oMENOMINEE, MICH.—The directors of the Menominee & Marinette Light & Traction Company have voted to close the option held upon the entire Holmes interest in the Menominee River-Grand Rapids water power, two miles west of Ingalls and Wallace. The preliminary work of survey