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### The New York State Convention

The quarterly meeting of the Street Railway Association of the State of New York, held in Kingston on Sept. 21, demonstrated anew the substantial progress which can be accomplished when a meeting gives its attention to two or three subjects. Those who are familiar with the good work this organization is achieving may well wonder why every electric railway company in New York has not joined

the body. All the more credit then is due to those who recognize its value and give it their hearty support.

Elsewhere in this issue appears an extended report of the meeting, from which it will be seen that the principal result accomplished was the adoption of a standard code of rules for interurban railway service. Although these rules are based on those of the American Railway Association, the New York society did not overlook those differences peculiar to electric service. The operation of cars under a combination of steam railroad and electric street railway conditions, as is the case on electric interurban railways, is a unique development and required an immense amount of thought so that regulations should be devised to meet every class of interurban transportation.

A happy feature of the meeting was the attendance of two representatives of the Public Service Commission, who followed the proceedings with the greatest interest. Whatever their opinions may have been before the meeting, the points brought out in the very active discussion on rules must have convinced them how anxious the railway companies are to give good and safe service. It is to be hoped that these and other members of the Commission will attend future meetings and lend their aid to the solution of important traction problems.

The discussion on fare collection showed that the ideal system of securing fares remains to be discovered. It would seem, however, that the less the money paid on the train the less danger from loss. Hence, Mr. Frankel's suggestion that ticket stations should be established wherever feasible is one that deserves attention. Some of the delegates recited their experiences with different patented registering and duplex devices, but the association has wisely refrained from making such details public, as it does not follow that the results on one line necessarily will be duplicated on another, and such disclosures might injure many manufacturers who are honestly striving to improve their devices in co-operation with those who are using them.

That many companies are still in the dark regarding the actual results from handling freight and express is apparent from the diverse opinions expressed in the papers and discussion. It must be admitted that the early electric railway companies which entered this field made many errors, but no pioneers ever yet found sign boards and macadamized roads in a virgin forest. The great differences between trunk line steam and interurban electric freight practice on one hand, and of interurban old line company express practice on the other hand have been discovered through costly experience. The conditions must be very favorable indeed, if an electric railway company can handle a dozen carloads of freight at the same rate and profit as a steam railroad company which will haul a thousand cars in the same



period. A slavish following of the steam classification has often prevented the electric railway company making rates which are justified by its quicker service. It would also appear that it is usually better to leave the wagon deliveries in connection with an electric express service to a local truckman. The load factor is just as important in the profit of a delivery service as of a power station. An arrangement such as here suggested would make it unnecessary to keep equipment idle and eliminate the trouble of looking after something not in keeping with electric railroading. The advertising value of the wagon service need not be impaired, as it is quite customary nowadays to see wagons carrying one firm's name making deliveries for a dozen others beside.

No doubt these and many other points of the freight and express business will be threshed out thoroughly by the committee which President Wilson will appoint to consider this subject. It is to be hoped that the members will be given every facility for securing the necessary data, to the end that this branch of electric railway service may be placed on a secure footing.

### Steam or Electric Locomotives ?

We abstract this week an interesting paper by Mr. Toltz on the possibilities of traction with improved types of locomotives and the resulting discussion at the New York Railroad Club. Mr. Toltz has no grudge against electric locomotives, but he holds and very properly that in making comparisons of cost between steam and electric traction the former should be credited, like the latter, with its reasonable possibilities. A somewhat ideal electric traction based on extensions and improvements on present practice ought not to be set over against steam working that is clearly and demonstrably inferior to that which could readily be introduced at moderate expense. This attitude was taken by certain of the other steam railroad operators present and is certainly fair in the discussion of relative economy, since the gain claimed for electric locomotives is the result of computation rather than experience and is based on averages for steam traction derived from ordinary, rather than selected data. To a certain extent Mr. Toltz's paper is critical of the late paper on electric traction by Stillwell and Putnam, and antagonistic to the adoption of electricity, and this fact brought a number of prominent electrical engineers to their feet to defend electrical operation. Mr. Toltz explained, however, that his main purpose was to demonstrate the possibilities for economy of which the steam locomotive is capable, and claimed that future comparisons should be based upon this reduced power cost, to be effected by the use of superheaters, feed-water heaters and other economical devices of proven desirability.

Taking up then the performance of steam locomotives, Mr. Toltz reckons the average consumption of coal per hp-hour in locomotives to be about  $4\frac{1}{2}$  lbs. on the basis of average steam consumption and evaporation. This figure is certainly as low as the facts of present practice will warrant and indeed most tests of ordinary locomotives on actual runs have tended to still higher values. On the other hand, the St. Louis tests, under the most favorable conditions, with improved locomotives, showed a coal consumption below  $2\frac{1}{2}$  lbs. per hp-hour. Let us look at the facts of the case to

see where locomotive economy really stands. The locomotive, so far as the engine is concerned, is in most cases a simple steam engine of large capacity and high piston speed, having a rather rudimentary form of valve gear and employing nearly saturated steam at, however, a good stiff working pressure. Its capacity, speed, and pressure help its economy while crude admission of saturated steam is an adverse factor as in any engine. The net result is that the steam economy is fairly good, between 25 lbs. and 30 lbs. per hp-hour. This is about what is obtained with simple Corliss engines of the older types, the locomotive gaining enough from its high pressure to compensate at least in large part for its rudimentary valve gear. Of course the locomotive, like any other engine, has its most economical cut-off point, and to this corresponds the load and speed of maximum economy which Mr. Toltz points out as a rather neglected factor in railroad economics. His analysis of this matter will bear close reading since it so directly affects the quality of the service, which has been too often neglected.

Now the steps in the improvement of ordinary locomotives considered merely as engines are tolerably obvious and work with stationary plants has been carried so far that one can tell with reasonable certainty what the effect of improvements will be. Unfortunately the lines of greatest progress in stationary engines, condensation and multiple expansions cannot easily be followed in locomotives. Plain compounding and superheating are practically available and were they generally employed would make a very considerable change for the better in locomotive steam consumption. Compound locomotives have been in limited use abroad for years and have been tried somewhat in this country. The result has been to show an economy for the compound engines still using saturated steam of approximately 15 to 20 per cent. This is about what should be expected from compounding without condensation. As regards superheating there are fewer data available. For a long time designers of power stations pretty uniformly discouraged any considerable superheating, possibly because its adoption would compel variations in steam engine standards. It is only since the coming of the steam turbine that the advantages of superheating have come to the front. But the results abroad have shown that it is quite easy to gain as much from reasonable superheating as from simple compounding. The tests on the Canadian Pacific quoted by Mr. Toltz are very much to the point in proving the effectiveness of superheating. The simple locomotive so operated beat out a compound locomotive by about 12 per cent.

There is, however, another side to the matter. The boiler of a locomotive is operated under conditions which are decidedly strenuous. It has to be forced at times beyond all reason and has to contend with condensation to a very serious degree. It has to work with forced draft and with difficult conditions of firing, so that its average performance is much worse than that of a stationary boiler. From Mr. Toltz's showing its practical evaporation is only about 6 lbs. of water per pound of coal, while under ideal conditions, as in the St. Louis tests the boiler would give fully 10 lbs. instead of 6. Although by compounding and superheating less serious demand would be made on the boiler, it still



has to work under bad conditions. Practically both compounding and superheating have been only moderately successful thus far. Railway men naturally look askance at any sort of added complication, and on Mr. Toltz's own showing the superheaters thus far tried have been rather prolific of trouble, although economical in fuel. We cannot see how the addition of the superheater would reduce the repair figures—in spite of the Canadian Pacific figures quoted on this point. Either the superheated locomotives must have been exempt from some repairs or the ordinary locomotives have been the victims of extraordinary and unexplained troubles. It seems to us that in spite of the good gains in fuel that can be made there is every reason to expect very material increase of repairs and renewals when compounding and superheaters are resorted to, and while these features ought to be introduced to a far greater extent than now, we see small hope of bringing the average fuel consumption anywhere near the figure of the St. Louis tests without paying heavily for the gain elsewhere. In other words, Mr. Toltz seems to us to have taken a rather roseate view of the situation, considering the practical difficulties which most steam engineers believe to stand in the way of the refinements which might be applied readily to locomotives were they not under the inconvenient necessity of running upon track.

### Increasing Demand for Results of Scientific Research

There is an increasing demand for reliable scientific data on matters pertaining to the technical side of electric railway operation. The industry is growing so rapidly that the supply to this demand is far from being adequate. The larger manufacturing companies of course conduct research work along the lines in which they are interested. But this work is prosecuted at considerable expense and is a part of the conduct of the company's business, so that while some of this information appears in printed form, the greater part of the results of these investigations are not usually made public. We must look in large part, therefore, to outside interests to carry on systematic scientific research, notably either to the Government or to the technical institutions of the country. The work of the former in forestry, agriculture, mining and other branches of industry has of course been very creditable, but as yet little or nothing has been attempted in the field of electric transportation, if we except questions relating to the values of different kinds of fuel and the preservation in various ways of wooden ties and poles. On the other hand, it is not altogether feasible for our technical institutions to do all that should be done in this direction, even within certain limits, owing to the heavy demands upon them to carry on the work of teaching, the small compensation paid to the professors for their services often necessitating their assumption of outside commercial employment, and the lack of funds necessary for special apparatus.

This condition has existed for many years, but particularly in our eastern states. In the Middle West some noteworthy attempts have been made at co-operation between the universities and the different State governments in the investigation of traction matters, and at the time of the St. Louis Exposition exceedingly valuable results were accomplished in the study of electric traction data under the direction of the management of that enterprise. The effect

of these spasmodic though fruitful efforts in the direction of solving electric railway problems emphasizes strongly the possibilities which can be secured through systematic work.

The opportunities for research in traction matters are omnipresent, and in cities like New York, Chicago and Boston are practically unlimited. The sphere of investigation should not be confined to a few theoretical subjects, but should include extended tests of all kinds, covering those pertaining to train movement, studies of trucks, brakes, energy consumption of cars, electrical characteristics of rails, bending moments of poles, transmission losses, energy values of fuels, ways of improving operating features, protective devices, electrolytic corrosion and numerous other subjects. Where funds are provided for carrying on such investigations their expenditure should not be hampered with "red tape."

The rapid commercial advance of Germany during the past four or five decades is attributed largely, by those who have made a study of this development, to the encouragement given to independent research of this character. This phase of the subject has recently been discussed in an interesting way by J. McKien Cattell, professor of psychology at Columbia University, in a pamphlet entitled "A Statistical Study of American Men of Science," in which he considers the study of 1000 scientific men in this country, of which number 126 were from foreign countries. In comparing the conditions here and abroad, Professor Cattell states that one chemical firm in Germany employs 300 doctors of philosophy to carry on scientific investigations. Research work in that country has been advanced immensely by the universities, which in turn have been greatly benefited by the commercial aspect given to their laboratory work. The professorships there are given as a reward for successful investigation as well as for teaching, and there is a tendency to permit certain professors to engage almost exclusively in research. A parallel is found in this country in the astronomical observatories of Harvard, Chicago and California universities, which are purely research institutions. Further steps in this direction have been taken in the endowment of such bodies as the Carnegie Institution and the Rockefeller Institute. Professor Cattell, however, considers the most logical advance to be in the conduct of research work by the Government. He thinks that if the Government proposes to control the monopolies, it should conduct studies of the kind indicated not for the benefit of a single individual, but for that of the people as a whole.

The subject is an important one, and whether the suggestions briefly referred to above are the best or not they call attention to a topic which is of vital interest to the industrial growth of the nation. Perhaps the most immediate assistance can be secured from our technical institutions by whom most creditable work, although on a limited scale, is now being done. Let this be broadened by the assistance where possible of the manufacturers and railway companies through the loan of apparatus and become better known by publication of the results in the technical press or before engineering societies. It might even be possible for the street railway and electrical associations of the country to effect arrangements with certain institutions by which the latter would undertake to carry on through each scholastic year work along definite lines laid down in advance.



## THE EVANSVILLE & EASTERN TRACTION SYSTEM

The Evansville & Eastern Electric Railway, which was put into operation June 10 last, has the distinction of being one of the very few electric lines in the country which does not parallel a steam railroad.

The road proper extends a distance of 21 miles from



A LONG TANGENT ON THE EVANSVILLE & EASTERN TRACTION SYSTEM

Newburg, Ind., which has a population of about 1500 people, to Rockport, having about 3500 inhabitants, with a 3-mile spur north to Richland. However, traffic arrangements have been made with the Evansville Suburban & Newburg Railroad whereby cars are operated into Evansville over the tracks of the latter company.

The road passes through a rich farming country. Corn is raised on the river bottom farms on one side, while the land to the north is devoted to wheat raising. Wheat which took one of the first prizes at the Chicago World's Fair was cultivated on land near the line in Warrick County.

Heretofore, farmers of the region traversed have been compelled to haul their grain distances up to 10 miles to Rockport, Boonville and Newburg. Those near the river made shipments by way of unreliable river boats. Practically all these shipments from the territory 6 miles from the line are now being carried over it. Before the road was completed the farmers made such insistent demands that arrangements were made to haul car-load lots of grain by means of the construction locomotive and about two hundred car loads were hauled.

The road, it may be seen, is practically a farmers' line, and the greater portion of the receipts will no doubt be derived from the farmers. There is, however, considerable through passenger traffic between Evansville and Rock-

port. The steam-road route between the two cities is 51 miles long as against 31 by the electric line. The time over the steam road is not to be considered, since very unreliable connections are made at Rockport Junction. During the first month's operation of the road an investigation showed that only five through steam-road tickets had been sold between Rockport and Evansville, and in three instances business along the line compelled the purchasers to take this route.

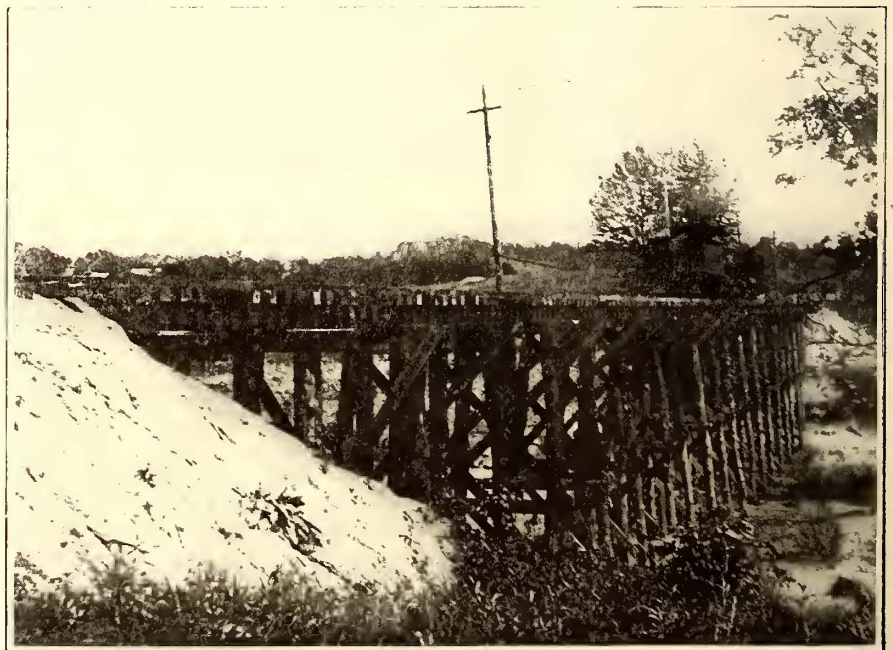
Owensboro, Ky., a city of about 15,000 people, located on the Ohio River, 8 miles below Rockport, is also served by the line through boats which make connections with trains at Rockport. Other than the terminals the only towns on the main line are Yankeetown and Hatfield, with about 400 people each. Eureka, with probably 600 people, lies about 1 mile south of the line, and Richland, on the spur already referred to, has a population of about 800 inhabitants.

### TRACK AND ROADWAY

All of the route, but particularly the western portion, is extremely picturesque. For about two miles after leaving Newburg the track is laid over bluffs on the bank of the Ohio River. The road then crosses behind the hills and passes over Cypress Creek on truss steel construction 115 ft. long. The only other steel structure on the line is that over Pigeon Creek, which is 130 ft. in length. Both rest on concrete abutments. Near Yankeetown the tracks are carried over a ravine on a wood trestle which will probably be displaced later by a fill.

The heaviest grading was necessary near Yankeetown where some 22-ft. cuts were made. East of Yankeetown the country is comparatively level. All cuts were made 22 ft. wide at the bottom and fills are 14 ft. at the top.

The track is laid with 70-lb. rails on oak ties, obtained



TRESTLE OVER A RAVINE NEAR YANKEETOWN

largely from the neighboring country. The entire road was bonded with brazed bonds, the work being done by the Electric Railway Improvement Company, of Cleveland, Ohio.

Sidings vary in length from 100 to 300 ft. and are located at about 3-mile intervals. All passing sidings are



double end; others are stub end. The sidings were placed more frequently than otherwise to provide for the simultaneous operation of freight trains and passenger cars.

Throughout its length the road is ballasted with gravel taken from the bed of the Ohio River, just above Newburg. The gravel was dug up and loaded into barges by a dredge boat, and a tug towed the barges down the river to a coal-mine incline, which extends over the tracks of the electric line. The coal-mine engines were used to pull small cars of gravel up the incline, and these cars were dumped, either directly into the ballast cars or into a hopper underneath the incline. The gravel is almost entirely free from sand and makes an excellent roadbed.

As the road was built partly for freight traffic, heavy grades were eliminated wherever possible. There is, however, one short grade of 2.4 per cent near Yankeetown.

OVERHEAD CONSTRUCTION

The trolley poles, which are of chestnut, 30 ft. and 35 ft. long, are spaced 100 ft. apart on tangents and as close as 75 ft. on curves. The poles are always placed on the outside of curves and are braced, either by deadmen, as shown in one of the accompanying illustrations, or by guy anchors. As no high-tension wires are carried on the poles, unnecessary height of poles was avoided by using a tubular steel bracket braced on the under side. A single trolley of No. 000 round wire is used. Telephone wires and feeders are carried on a cross-arm just below the bracket. Shaw non-arcing lightning arresters grounded to steel rods are placed three to the mile. All of the overhead material with the exception of the lightning arresters was furnished by the Ohio Brass Company.

POWER STATION AND FEEDER SYSTEM

The power station is located about midway of the length

units each, consisting of a Westinghouse compound non-condensing engine and a Westinghouse 600-volt generator. The switchboard is of Western Electric Company manufacture and consists of two generator and two feeder panels. Water for the boilers is obtained from wells sunk near the power house, and coal is hauled in the company's cars from mines at Newburg.

A 500,000 circ. mil feeder leaves the power house in each



A PICTURESQUE SPOT ON THE EVANSVILLE & EASTERN TRACTION SYSTEM

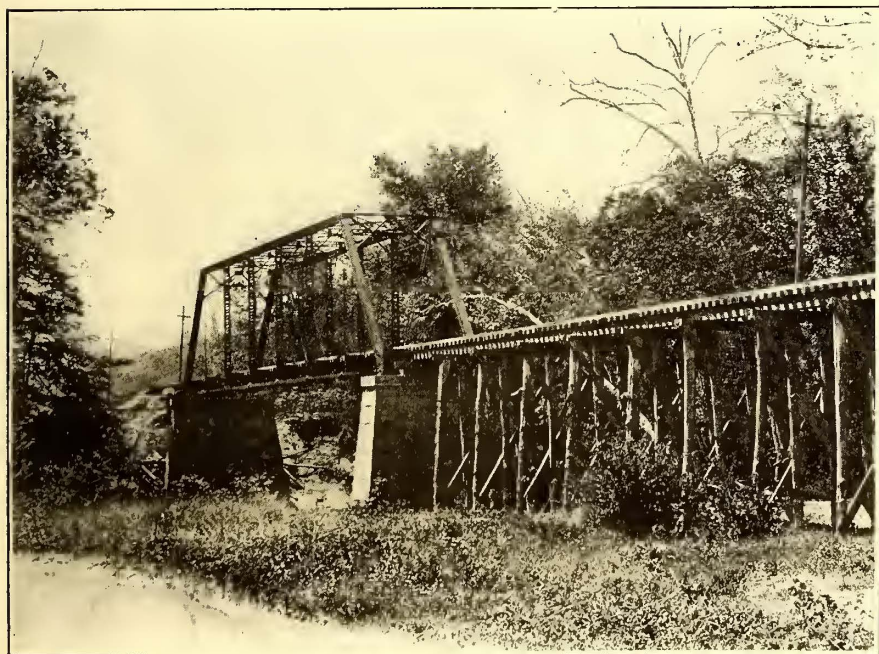
direction. The feeders continue at this size to points 5 miles from the station where they are reduced in size to 350,000 circ. mil. These smaller feeders are carried to within 1 mile of the ends of the line.

REPAIR SHOPS

A brick repair shop adjacent to the power house at Hatfield contains three storage tracks and space along one wall for the installation of requisite machinery.

CAR EQUIPMENT

The road is equipped with five passenger cars built by the American Car Company. The cars are 46 ft. long over all, 9 ft. wide and seat forty-eight people. The inside finish is dark oak. All are built with a small baggage compartment at one end and are intended for double-end operation. They are equipped with four Westinghouse 101-J motors of 50 hp each, and these are mounted on 21 E-1 Brill trucks. K-14 controllers are used. The cars are provided with Westinghouse Traction Brake Company straight air brakes, and Peter Smith hot-water heaters. They are painted a Big Four yellow, which



ONE OF THE TWO STEEL BRIDGES ON THE EVANSVILLE TRACTION SYSTEM

of the line, at Hartfield. It is a brick structure, divided into a boiler and engine room by a transverse wall. The boiler room contains two 300-hp B. & W. boilers served by one steel stack. In the engine room are installed two 375-kw

color has been adopted by the company as a standard and is being used wherever possible.

Package freight is hauled in an express car of practically the same dimensions as the passenger cars.



For handling heavy freight a steam locomotive and twelve standard steam-road freight cars are employed.

Passenger cars are operated between Evansville and Rockport on an hourly schedule. The run requires 1 hour and 20 minutes and three cars are employed. The express car makes two round trips per day.

At Rockport an agent is employed who gives all of his time to the company. In the other towns the agent is employed on a commission basis. Tickets are sold at approximately 2 cents per mile. An extra charge of 25 cents per piece is made for baggage.

The operating offices, which are now located in Evansville, will ultimately be moved to Hatfield.

The road was constructed and partially financed by the Tennis Company, of Cincinnati, with C. H. Battin as engineer in charge. The officers of the Evansville & Eastern Traction Company are: W. H. McCurdy, president; W. L. Sonntag, vice-president; M. S. Sonntag, secretary and treasurer; C. H. Battin, general manager, and F. C. Storton, superintendent.

This company and the Evansville & Mt. Vernon Electric Railway are held and are operated by the Evansville Railways Company.

#### TRAFFIC

Including the two terminal towns the population along the line, it is safe to say, is not more than 400 per mile, taken 2½ miles back on each side of the track. In the Northern portion of Indiana very few lines have been built through territories not showing a population of twice or three times as great. However, in estimating the possible earnings of the Evansville & Eastern Traction Company it must be remembered that the territory is entirely dependent on the line both for passenger and freight service, and that this exclusive territory extends back from the line in some places as great a distance as 6 miles. Moreover, it must be remembered that Evansville, though not on the line proper, must, under the present operating conditions, be regarded as a terminal.

During the first few months operation the receipts have been such as to justify the belief that in electric railway construction there has been too great a tendency to parallel already existing steam lines, rather than to push out through thickly settled farming country, remote from steam roads.

#### FIRST ELECTRIC EXPRESS TRAIN FROM INDIANAPOLIS

The first express train out of Indianapolis, Ind., operated by the U. S. Express Company, was run between Indianapolis and Lafayette Sept. 17. At Lafayette the express was transferred to the Ft. Wayne & Wabash Valley car to be taken north to Ft. Wayne and intermediate points. A movement is on foot by the United States Express Company to obtain the right to operate on all traction lines out of Indianapolis.

#### MEXICAN CONSOLIDATION ANNOUNCED

It is announced that control of the Puebla (Mex.) Tramway, Light & Power Company has been purchased by a syndicate in London, England, of which Sir Weetman Pearson is head. The transaction, it is said, involves the consolidation of the Anglo-Mexican Electric Company, Limited, with the Puebla Company. The same interests are identified with the Mexican Light & Power Company.

#### THE CHICAGO PAY-AS-YOU-ENTER CAR

President T. E. Mitten, of the Chicago City Railway, has submitted to Mayor Busse, of Chicago, a report dealing in detail with the operation of the 300 pay-as-you-enter cars to be installed, beginning next week. The car is of the Montreal standard design, which was described in the STREET RAILWAY JOURNAL of Sept. 16, 1905, except that the cross seats have been widened, the heating and ventilating methods improved and certain safety devices have been introduced. The car body is 32 ft. 5 ins., the length over all 45 ft. 9 ins., inside width 8 ft. 2½ ins., outside width over all 9 ft. There are seven pairs of transverse seats



"TAKE NEXT CAR, PLEASE," SHOWING CONDUCTOR'S POSITION WHEN HIS CAR IS LOADED TO AGREED MAXIMUM

and longitudinal corner seats, each for four passengers, making the total seating capacity forty-four. Although the platforms were built to make possible the use of the Minneapolis folding gate (which is closed by the motorman before starting), Mr. Mitten does not consider it sufficiently flexible for Chicago conditions. The Continental system of no seat no fare is also considered impracticable. Platform accidents in 1906 amounted to about 30 per cent of the total number of casualties.

The method of operating the pay-as-you-enter car will be as follows:

Large platforms are used at either end of the car, the arrangement being such that the car may be operated in either direction. The rear platform is supplied with two doors, one nearest the platform step for exit only, and one at the inner side of platform for entrance only. From the body of the car to the front platform one door gives exit only, and upon the front platform only is smoking allowed. Thus smokers are accommodated and at the same time objectionable smoking or expectoration is eliminated in the passages or on platforms traversed by non-smokers. Passengers are permitted to alight from the front platform, but not to enter, the closing of the door being controlled, through the use of a lever, by the motorman. This eliminates a very numerous class of accidents caused by passengers attempting to board moving cars by the front entrance and falling beneath the wheels.

In entering the car all passengers will pass the conductor, who is stationed on the rear platform in the space provided between the exit and entrance doors. The entrance part of the rear portion of the rear platform, which is barred off from the exit passage, will hold as many as twenty persons, so that there need be no delay even at busy corners, although no fare passenger enters the door of the



car without having first paid fare to the conductor, who is provided with every facility for making change rapidly. The conductor being on the rear platform at all times, and with the divided entrance, cannot only control the overloading of the car, but is never out of sight of the car step, and thus has no excuse for giving the go-ahead signal while persons are boarding or alighting therefrom.

Under the terms of the settlement ordinance the company is required to "increase as rapidly as possible the number of double truck cars . . . until there shall be in operation . . . at least 800 such cars." Five hundred and five double truck cars are now in operation and 300 additional are for delivery during October and November.

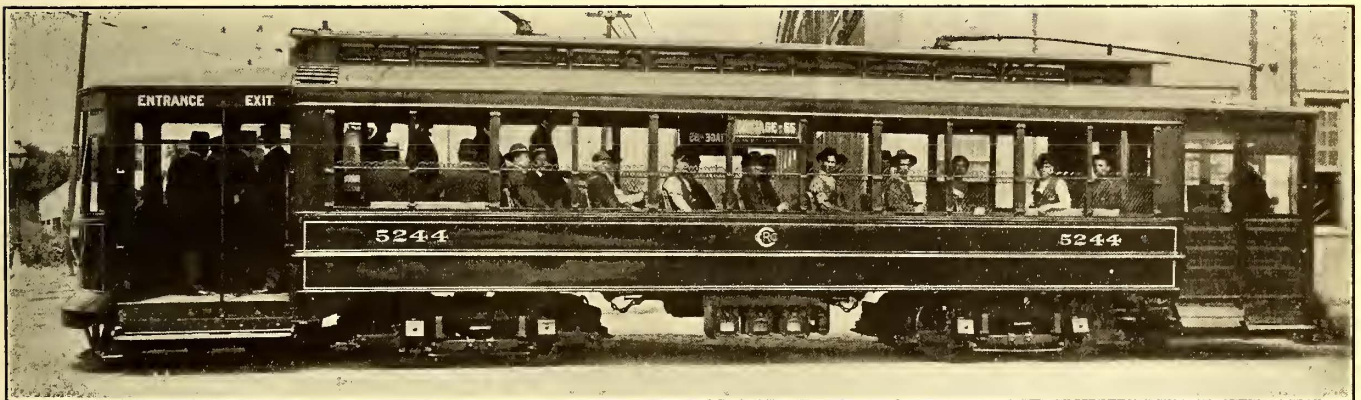
As the "pay-as-you-enter" car can be readily adapted to the present method of fare collection, the 300 cars now under contract have been so designed as to permit of the trying out of that feature as an experiment, with the idea of either adopting the plan as a whole or of later making such changes as may be found necessary to fit the Chicago conditions. All of the standard 1905 and 1906 cars can be readily adapted to this "pay-as-you-enter" feature, as it means simply the lengthening of platforms and the rearrangement of doors.

As arranged, there is a certain flexibility to the Chicago plan, so that in case of extreme rush the conductor might,

## PROGRESS ON THE BALTIMORE & ANNAPOLIS SHORT LINE

Interests identified with the work of electrifying the Baltimore & Annapolis Short Line Railroad report that about 80 per cent of the work has been completed. The line which is being electrified is part single and part double-track road, extending from Baltimore to Annapolis, a distance of about twenty-five miles. The northern terminus of the Short Line tracks is at Clifford Junction, about four miles from Baltimore, and from this point the trains have been operated over the South Baltimore branch of the Baltimore & Ohio Railroad. In order to extend the tracks of the Short Line to the city it has been necessary to move over 200,000 yards of earth for a distance of about two miles. In preparation for the electrification, new 80-lb. steel rails are being laid over the entire road. All curves possible are being eliminated, others are being reduced, easements being used on all curves of more than two degrees.

The cars will be of high-speed, interurban type with inclosed vestibules. They will be finished inside in mahogany. The express cars will seat between fifty and sixty persons. The local cars will be equipped with baggage and



CHICAGO PAY-AS-YOU-ENTER CAR IN SERVICE

at the outset, allow passengers to go into the car rather than create a blockade, thereafter following into the car, collecting the fares and returning to his post. Mr. Mitten is quite satisfied, however, that eventually all the fares will be collected from passengers before entering the car. The rear platform will be at all times kept clear, except when car is fully loaded, when conductor will step to the edge of the platform notifying prospective passengers to "Take next car, please."

Each conductor will be supplied with a change carrier containing \$25 in change. The published rates of fare which appear in cars are as follows:

### RATES OF FARE—CITY ORDINANCE.

Passengers twelve (12) years of age or over, five (5) cents. Children under twelve (12) years of age, three (3) cents. For two children under twelve (12) years of age, when accompanied by an adult, five (5) cents will be accepted. Children under seven (7) years of age, accompanied by a person paying full fare, will be permitted to ride free. Children under seven (7) years of age, not accompanied by a person paying full fare, will be charged three (3) cents fare. Conductors are not required to furnish passengers with change for bills of a larger denomination than two (2) dollars.

express compartments, and both classes of cars will also have smoking compartments. The cars are being built by the Southern Car Company.

Each of the cars of the company will be equipped with four 100-hp alternating-current motors, and will be capable of attaining a maximum speed of fifty-five miles an hour. They will be equipped with the Westinghouse electro-pneumatic multiple unit control system. The trucks are being especially constructed for this road by the American Locomotive Company, and are designed for the heavy requirements of the high-speed service contemplated.

Power will be supplied by the Consolidated Gas Electric Light & Power Company from its Westport powerhouse, and the current will be fed to the trolley at 6600 volts and 25 cycles. The transmission voltage will be 22,000. There will be only one sub-station, at Jones' Station, nineteen miles from Baltimore and six miles from Annapolis. This building will be constructed of brick and concrete, and will be about 15 ft. by 45 ft.

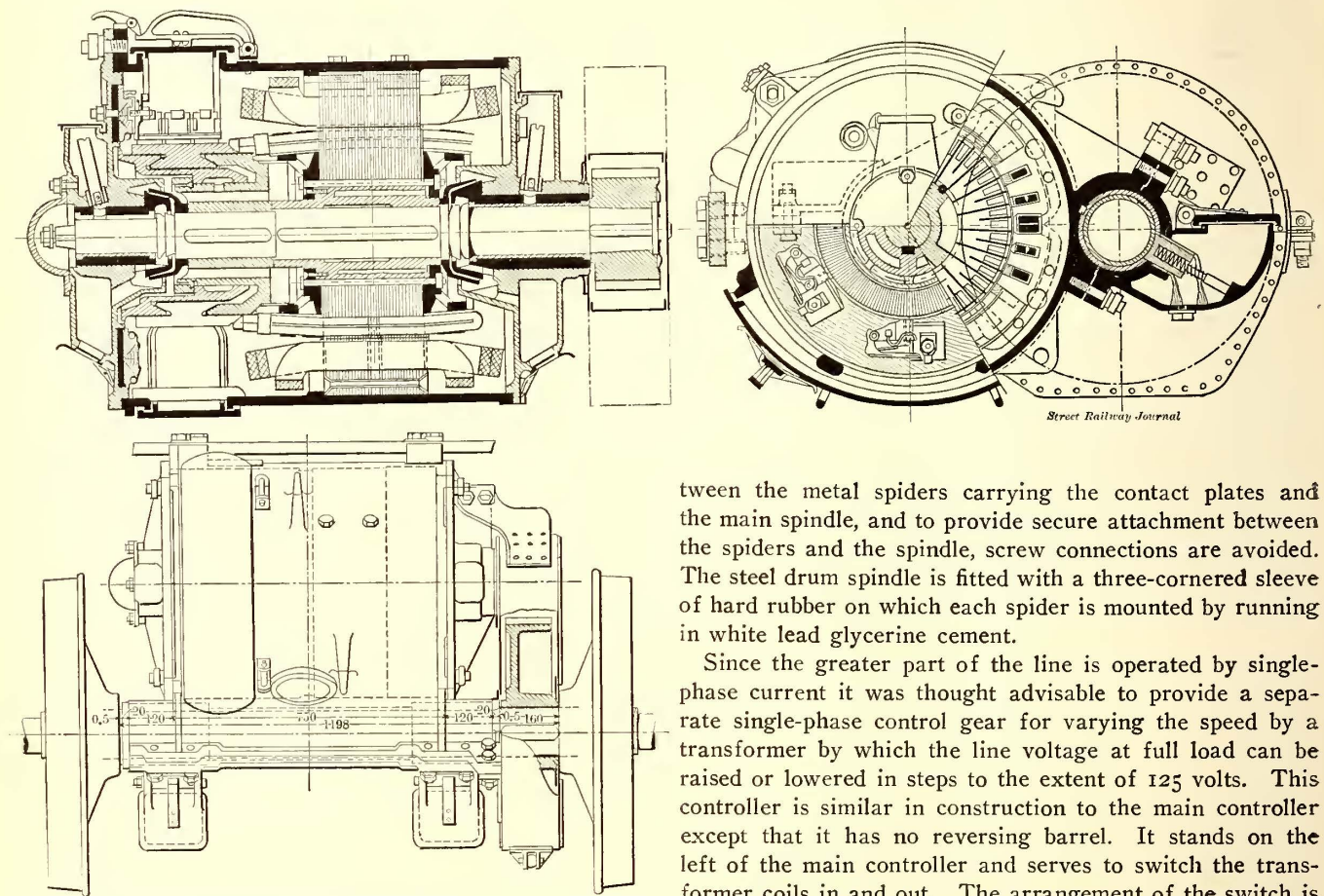
All of this work is being carried out under the joint supervision of J. G. White & Company, of New York, through their representative, Waldo H. Sawin and Dr. J. B. Whitehead, associate professor of applied electricity at the Johns Hopkins University, as consulting engineer.



## COMBINATION DIRECT-CURRENT AND SINGLE-PHASE EQUIPMENT FOR THE VIENNA-BADEN RAILWAY

The Vienna-Baden Railway is one of the latest single-phase interurban lines operated on the Continent. As part of the route in Vienna and Voeslau is over city lines using direct current, the motors are arranged for service on either circuit. Overhead construction is used throughout, which condition required a special design of the current collectors as there are three bridges where the trolley wire is less than 16 ft. above the rails.

The fourteen motor cars are each equipped with four 40-hp single-phase commutating motors with single reduction gearing. In addition to the magnet and compensating windings, the motors have another commutation winding for reducing sparking at the brushes. No resistances are inserted between the commutator and armature windings.



SECTION AND ELEVATION OF ONE OF THE VIENNA-BADEN RAILWAY'S SINGLE-PHASE MOTORS (DIMENSIONS IN MM.)

The motors have long commutators and sets of three brushes 10 mm (.4 in.) thick. The bearings are constructed for oil lubrication. Characteristic operating curves for direct and alternating current are given in two of the accompanying cuts.

The control is of the series parallel type, the motors being permanently connected in two groups of two in series each. The motors are designed to haul a train of one motor car and two trailers weighing sixty-two tons at a speed of twenty-four miles an hour on a 7 per cent grade with 250 volts a. c. at the motor terminals; with 300 volts a. c., the speed is over thirty-seven miles an hour on a 3½ per cent grade. Over the 500-volt d. c. lines the motors

will propel a train at about ten miles an hour on a 15 per cent grade when all the motors are in series.

The controller has eight running steps, four series and four parallel, with six braking steps. Owing to the use of two kinds of current and also to the large amounts of power sent through the controller, a solenoid blow-out coil is used by which the arcs are blown out parallel to the arc shield and away from the controller barrels. This results in a very small wear of the sparking contacts and the spark gaps can be so reduced as to keep down appreciably the size of the controller.

To avoid damage to the contacts when switching off the short-circuit brake, the circuit is not broken in the usual way, but the excitation of the motor is short-circuited. To prevent unnecessary heating of the magnetic blow-out coil the controller connections have been arranged so that the coil is switched off at the same time that the last resistance is disconnected. To prevent leakage, or short circuits, be-

tween the metal spiders carrying the contact plates and the main spindle, and to provide secure attachment between the spiders and the spindle, screw connections are avoided. The steel drum spindle is fitted with a three-cornered sleeve of hard rubber on which each spider is mounted by running in white lead glycerine cement.

Since the greater part of the line is operated by single-phase current it was thought advisable to provide a separate single-phase control gear for varying the speed by a transformer by which the line voltage at full load can be raised or lowered in steps to the extent of 125 volts. This controller is similar in construction to the main controller except that it has no reversing barrel. It stands on the left of the main controller and serves to switch the transformer coils in and out. The arrangement of the switch is similar to that of a battery switch, the change from one coil to the next being made by an auxiliary resistance which prevents the short-circuiting of any coil, though the main circuit is never broken. Severe sparking at the contacts is thus avoided.

The handles of the switches are only removable in the "off" position, and only one set is provided per car. The transformer controller is interlocked with the main controller and when it is in the "off" position the transformer is entirely disconnected from the circuit. When working with direct current the main controller alone is used and the transformer controller remains in its "off" position. To insure that this should be so the spindle of the transformer controller is always locked when direct current is in use or when the current supply fails. When alternating current is being used a small electromagnet connected in



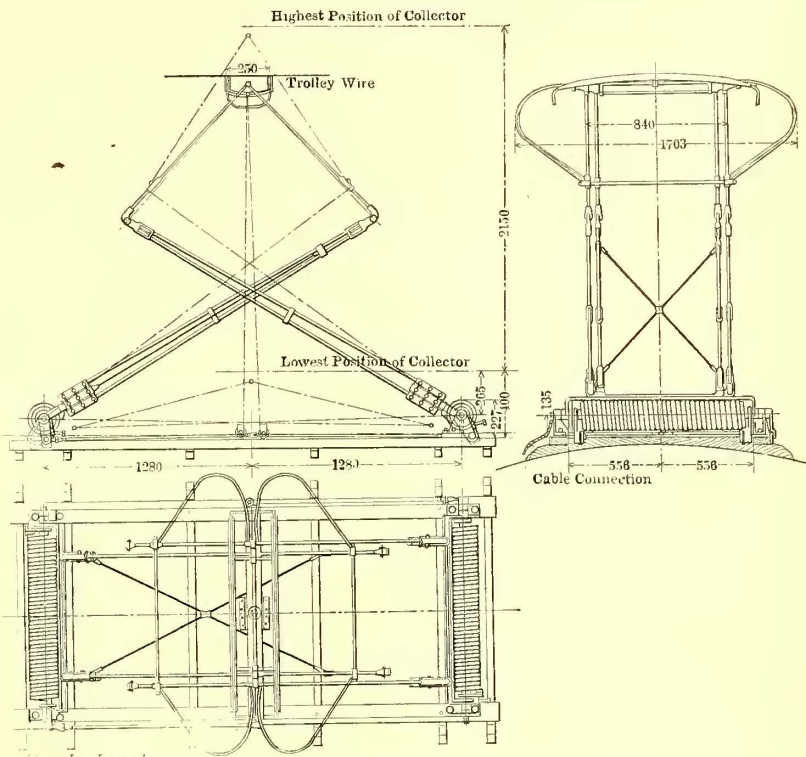
the secondary circuit of a small auto-transformer with-draws the lock and leaves the spindle free. The small auto-transformer is placed under the platform, and has a primary winding of sufficient resistance to prevent excessive current flowing in it when the car is using direct current. Similarly the main controller is locked so that when working with direct current (or when current fails) it cannot be turned beyond the full series position. This prevents the possibility of running at too high a speed within city limits. The alternating current relay magnets of the main controller and transformer controller are connected in the same circuit, so that only one auto-transformer is required for supplying them.

The transformer used for controlling the speed of the motors on the single-phase section of the line is constructed as an auto-transformer. It is hung under the middle of the car floor supported in a cast-iron frame. The coils and their terminals can be removed without taking the transformer from the car by opening the sheet-iron cover.

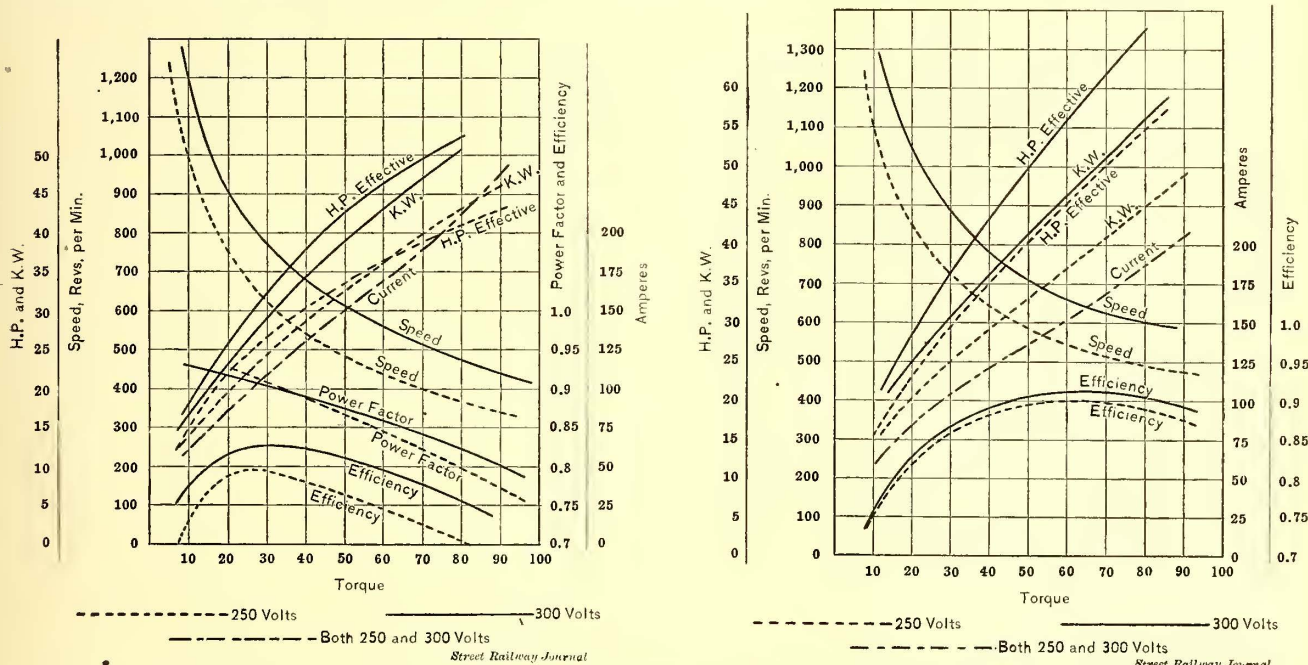
The vacuum brake equipment is also furnished with a. c.-d. c. motors.

Each car has one pantograph bow collector carrying two aluminum contact strips. The collector is balanced for wind pressure and designed to allow for the extreme differences in the height of the trolley wire without appreciable variations in pressure. The contact strips are of U section and are so supported that both sides of the U are in con-

protect the car apparatus against excessive currents. The switch can be opened by hand and also serve as an emergency cutout, for which purpose it is arranged to be opened by alarm-knobs in the car. Each car is also provided with an overload fuse mounted in an accessible posi-



DETAILS OF THE PANTOGRAPH CURRENT COLLECTOR



CHARACTERISTIC OPERATING CURVES OF THE COMBINATION TYPE MOTORS USED ON THE VIENNA-BADEN SINGLE-PHASE RAILWAY

tact with the trolley wire in whichever direction the car runs. This insures good contact and allows the grease in the U to lubricate the wire and thus reduce the wear of both contact strips and wire. The bow does not require reversal when changing the running direction. The collector can be pulled down to the roof of the car in a moment by a cord which leads into the motorman's cab.

A maximum automatic cutout is placed in each cab to

tion under the car. The primary winding of the regulating transformer is protected by two fuses and also by a horn lightning arrester. Each car is also equipped with a horn lightning arrester and electric heating and lighting.

The facts and engravings published above are taken from a recent article in the London "Electrician," which mentions the Austrian Siemens-Schukert Works as being the contractors for the electrical equipment.



RECENT TESTS ON CURTIS TURBINES

The General Electric Company lately has released some interesting reports of tests on the Curtis steam turbine. Two of these trials show degrees of steam economy which are asserted to be considerably better than accomplished by other engines or turbines operating with the same range of pressure.

During the past year four 9000-kw units have been in-

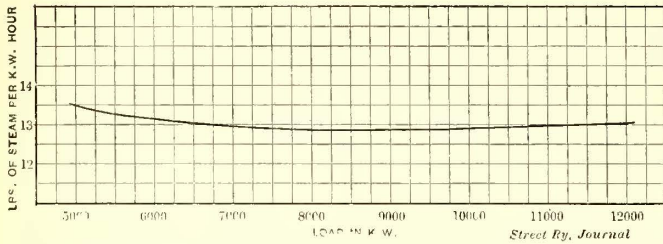


FIG. 1.—LOAD-WATER RATE CURVE FOR A 9000-KW TURBINE OPERATING AT 200 LBS. GAGE PRESSURE WITH 125 DEGS. SUPERHEAT AND 29-IN. VACUUM

stalled in the Fisk Street station of the Commonwealth Electric Company, of Chicago. One of these machines has been tested at different loads by engineers employed for the purpose by the owners. These tests were part of a general investigation of station conditions which has not yet been

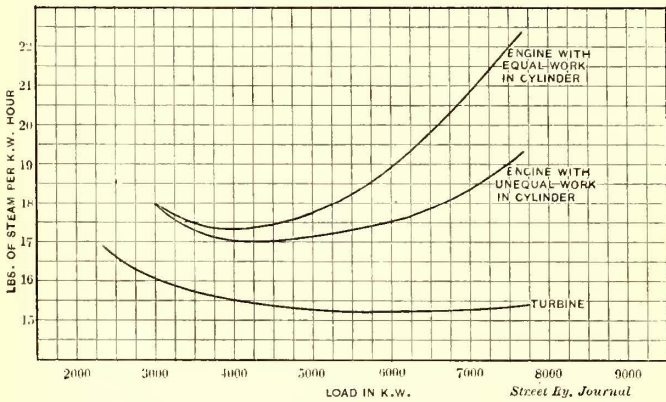


FIG. 2.—COMPARISON OF A 5000-KW FOUR-CYLINDER COMPOUND ENGINE AND A 5000-KW TURBINE OPERATING UNDER THE SAME CONDITIONS

published. The following figures give the results of five tests that were made:

TESTS OF 9000-KW TURBINE GENERATING UNIT AT CHICAGO

Load in Kilowatts.	Gage Pressure, Pounds.	Vacuum, Inches.	Superheat, Degrees F.	Water Rate, Pounds per Kw-Hour.
5,374	182	29.43	133	13.15
8,070	179	29.55	116	13.0
10,186	176	29.47	147	12.9
12,108	182	29.34	148	13.05
13,900	198	29.31	140	13.6

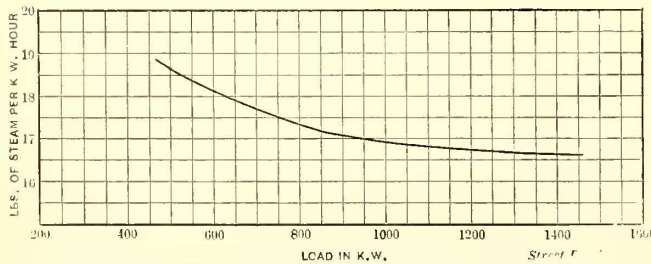


FIG. 3.—LOAD-WATER RATE CURVE FOR A 1000-KW TURBINE OPERATING AT 170 LBS. PRESSURE WITH 170 DEGS. SUPERHEAT AND 28-IN. VACUUM

A test conducted in Boston, Mass., on Jan. 29, 1907, on a 2000-kw five-stage, 720-r. p. m. machine operating under normal full-load conditions gave the following results:

Load on generator, 5915 kw; steam pressure, 173.7 lbs.; vacuum, 28.8 ins.; superheat, 142 degs. F.; steam consumption, 13.52 lbs. per kw-hour. This turbine is mounted on a base condenser which forms part of the unit, and it is believed that this method has much to do with the high vacuum obtained.

A third interesting test is shown by the comparison curves in Fig. 2 between the 5000-kw machine used in Boston and a 5000-kw compound-engine unit, both units operat-

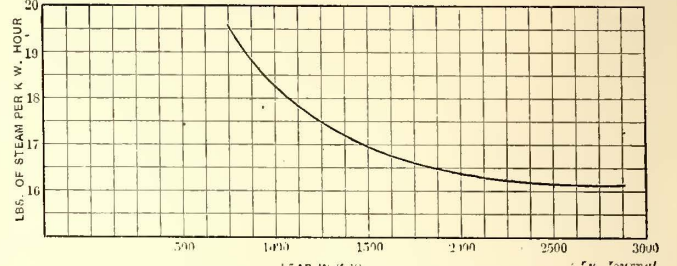


FIG. 4.—LOAD-WATER RATE CURVE FOR A 2250-KW TURBINE OPERATING AT 160 LBS. PRESSURE WITH 150 DEGS. SUPERHEAT AND 28-IN. VACUUM

ing under the same conditions. These curves illustrate the value of the high overload efficiency of the turbine and it should be noted that 50 per cent overload on the engine with equal work in the cylinders requires 43 per cent more steam than the turbine for the same purpose. This construction, of course, is of great importance in connection with the peak capacity of the station with a given equipment of the boilers and auxiliaries and also shows that the change to turbines effects improvement on the normal operating economy.

The high overload efficiency of this turbine is shown to a marked degree in Figs. 3 and 4; Fig. 3 showing the results on a 2250-kw machine made in April, 1907, and Fig. 4 the result of tests on a 1000-kw machine made in May, 1907. Both of these tests were conducted at Schenectady.

TWIN CITY RAPID TRANSIT PROGRESS

Thomas Lowry, president of the Twin City Rapid Transit Company, is quoted as follows in an interview secured by a financial paper:

"I will soon bring before the Twin City directors the question of an increase in the dividend rate. The next quarterly declaration is due in October. I doubt whether the present is a good time to increase dividends. Such action is sure to be interpreted as an effort to advance the stock. If the increase in our dividend comes the early part of next year the stockholders should be satisfied.

"Much pressure has been brought to bear on me in the past to put the stock on a 6 per cent basis, but I felt the property needed money for extensions and improvements. This work is about completed. Our system will be rounded out next year. So it becomes good form to talk about an increase in the dividend. The question is whether it would be good policy to take such action right away.

"The company's earnings for the year will be between 9 and 10 per cent on the common stock.

"We have spent \$3,000,000 a year the past three years on the property, and \$2,000,000 this year, or a total of \$14,000,000 in four years. Now we have the best traction system in the United States. The property is in splendid condition.

"Our franchises in St. Paul and Minneapolis are impregnable. Not only are our rights exclusive and perpetual, according to court decisions, but we can charge straight 5-cent fares. The city of St. Paul attacked our franchise three years ago, but the court ruled in our favor."



## NEW YORK RAILROAD CLUB PAPER AND DISCUSSION ON STEAM VS. ELECTRIC LOCOMOTIVES

The first meeting of the New York Railroad Club after the summer intermission was held on Friday evening, Sept. 20, 1907. The paper presented was by Max Toltz, general manager of Manistee & Grand Rapids Railroad. Before the paper was read, Eugene Chamberlain, chairman of the nominating committee, stated that all of the officers and committee members of the preceding year had announced their willingness to serve another term, although the committee had met with declinations at first from President Vreeland and Vice-President Deems. The report of the committee was unanimously adopted and the present officers and committees duly re-elected. An abstract of Mr. Toltz's paper appears below:

### STEAM LOCOMOTIVE VERSUS ELECTRIC LOCOMOTIVE

At the 213th meeting of the American Institute of Electrical Engineers, New York, Jan. 25, 1907, a paper on "The Substitution of the Electric Motor for the Steam Locomotive" was presented by Lewis B. Stillwell and Henry St. Clair Putnam.\* According to their estimate, if all the railways of the United States were to-day operated by electricity the aggregate cost of operation, which in 1905 amounted in round numbers to \$1,400,000,000, would be reduced by about \$250,000,000. This bold statement seems to have scared some editors of eastern railroad periodicals, so much so that one of them at once propounded the question: "What will be done with steam locomotives if electricity should become the motive power on the steam railroads within the next few years?" In such an event he fears that large numbers of steam locomotives would be thrown out of service and a vast amount of invested capital lie idle.

It is not the intention of the writer to discuss all the details of the second subdivision of the above-named paper comprising the comparative cost of operation by steam and electricity applied to railways in operation, and including both passenger and freight service, but he will confine himself only to the items pertaining to steam locomotives, viz., repairs and renewals of locomotives, engines and round-house men, fuel for locomotives and water supply for locomotives.

Incidentally it may be stated here that the writer does not agree with the statements made by the two gentlemen relating to maintenance of way estimates in which the items of cost of renewals of rails, ties, bridges and culverts have been reduced about \$21,000,000 and for repairs and renewals of building and fixtures about \$13,500,000. It has been found that the construction of the track and the roadway must not alone be fully as good, but better, when operating upon them an electric railroad, and more pains and labor will be necessary to keep up the repairs. Why repairs and renewals of buildings and fixtures should be less when operating electrically, is not explained.

The writer will show in the following that the steam locomotive properly improved is by far more economical than the electric locomotive, even taking it for granted that a kilowatt hour of electrical power could be furnished at the low figure of 0.6 cents at the bus-bars and at 0.8 cents effective for traction as named by Messrs. Stillwell and Putnam, who further state that a horse-power effective for

traction will cost therefore 0.6 cents, of which 0.35 cents is for fuel when coal of 1400 B. t. u. per pound costs \$3 per ton of 2240 lbs., and 0.25 cents is for other supplies, labor and maintenance equipment.

To analyze these statements it will be necessary first to establish the cost of an effective locomotive horse-power to be hereafter called draw-bar horse-power of the locomotive. From the figures given by the authors who estimate that for the operation of the entire freight and passenger service of the United States as existing in 1905, the aggregate energy required at the bus-bars of power-houses would approximate 12,500,000,000 kw-hours per annum. This converted into horse-power would give 16,625,000,000 hp-hours. To check this statement, the writer refers to the report of the Interstate Commerce Commission of 1904. The locomotives in service were in round numbers 47,000. The average freight locomotive is actually on the road not more than six hours in each twenty-four hour period and the same figure is approximately correct for the passenger locomotives. Assuming that each locomotive will develop during the six hours' work at every time 250 draw-bar hp (a very low estimate) the total number of hp-hours per annum will then be nearly 26,000,000,000. In the reports of the Interstate Commerce Commission 1905, it is also stated that nearly \$156,500,000 was expended on fuel for locomotives. Dividing this item by the total hp-hours per annum would give a cost of 0.6 cents for fuel per draw-bar hp-hour compared with the estimated cost of fuel of 0.35 cents as above mentioned when assuming the railroads are operated electrically. This former figure is practically correct because we know that in the average a steam locomotive will use twenty-eight pounds of steam per hp-hour. The average coal used in a locomotive boiler will evaporate about six pounds of water, which would necessitate 4½ lbs. of coal per hp-hour, at \$3 per ton of 2240 lbs. will amount to 0.6 cents per hp-hour. This, indeed, shows that more fuel per hp-hour is being consumed in locomotives than in modern stationary plants which furnish power for electrical operation.

But is it fair to compare the up-to-date power plant with the average locomotive? About 60 per cent of the locomotives now in use were built over fifteen years ago, are of the smaller type and cannot be worked as economically as the latest type, such as the Prairie, the four-cylinder balanced compound and the Mallet articulated compound with wide fire boxes. The reasoning for comparison should therefore be made upon the basis of the latest type of locomotives and therefore the writer refers to the locomotive tests made during the World's Fair at St. Louis, which have established the fact that the coal consumption per draw-bar hp-hour was considerably less than 2½ lbs. Yet properly to dissect the economy in the locomotives, it will be in place to call attention to the fact that each locomotive has one most economical speed limit, or in other words, that on a given grade at a certain speed with a defined maximum load the locomotive will turn out the most work at the lowest cost.

For further explanation the writer submits three grapho-static diagrams showing different characteristics of a Consolidation engine, Great Northern Railway F8 type; of a Prairie, Great Northern Railway J type, and of a Mallet Compound, Great Northern Railway L1 type. These diagrams give the coal consumption per draw-bar hp-hour at different speeds, the train tons on different grades (this train tonnage does not include the engine proper but does include the tender), the different draw-bar pulls in pounds

\*See STREET RAILWAY JOURNAL for Feb. 2, 1907.



at the draw-bar between the locomotive and the tender, the maximum draw-bar hp developed at the different speeds, the ton miles on the different grades and at different speeds, the coal consumption per 1000 ton miles for saturated steam as well as for superheated steam, the increase of coal consumption over five miles per hour, the ton miles increase over five miles per hour and the actual cost of hauling 1000-ton miles at the different speeds in which only cost of coal and wages of train crews have been considered. From these diagrams it can readily be seen that each locomotive does the most economical work at certain speed, for instance, the F8 engine working with saturated steam on a 1 per cent grade will work at the lowest cost at the speed of 11 miles, while with superheated steam at a speed of little over 12 miles. On a 2.2 per cent grade this locomotive working with saturated steam will work most economically at 10 m. p. h. and with superheated steam at 11½ m. p. h. It can further be seen that the total coal consumption is increased slightly over that of a speed of five miles per hour, while the ton miles per hour are increased considerably. The data referred to in the diagrams are arrived at from the given details of cost in each case under the condition that the locomotive is working on the mentioned grade between stations and performing continuous work. No delay or stops at stations nor any broken grades of the road have been considered.

The question of the most economical work to be obtained from any locomotive seems to be not fully understood because the management of roads generally have prescribed the policy of big train tonnage to the detriment of the service. The Mechanical Departments' recommendations re-

cause more economy can be derived from further improvements, especially in superheating.

During the last two years a successful attempt has been made to improve the steam by superheating, which not alone gives steam economy, but also saves the coal pile. Mr. Vaughan, of the Canadian Pacific, in his recent paper on superheated steam locomotives read before the American Society of Mechanical Engineers at Indianapolis, reported an average saving of coal of 15 per cent with superheated over saturated steam locomotive, although in European practice these results average over 25 per cent.

The accompanying service records of May and June, 1905 made with a 2-4-4 high-speed compound saturated steam locomotive and a 4-4-0 simple superheated steam locomotive on the Prussian State Railway, were furnished by Herr Robert Garbe, director of the mechanical department, to the writer, who was able to verify them in January, 1906.

There is no doubt that this economical feature of steam engineering will be adopted and, with a little more vim and proper attention (see Mr. Vaughan's remarks made at the recent convention of the Master Mechanics—they are opportune, important and correct) to the parts of the superheater, better results will unquestionably be obtained. Great credit should be given Herr Schmidt, who for the last ten years has done excellent work in this line in Europe, and the writer is fully convinced that in a few years, after the locomotive superheater has been adapted to and tried in our railroad practice, a greater economy in coal than has been shown so far will be recorded. Consequently, the saving in coal by the use of superheated instead of saturated steam will be assumed to be 20 per cent.

Locomotive	Train Load			Water		Coal		Time		Highest Temperature Taken			
	Axles	Metric Tons	Increase	Used Gal.	Saving	Used Lbs.	Saving	On Road, Minutes	Saving	° F Smoke Box	Vac. in in.	° F Flues	° F. Steam Superheated
Comp. satur. ....	36	317.5	.....	6450	.....	10150	.....	190	.....	428	5.1	.....	.....
Simple superheated.....	36	328	4%	3960	38%	7820	23%	170	10%	627	4.3	1202	625
Comp. satur. ....	44	387.5	.....	7200	.....	12000	.....	200½	.....	446	7.5	.....	.....
Simple superheated.....	44	410	6%	4640	36%	8600	28%	173	14%	602	5.5	1202	625
Comp. satur.....	51	437	.....	7600	.....	12450	.....	229¾	.....	446	5.5	.....	.....
Simple superheated.....	52	482	10%	5070	33%	9150	27%	187	18%	644	5.7	1292	644

garding smaller tonnage and higher speeds are often not accepted and in consequence it will be found that the locomotives do not work to the best advantage.

Although a good deal has been said and written lately about the best train tonnage, it is within the province of the Mechanical Department of a railroad to establish such tonnage by computing the different data corresponding to the diagrams and the tests of the locomotives.

The basis of later calculation of the cost per draw-bar hp will be made from the figures given on the diagram of the Mallet compound engine, in which it is shown that the best performance is made at nine miles per hour on 2.2 per cent grade, working with saturated steam, while with superheated steam it is at a speed a little over 10 miles. Taking the first case, the increase of coal consumption over 5 miles per hour is only 8 per cent, while the increase in ton mile hours over 5 miles is 72 per cent. At this speed the coal consumption per draw-bar hp-hour is 2.6 lbs.

This is a remarkable showing, but we should not be satisfied with the result obtained in this type of locomotive be-

Higher superheat should and must be used to derive the advantages from superheated steam. This has been shown in the locomotive of the Canadian Pacific, which was equipped with the first Schmidt smoke-box superheater, in 1901. Under E. A. Williams, formerly superintendent of motive power of that road, a test was made with three locomotives, one the simple superheated, one a simple saturated and one Vauclain compound saturated steam engine. This test was carried on from July 1, 1901, to Dec. 21, 1902, with the following results:

Engine	Ton Miles Per Ton Coal	Relative Per Cents.		Mileage	Cost of Repairs	Cost, Repairs, Per Mile
Simple superheated...	21185	133.4%	100%	64926	\$1726.28	2.66c.
Simple saturated.....	15877	100 %	75%	67969	\$3719.51	5.49c.
Vauclain compound sat	18611	117.2%	88%	61645	\$2496.45	4.05c.

This remarkable showing is due to the high degree of superheat derived from the great heating surface of the



superheater and from the greater temperature of the gases which were carried from the fire box by a large fire flue of 14-in. diameter in the bottom of the boiler. As far as the writer knows, the connection of this big flue with the tube sheets has not given any trouble due to leakage, but Schmidt abandoned this design merely to avoid the danger which

crew has been increased, due to the magnitude of the latest type of machine, so much that the limit of its capacity has been reached, it is believed, that by applying the improvements, which are possible from a mechanical engineering standpoint, the work of the crew will be decreased in many respects. For instance, in superheating the steam less coal will be handled by the fireman, and in connection with perfect lubrication, the work of the steam in the cylinders will be greatly improved. There should be no blown out cylinder heads due to accumulation of water. Better and quicker starting of the train will be attained. Failures of non-steaming will be avoided by heating the feed water. There will be fewer leaky flues and fire boxes and the hard work of the fireman can be reduced considerably by a perfect stoker. Roundhouse labor on the boiler will be minimized, though the use of some coals, such as Illinois and Iowa, will require more attention to the cleaning of the smoke flue superheater. Fire boxes and flues will last longer, and last but not least, the curse of uncleanness, due to locomotive smoke, will be abated under conditions of perfect combustion in the fire box.

In making statements as to saving in the items of

- (1) Repairs and renewals of locomotives,
- (2) Engine and roundhouse men,
- (3) Fuel for locomotives and
- (4) Water supply for locomotives,

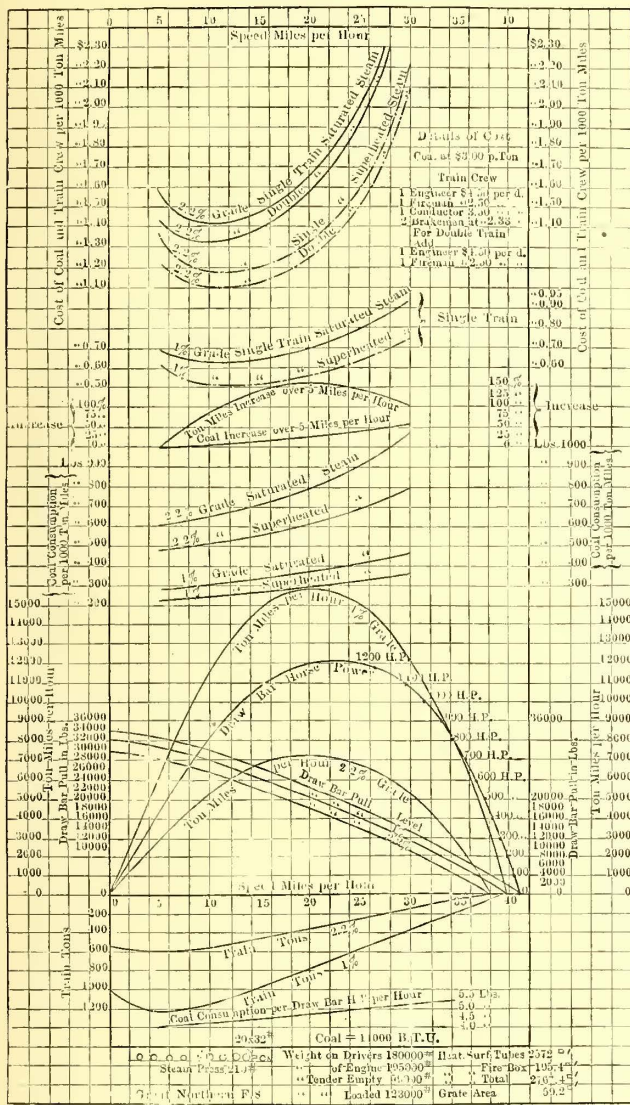


FIG. 1

may develop on account of it. A greater number of locomotives of the Belgian State Railway is equipped with this superheater and according to the statement of Monsieur Flamme, general superintendent of motive power, the saving of coal amounts to over 25 per cent.

Next to the saving in coal, by the use of superheated steam, comes the increase in the capacity of the boiler and the saving of feed water, which averages more than 30 per cent. This feature is very important because in many instances a water station with exceptionally bad water can be abandoned or used for emergency. Boiler washings will be reduced and cost of water supply decreased proportionally.

According to the statistics of railways for 1904, compiled by the Interstate Commerce Commission, the repairs and renewals of locomotives amounted to \$115,000,000, while for engine and roundhouse men about \$130,450,000 was expended. With improvements to boiler and to feed water apparatus as outlined above, these items in the opinion of the writer, could be reduced 30 per cent, which would make a saving over \$73,635,000.

Although it is maintained that the work of the engine

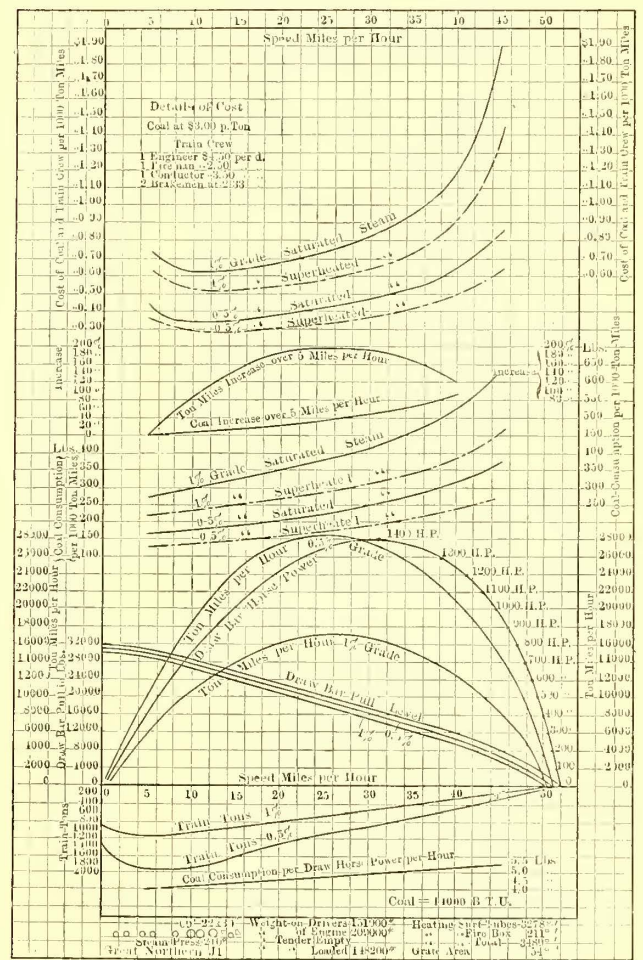


FIG. 2

assuming that all locomotives are equipped with the aforesaid improvements, different propositions are computed.

The saving in coal can be figured at 20 per cent by superheating, at 20 per cent by feed water heating, and at 5 per cent by perfect combustion, an aggregate of 39.2 per cent; the saving in locomotive repairs, items 1 and 2, 30 per



cent, the saving in water supply for locomotives, 30 per cent.

The first proposition which naturally presents itself is to deduct from the items of the 1904 report of the Interstate Commerce Commission these various percentages, which will give the following results:

30% of \$130,500,000 for engine and roundhouse men (2).....	\$39,150,000
39.2% of 156,500,000 for locomotive fuel (3).....	61,348,000
30% of 9,150,000 for water supply (4).....	2,745,000

Total saving per year.....\$103,243,000

In this no account has been made for reduction of repairs and renewals, item (1).

The second proposition, assuming that all existing locomotives are of the latest types using, instead of 4¼ lbs., only 2.6 lbs. of coal per draw-bar hp, as stated above, and are

It is proper to repeat the statement made by Messrs. Stillwell and Putnam relative to the reduction of the four items referred to when all roads are electrically operated. They assumed a saving of

- 70% in item 1, Repairs and renewals of locomotives;
- 50% in item 2, Engine and roundhouse men;
- 50% in item 3, Fuel for locomotives, and
- 100% in item 4, Water supply for locomotives.

Accordingly, the savings would be as follows:

Item 1— 70% of \$115,000,000.....	\$80,500,000
Item 2— 50% of 130,500,000.....	64,860,000
Item 3— 50% of 156,500,000.....	78,250,000
Item 4— 100% of 9,148,000.....	9,148,000

A total of.....\$232,758,000

This indeed, looks very attractive, but the writer leaves the criticism of these assumed figures to his brother engineers.

The amount of capital which must be expended to obtain these doubtful results can hardly be imagined. A conservative estimate would be several billions of dollars. Although the estimated savings by an electrical equipment might warrant such an immense expenditure, the improvement of the steam locomotive offers like inducements. It has been the boast of the advocates of railroad electrification that with an electric locomotive double the trailing tonnage can be hauled at double the speed of the present steam locomotive. The writer begs to state that the steam locomotive of to-day (and not the most powerful one yet built) takes 800 tons singly and 1600 tons doubly over a mountain grade of 2.2 per cent with a speed of ten miles per hour.

The electric locomotive, either in single or multiple units, has its place in big terminals and in tunnels, but it cannot in its present development replace the steam locomotive for trunk-line service. The writer has investigated some of the greatest water powers in the Rockies and in the Cascades, and he ventures to say that none of them can deliver electrical power per draw-bar hp per hour for less than 5 cents. Another feature over which most enthusiasts of electrification stumble is the high power factor which is assumed. If electrically operated to-day, the load factor would not exceed 48 per cent on three typical American railroads; the Great Northern, Northern Pacific and Canadian Pacific. These are facts as Daniel Webster once said, which can invariably be proved, and it will therefore be a little time yet before our old standby, the steam locomotive, will be regulated to the scrap heap, if our fraternity will assist in making this old friend of ours what it should be.

DISCUSSION

The discussion was opened by William McClellan, consulting engineer of New York City. He referred first to superheaters, saying that his experience with them in connection with stationary boilers had convinced him that they form the most troublesome part of the boiler plant. Superheaters, like other improvements, would have to go through a long course of experiments before they could be successfully operated on the average road engine. He could not understand why the cost of maintenance of the locomotive should be so much reduced by the superheater as shown in the paper because a superheater is usually expensive to maintain. As to the general subject of the electric locomotive, he felt that the performances already on record were a pretty good defence. He regretted there should have been so much controversy over steam vs. electric operation. It would have been better if from the very first electric engineers had made themselves more familiar with steam operating conditions and the steam engineers had more carefully studied electrical possibilities. The cost of the

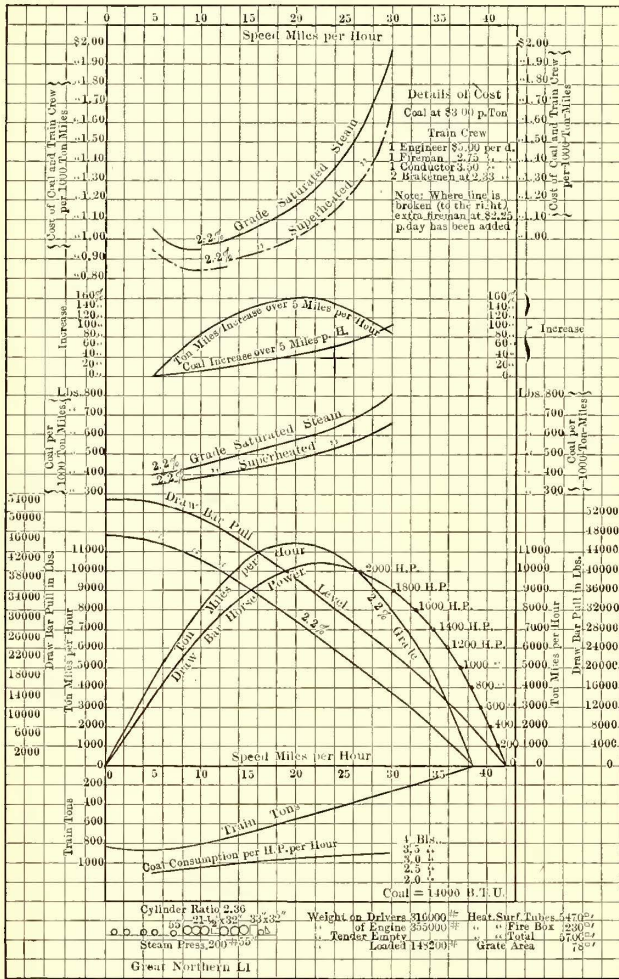


FIG. 3

equipped with the saving devices, will resolve itself into the following:

42.2% less coal for modern equipment.....	\$66,040,000
39.2% of \$90,460,000 (item 3) about.....	35,460,000
(\$90,460,000, \$66,040,000, \$156,500,000, total item 3)	
30% of \$115,000,000 (item 1).....	34,500,000
30% of 130,500,000 (item 2).....	73,635,000
30% of 9,150,000 (item 4).....	2,745,000

Total saving per year.....\$177,880,000

It is estimated that the three improvements, viz.: superheater, feed water heater and smoke consumer or stoker, can be added at a cost of less than \$4,000 per locomotive, which will make a total expenditure of \$188,000,000 for 47,000 locomotives. According to propositions I and II this amount would be repaid within 22 months and 12.5 months respectively from the saving.



change to the later motive power certainly is very great and the electrical engineer who admits that fact does more good to the cause than one who does not. The cost should be compared not with what the steam road now has, but what it would cost to supply the service by steam which could be given by electricity, viz., a half-hour service, brilliantly lighted cars, etc. Mr. McClellan admitted with regret that comparative costs of operation were very hard to obtain, especially such items as the cost of fuel and water station, ash pits, repairs, etc. It seemed that on an average about 15 per cent of the general repairs of steam locomotives were due to the boiler, but even this factor was not universal. The only way that such costs could be obtained would be to follow the method of W. S. Murray, electrical engineer of the New York, New Haven & Hartford Railroad, who prepared a table showing the performance of a given number of steam and electric locomotives operated on the same system. The electric locomotive is no more complex than the New York subway cars, and as the latter had proved easy to care for despite their great number of movements he did not apprehend any difficulty in maintaining electric locomotives in a service requiring far less movements, nor would the track repairs in electric service be greater than that due to the introduction of higher acceleration, quicker braking and increased speeds. In summing up, the speaker said that there were other factors to be considered besides the financial ones, such as multiple unit operation, cleanliness, desirability of a subway service on trunk lines through large cities, the independence of weather conditions, etc.

N. W. Storer, chief engineer of the railway department of the Westinghouse Electric & Manufacturing Company, said that his only fear was that the demand for electric locomotives would be greater than the facilities of the manufacturers to supply them. He said in humorous vein that as there are 47,000 steam locomotives to be replaced, or 4700 locomotives a year on the basis of ten years life, he really did not want to see them replaced so rapidly. He wanted to bring out, however, the fact that in the steam locomotive the maximum speed is fixed by the boiler capacity and the economical rate of expansion in the cylinders, but in the electric locomotive with gearless motors a certain tractive effort can be had at any speeds up to 70 m. p. h. with economical voltage regulation. The New Haven locomotive has an efficiency of 60 to 65 per cent with a continuous tractive effort up to 10 m. p. h. and 87 to 88 per cent at 50 m. p. h. with normal voltage. The latter speed can be exceeded 10 to 20 per cent simply by increasing the applied voltage, and at the same time the efficiency increases as the speed increases. Hence the most economical speed is the highest that is safe to operate. Instead of 10 m. p. h. up a 2 per cent grade it is just as easy to make 20 or 25 miles, which, of course, means a great increase in the capacity of the road. He was glad that the steam locomotive is still showing some life, but the harpoon was in its neck and it was bound to be landed sooner or later.

The next speaker, J. E. Muhlfeld, superintendent of motive power of the Baltimore & Ohio Railroad, who began his remarks with a reference to the paper presented by him on Feb. 16, 1906, before the club, on "Large Electric and Steam Locomotives," in which figures were given of the cost of operating the electric locomotives used by his company and wherein certain suggestions were made for the improvement of electric locomotives in general. (This paper was published in the STREET RAILWAY JOURNAL of Feb. 24, 1906.) He said that while the electric locomotive might be a neces-

sity in tunnel service it was an expensive proposition where the question was simply one of handling a given tonnage. He then presented a comparison of shop charges made for one and one-half years to two and one-half years previous on steam and electric locomotives used by the Baltimore & Ohio Railroad. These figures, which cover the running repairs and supervision per 100 miles are given herewith:

Three passenger electric locomotives, tractive effort 28,000 lbs.; weight, 196,000 lbs.; cost of mechanical and electrical repairs, \$19.20.

Three freight electric locomotives, tractive effort 70,000 lbs.; weight, 320,000 lbs.; cost of mechanical and electrical repairs, \$12.70.

Mallett articulated type steam locomotives, tractive effort 64,000 lbs.; weight, 335,000 lbs.; cost for repairs per 100 miles, \$5.75.

Thirty-five passenger steam locomotives Pacific type, tractive effort 35,000 lbs.; weight, exclusive of tender, 230,000 lbs.; cost for repairs, \$4.35.

One hundred and seventy-five steam locomotives, Consolidation type, tractive effort 42,000 lbs.; weight, 209,000 lbs.; cost for repairs, \$3.15.

Compared on the basis of average cost per 1000 lbs. of rated power, the figures per 100 miles were as follows:

Passenger electric locomotives, 68c.; freight electric locomotive, 18c.; Pacific type steam locomotive, 12½c.; Mallett type freight locomotive, 8c.; Consolidation type freight locomotives, 7½c.

Compared on the basis of the same tractive effort, the average cost was \$84 for the electric and \$41 for the steam locomotive.

The figures given by Mr. Muhlfeld do not include interest, depreciation or taxes in either case, nor are the electric locomotives debited with the cost of maintaining feeder, third-rail, bonding wires, switches and other equipment incident to electric service.

The original cost of the different locomotives made on the basis of total working weight is as follows: Passenger electric, 20c. per pound; freight electric, 12c.; Mallett, 9c.; Pacific, 8c., and Consolidation, 8c.

Mr. Muhlfeld said that the brilliantly lighted cars, hourly service and first-class signals mentioned by Mr. McClellan were regular features of his company's line between Baltimore and Philadelphia, and hence were not peculiar to electric operation. In regard to the multiple-unit operation of electric locomotives, he had found that when two locomotives were at the head of a train their combined tractive effort is only 90 per cent of what it would be if one of the locomotives were at the end of the train. The points made about the time lost in round houses by steam locomotives did not apply to the Baltimore & Ohio Railroad, as it had passenger locomotives running anywhere from 8000 to 12,000 miles per month and freight locomotives giving 6000 miles monthly. As to Mr. Storer's remarks about the ten-year life of steam locomotives his experience was that the average life was twenty to twenty-five years.

C. A. Seeley, mechanical engineer of the Rock Island Pacific Railroad, Chicago, referred to the proposed electrification of the terminals of the steam railroads in Chicago, which he said had attracted considerable attention recently on account of the visit to New York of the Mayor, who had been making a study of the New York Central results. In Mr. Seeley's opinion, however, such electrification in Chicago would not at the present time be either profitable or desirable. When the New York Central electrification is finished and all the bills are paid it would then be an appropriate time to determine the desirability of electricity for steam railroad terminal service. The installations at both Baltimore and New York were necessary on account of tunnels, heavy traffic and other local conditions. There is little direct evidence at present pointing to any direct



economy of electric operation. In his opinion density of population was the deciding factor. He was a believer in electricity under favorable conditions; he also believed that improvements were possible in the present steam locomotive. The Rock Island Railroad is now trying experiments with superheaters on its locomotives.

The next speaker was L. B. Stillwell, consulting engineer, New York. Mr. Stillwell referred to the figures given in Mr. Toltz's paper relative to the possible saving of 1.65 lbs. of coal per drawbar horse-power by using different auxiliaries. Such a large saving seemed rather strange to him in view of the fact that inventors have been trying for years to reduce the coal consumption per horse-power in large central stations. The latter are equipped with large generating units using condensers, stokers, feed water heaters, superheaters and other auxiliaries, some even pop-valves and carbon-dioxide recorders, yet they had not succeeded in securing a drawbar horse-power for 1.65 lbs. of coal. If Mr. Toltz is right, it would seem that the proper thing to do would be to build 200 250-hp stations instead of one 50,000-hp station, and perhaps also to put these power stations on wheels to secure this high economy. The first Mallett locomotive tested in St. Louis had developed a drawbar horse-power per 2.6 lbs. of coal, although equipped with automatic stokers, smoke preventers and other fuel saving devices. Referring to the exceptions taken by Mr. Toltz to the figures given in the paper by Mr. Putnam and himself on the amount and cost of fuel used by locomotives throughout the United States, Mr. Stillwell said their comparison was based not only on the reports of the Interstate Commerce Commission, but also on confidential information from many railroad officials. In fact, the results given covered the experiences of many of the greatest railroads, included about 25 per cent of the total mileage of the country and a locomotive mileage for the periods for which the data were given of 314,000,000 miles. The average price of coal per long ton was found to be \$1.96 and the coal consumption per locomotive mile over 174 lbs. for freight and 101 lbs. for passenger service. He wanted it understood that the objects of their paper were three: to promote the early standardization of electric traction equipment; to create the proper perspective to impress electrical engineers with the magnitude of the change; and to secure an alternating current frequency having reference to the purchaser's interests rather than the manufacturer's convenience, whereby the maximum drawbar pull per dollar invested would be secured. While some of the savings given in their paper were assumed, most of them were drawn from practice. For instance, the figures on repairs and renewals of electric locomotives were based on the experience of six roads with a motor car mileage of over 60,000,000 miles. The New York subway results were based on 400-hp equipments on each car of, say, an eight-car express train, the total of 3200 horse-power being equal to double that of the most powerful steam passenger locomotive. Considering the figures obtained from this service a number of inter-urban roads and the Valtellina line in Italy, the maintenance costs mentioned by Mr. Muhlfeld were surprisingly high. In conclusion, Mr. Stillwell referred to several other items in the paper by Mr. Putnam and himself and explained how the costs were obtained.

The next speaker was A. H. Armstrong, of the General Electric Company, who said that Mr. Muhlfeld had taken a rather narrow view of the problem in comparing the cost of maintenance of the earliest type of electric locomotive with the latest type of steam locomotive. It would be very much

as if some one were to compare the performance of the "DeWitt Clinton" and an electric locomotive. In his mind the problem was not one of small economies, but of satisfying the demand for service that could not be filled by steam locomotives. The increase of the carrying capacity of a railroad over mountain grades was a case in point. The electric locomotive recognized no such thing as a ruling grade and this makes it available for severe grades where the traffic has been hitherto limited by the conditions inherent to steam railroad operation. A saving of 20 per cent in the cost of fuel was a very small item compared to the benefits of doubling the capacity of the line.

### LOW POWER COSTS IN HARRISBURG

Through the courtesy of Mason D. Pratt some interesting figures have been made available on the excellent performance of the Central Pennsylvania Traction Company's station, which was designed and built under Mr. Pratt's direction with C. O. Mailloux and W. C. Gotshall as the advisory engineers. This station was described in the STREET RAILWAY JOURNAL of April 27, 1907. Its power generating equipment consists of five 327-hp Keeler water-tube boilers, three 984-hp (with superheat) Allis-Chalmers horizontal cross-compound condensing Corliss engines direct-connected to 600-volt railway generators of the same manufacture. An interesting feature of the boiler equipment is the use of the Reagan hand-fired shaking grate.

The figures on coal consumption and cost follow:

	March.	April.	May.	June.	July.	Aug.
Total cost per kw-hour on switchboard—cents . . . . .	0.925	0.715	0.658	0.666	0.640	0.620
Includes coal at \$2.55 per gross ton; plant, salaries and wages; oil, water, supplies and repairs.						
	March.	April.	May.	June.	July.	Aug.
Coal consumption: Pounds per kw-hour . . . . .	4.05	3.55	3.22	3.14	2.99	2.96
Load factor, per cent . . . . .	48	47	44.5	45.7	46.5	46.0
Cost of power per car-mile, cents . . . . .	2.45	2.03	1.76	1.77	1.68	1.60

In connection with the load factor Mr. Pratt states that he bases this figure on the total rated capacity of the three 650-kw generators on a twenty-four-hour basis. As a matter of fact the traction company operates only two engines most of the time, and hardly once in three months is it necessary to start up the third engine to help over the peaks. The operating period is only twenty hours a day. The actual load factor based on engine hours operated is about 85 per cent.

Another interesting fact is that 10 per cent annual interest on the cost of the plant added to the total cost figures to cover interest and depreciation on the plant (although it will be noted that all repairs are included in the cost figures given) will not run the cost per kw-hour on the switchboard much over nine mills. A fairly good grade of bituminous coal is used.

The cost per car mile is given simply as a check on the other figures and will indicate to any street railway manager that the low figures for power are not caused by a racing meter. Thomson wattmeters are installed to show the performance of each engine, and there is every reason to suppose that the meters are registering within the usual accuracy. If anything, the meters are more liable to lag than to run ahead. Considering the size of the station the figures given certainly are very low.



## KINGSTON MEETING OF THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK

The fifth quarterly meeting of the Street Railway Association of the State of New York was held at Kingston Point Park Pavilion, Kingston, N. Y., on Sept. 21. The use of the handsome pavilion was granted through the courtesy of C. Gordon Reel, vice-president and general manager of the Kingston Consolidated Street Railway Company. The convention was very well attended, there being over 75 gentlemen present, most of them from the electric railways of the Hudson Valley and Central New York. The meeting also was honored by the presence of J. E. Sague, member of the Public Service Commission for District No. 2, and C. R. Barnes, electrical expert of the Public Service Commission. Both gentlemen followed the discussions with a great deal of interest. Mr. Barnes took a very active part in the discussion on rules, making several valuable suggestions.

### REPORT AND DISCUSSION ON INTERURBAN RULES.

The morning session was called to order at 10.15 o'clock by President Wilson, who said the first subject to be taken up would be the report of the Committee on Interurban Rules. Instead of discussing the report as a whole it was decided that the importance of the subject demanded separate consideration for each item, and hence the discussion was most thorough. The chairman of the rules committee, J. E. Duffy, superintendent of the Syracuse Rapid Transit Company, said that he and his associates, Messrs. Sheehan and Ryon, regreted they had not been able to give the subject as much attention as its importance deserved, but they had carefully studied the rule books furnished by interurban railway companies of New York and other states and the standard code of rules provided by the American Railway Association. They felt that the experience the steam railroads had gained from many years of operation should govern them at least partially in their recommendations for an electric railway rule book for interurban railway operation. Most interurban railways were developing speeds not exceeded by steam railroads and this condition required careful training in the selection of employees for train service. They believed that in view of the fact that many of the interurban electric railways had adopted a large number of the rules in the standard code and had found them to serve their purpose satisfactorily the committee could not do better than recommend the adoption of the standard rules of the American Railway Association with such alteration as might be necessary to fit electric railway conditions. Mr. Duffy then proceeded to read the rules which as finally adopted are published on page 465.

The following comprise the principal changes made from the original committee report:

Rule A under General Rules was strengthened in that employees will be required to have the rule book with them when on duty, whereas the steam code simply states that employees must be provided with a copy.

General Rule C C was amended to permit employees to give information about accidents, delays or other troubles to those authorized by law to ask for the same.

After prolonged discussion under the head of definitions it was decided to define an engine as a locomotive propelled by any form of energy. It was also decided that where the word "motor" is used it should be followed by "or engine," to avoid all misunderstanding on the part of employees.

Rule E E was amended to include "names and addresses"

of all witnesses instead of "names of all witnesses," and the word "superintendent" changed to "proper officer."

In Rule G G the word "observed" was changed to "obeyed."

In discussing signal rules it was decided to use green as a "proceed" signal and yellow for "proceed with caution."

The discussion on communication signals disclosed some important differences between city and steam practice. As so many interurban railways are operated by men accustomed to the city standards, some members feared there would be confusion if they were asked to use the other system. One of the members whose electric cars are now operating under steam railroad conditions said he found no difficulty of this kind. It was decided, however, to print Rule 16 in two forms, A and B, the latter to be optional.

It will be noticed that blanks are left in the rules for time, distance and titles of officials to whom reports must be made. This was done to allow each company to fill them in to suit its conditions.

Owing to the active interest displayed on the subject of rules, it was found necessary to carry the discussion over to the afternoon session. Before adjourning to luncheon, Mr. Reel announced that the steamboat "Central Hudson" had been engaged for the use of the members, and that there would be a dinner on board the boat at 6 o'clock, after which there would be a moonlight sail down the Hudson to Poughkeepsie. Those who desired could leave at Poughkeepsie to make train connections for their homes, while the rest remained on board until the next morning for landing at Kingston. It may be added here that this program was carried out and proved very enjoyable.

Mr. Reel also announced there would be a joint meeting and reception of the Empire State Gas & Electric Association and the Street Railway Association of the State of New York, in the Concert Room, at Madison Square Garden, on Oct. 1. Full details of the program for this meeting are announced elsewhere in this issue.

The afternoon session opened with a continuation of the discussion on rules. The second paragraph of Rule 90 of the steam code was changed to add the words "when on time" after the words "the superior train."

Rule 208-A, on the transmission of train orders, was not entirely satisfactory to all present and it was therefore considered desirable to insert 208-B for optional use.

In the discussion on forms, a member pointed out the importance of ruling train orders. Several serious accidents have been caused by the fact that on a carelessly written order it is not easy to identify the corresponding time and place. Such mistakes in reading would be practically impossible if the form were plainly ruled.

Upon completing the discussion of the report Mr. Duffy said that as the committee's time had not permitted it to incorporate all classes of rules he would recommend that it be continued for further work, but that something be done with the rules already discussed. Several members declared their willingness to accept immediately all the rules as amended, and upon motion the rules were unanimously adopted and a vote of thanks tendered to the committee which was asked to continue in office to prepare additional regulations. It was understood that the rules as adopted will be printed by the different companies in one kind of type and that any additions will be printed in another to indicate variations. The optional paragraphs have already been mentioned.

The next subject discussed was the collection and registration of interurban fares on which the following paper



was presented by B. A. Frankel, chief of the treasury department of the Utica & Mohawk Valley Railway Company:

THE COLLECTION AND REGISTRATION OF INTERURBAN  
FARES

The collection and registration of interurban fares is one feature of the railway business in which local surroundings and conditions must take a prominent part. A system of collection which would be a success on a well patronized road might overburden a light carrying line, and the same can be said where the conditions are reversed. In our section of the state we are blessed with more than the average density of population. This coupled with the riding habit formed by the people compels us to use a system enabling the conductor to pick up his fares, take care of his car and make up a report that will show us where we are at.

Like all other interurban railways, we have gone through the experimental stages, having used several different systems of cash collections and discarding them as we found that they did not answer our purpose. At the present time we are using the "tear-off cash fare receipt" on one division and the duplex on another, both of which are working out with a fair degree of success. This we consider is due to the difference in the sales of tickets at our ticket offices. At the opening of the Utica & Mohawk Valley line, the conductor used the "zone" collection of fares, making thirteen different collections and registrations in a distance of thirty-eight miles. This method was more than the passenger could stand and we soon abandoned it. Since then there has been used the tear-off, the duplex, a patent ticket box with tear-off and back to the present tear-off which has been found the most practicable for our use. The distances between stations and the heavy travel on this line are such that this system was found the more successful, although the other systems used have a number of good features. Inasmuch as there is no inducement for the passenger to buy single trips as there is only a reduction of five cents on the round trip, they have gotten into the habit of getting on a car and paying the conductor. The sale of tickets and opening of ticket offices did not commence until several months after the opening of the line, which gave the public the opportunity of paying cash on the car. The average sales are from 56 to 60 per cent, which is very light in comparison to the sales on the West Shore or Oneida railway.

I consider the cost of installing ticket offices money well spent and think it proper to charge a slight excess fare over the ticket fare when the passenger pays on the car. We have followed out this policy in making up the schedule of rates on the Utica-Syracuse division and up to the present time, after a three-months' trial, can say that the number of complaints because of this charge is very few. The sale of tickets averages from 85 to 90 per cent as compared with the 56 to 60 per cent on the Utica & Mohawk Valley line. I attribute this to the excess between the cash and ticket rate, and the fact that the sale of tickets was started when the line was put in operation. I think it advisable therefore to commence the use of tickets on the day a new line or division is opened for business. Should the passengers once get into the habit of paying fare on the car, it would take a long time for them to give it up unless the inducement of buying tickets is enough to pay them for the trouble.

On the West Shore the duplex system of collection has been very successful because of the large sales of tickets. The excess is from five to ten cents on single trip, depending on the distance, and from five to thirty cents on round-

trip tickets. The simpler the ticket is printed the better the passenger likes it. We make no conditions, merely stating that it is good when properly stamped and placing no time limit on the use. A great many passengers buy in lots of half dozen or more. This also obviates the complaint a passenger might make if the ticket office is not opened.

For the use of the transportation department, some managers would like to know where the travel begins and where it ends, so that the section showing the heavy travel can be given the consideration it deserves as compared with the light-carrying division. We have found that with the use of the duplex and the report of ticket sales, this information can be compiled and tabulated to give the information desired. This statement is made up and embodied in our monthly report. It has been our aim to lessen the work of the conductor as much as possible, as we found through this, he is in a position to take care of his passengers and car to better advantage. For their convenience on the heavy carrying sections of the Utica & Mohawk Valley the conductor registers all five cents fares, giving no receipt whatever, but for all cash fares above this amount a receipt is given.

On the opening of the electrified West Shore between Utica and Syracuse, we tried the experiment of making but one collection for a through rider instead of the usual practice of collecting in sections. This policy has been favorably commented on by passengers, as they can now enjoy their ride without being disturbed by the conductor. The latter also seems to have taken up with this method, as after hatching the passenger to the point of destination, he has nothing further to trouble about except to get the hat-check before the passenger leaves the car.

In conclusion, I would strongly recommend the use of tickets and installation of ticket offices, and the use of a cash-fare receipt to give the conductor a chance to pick up his fares, look after the car, make up his report, and attend to such other duties that he may have. Where the percentage of ticket sales is high enough, the duplex will cover this, especially as it shows the "from and to" travel, and the collection of the fare at one time.

DISCUSSION ON FARE COLLECTION AND REGISTRATION  
ON INTERURBAN RAILWAYS

The discussion on Mr. Frankel's paper was opened by John G. Phillips, assistant general manager of the Hudson Valley Railroad Company, who said that he agreed with Mr. Frankel's ideas on the ticket selling question. On his system they had cash fares exclusively and had found that on heavy days it was impossible for the conductor to get all his fares. Several years ago they had used a duplex ticket but they had found that the conductors would punch, say 5 cents on one ticket and 75 cents on another.

N. P. Baker, division superintendent of the International Railway Company, explained the method now in use on his company's interurban lines. On the Niagara Falls route there are some 25 to 30 different fares and the conductors carry nine or ten forms of tickets which of course makes matters very difficult for them with heavy traffic. They had found it hard to get conductors competent enough to handle the situation and turn in clear records. On this point he was sure an improvement could be effected if interurban conductors were paid more than local conductors, thus offering some inducement for a higher class of men. Their former method of checking this line was to use special agents, but this has proven very unsatisfactory, as it



took them so long to become acquainted with the details of the fare collection that by the time they had learned the method they were known by all the conductors on the line. These men cost the company from \$3 to \$5 a day and seldom could check more than 4 to 5 conductors daily. Finally the company threw out this system and selected two of its oldest and best conductors, who were appointed as regular inspectors for the registration and collection of interurban fares. Owing to their experience these men check a far greater number of conductors and find discrepancies much more easily than could the outside men. Conductors found at fault are called into the office and the discrepancies explained to them. In some cases they are discharged but in other instances an endeavor is made to make them feel that they are holding a responsible position in which accurate reports are a necessity. Since this method of checking was adopted the revenue on this line has shown a steady increase. Referring again to the subject of ticket sales, he said that at first when the ticket office was in an out-of-the-way part of the city they had met with little success, but now tickets are sold at the point where the car leaves, so a

During the past few years many electric street railway companies have given considerable thought to handling freight and express matter on their lines. The business is one deserving considerable attention, as it is not only a great convenience to the public but also a source of revenue which, of course, is the primary object of railway managers.

For a number of years I was in the employ of the old line express companies, who operate over the steam roads and cover thousands of miles of territory. When I entered the service of the electric lines who do only a local business, I felt that it would be so easy after my previous experience, that "There would be nothing to it." I soon found I was mistaken, and that there was very much to it, for it opened an entirely new field which made necessary the application of methods suited to the locality.

I have learned that each company handling freight and express has its own methods of doing business, and while I believe local conditions bear largely on the methods used, I think some uniform system should be adopted. We all agree that for the present our business will be purely local, but with the progress made in the last few years in electric service, there is no telling what the future has in store. It is not my purpose to submit a large amount of data, but simply to discuss the plan of operation and to try to set forth some ideas that could eventually be worked into a system applicable to most places.

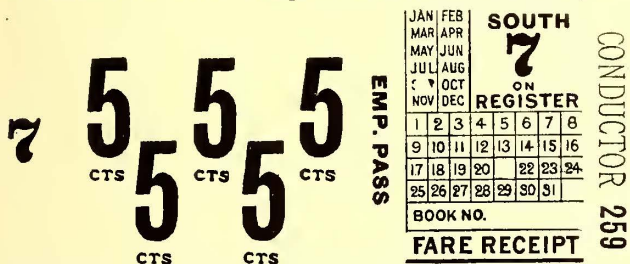
I have already stated that local conditions govern to a large extent. One of the first things to do is to size up the territory thoroughly to ascertain if it produces or consumes. Another very important point is the rate question. Some managers advocate class rates as adopted by steam roads, while others favor the flat rate as used by the old line express companies. I may be prejudiced, on account of my previous experience, but personally I favor the flat rate. However, I think it is only a question of time before we will have to adopt class rates, but rather than use the present steam road classification we should make a classification to suit ourselves. The steam roads have eight different classifications whereas four, or even three, would be enough for electric railways.

In my judgment, the low class freights do not pay for the trouble of handling, and considering the prompt service electric lines are able to give on local freight they should look for the high-class commodities. If any merchant is in a great hurry for heavy, rough material and to save time is compelled to ship by electric railways, he will gladly pay what the difference would be in the classification.

In most cases I find we can get all the steam road asks and often a trifle more, for it stands to reason that our service is much better in securing shipment and delivery at destination.

The method of delivering freight and express is an important one. At one time we hired wagons to make our collection and delivery on a percentage basis, but after trying it for several months, found it did not work to our satisfaction and finally put on our own wagon equipment. From the time of that change our business increased. We were able to pick our own men for drivers, which we could not do on hired rigs, and also found that the attention our neat looking wagons attracted was a good advertisement.

I have been asked several times what is the difference between freight and express. While this is rather hard to answer, there is as much difference between them (looking at them from the steam-railroad freight and the old line express company business standpoints) as there is between



SAMPLE OF CONSECUTIVELY NUMBERED AND DATED INTERURBAN FARE RECEIPT

great many passengers buy tickets before the car starts, thus relieving the conductor of considerable work.

In reply to a question as to how he checked up tickets, Mr. Frankel said they know how many were sold every day from the daily report and how many were accepted, and usually these figures were in close agreement. Another delegate said that this company's practice was to set aside the difference between tickets sold and turned in, not counting it as daily receipts. There was then an animated discussion on different forms of registers and tear-off devices. One of the delegates said that they had used a notching scheme which worked very well at first but after some use the notchers would become dull and no longer tear accurately. Another delegate submitted the accompanying form of ticket which had come to his attention. Tickets of this kind are serially numbered, the one reproduced, for example, being the seventh in the pad. The fare receipt is punched for month and date. With any ordinary straight edge the conductor tears off the number of five-cent fares that the passenger has paid, the stub being turned over to the auditor. If the stub contains no 5 the auditor knows that 25 cents was collected; if one 5 is left, 20 cents; two 5's, 15 cents, and so on. The fare receipt also contains the conductor's number and the direction of riding. On the back there is a notice to passengers that the conductor must give them a receipt showing the amount of fare paid.

After the conclusion of the foregoing discussion telegrams were read from J. S. Kennedy, secretary, and F. W. Stevens, chairman of the Public Service Commission for District No. 2, regretting their inability to attend the meeting.

EXPRESS RATES AND SERVICE

The subject of express rates and service was then opened by the following paper by Frank Walsh, general manager of the Electric Express Company, of Schenectady,



chalk and cheese. While the Electric Express Company's system may not be perfect, I think we have a good one. The easiest way to answer the question of the difference between freight and express is to give you our method of operation and point out the distinction as we see it.

We divide our business into three classes, viz.: Class "A," express service, includes collection and delivery; class "B," freight, no wagon service; and class "C," fast freight, wagon service on one end.

Under class "A" we handle at a flat rate all goods which we are expected to pick up by wagon and deliver, and give this class of business preference in loading and delivering. The class "B" rate is applied on all shipments delivered at our terminals and called for at destination by consignees. Class "C" freight is applied mostly on shipments from wholesale houses to stores in different places. The last class is used by most people and is a popular one with the big shippers.

Under this class "C" we handle a lot of groceries and like commodities that formerly went by steam railroad consigned to town truckmen for delivery to the consignees. I may safely state that 50 per cent of our business is handled under this class. We simply charge, in addition to the freight rate, a fair delivery cost. We do not apply this class on perishable goods that would in any event be sent forward by express.

We maintain that any company which does not use wagons in connection with its freight cars is doing only a freight business and where wagons are maintained they are doing express business also.

I strongly advocate a meeting of the freight men whose companies are members of this association thoroughly to discuss the matter of rates and classifications of freight, feeling that the steam railroad classification is not just what is needed for us. We have an entirely different proposition than the steam roads or old line express companies, but yet worthy of much consideration by the electric railways, as there certainly is money in the freight and express business.

After the paper by Mr. Walsh had been read, C. H. Armatage, traffic manager of the United Traction Company, offered the following contribution on freight and express matters:

#### FREIGHT AND EXPRESS RATES

In the development of freight and express service on electric railways, conditions existing and anticipated, the general merchandise and character of the products of the different industries along the line and through the territory the railroad serves are important factors which require careful and deliberate thought toward the progress and ultimate success of this modern method of transportation.

Managers of electric railways are constantly on the lookout for new sources of revenue, and in the installation of an express service on their individual roads lose sight of the actual value of the service contemplated and given. In their eagerness to secure business they quote ridiculously low rates for the transportation of the different commodities offered. Finding after a few months' operation their serious error, they attempt to increase the rates. This action invariably meets with pronounced opposition and jeopardizes the already established harmonious relationship existing between the company, the shipper and receiver.

The value of an electric express service lies in the great saving of delay, the frequency of its trips over short mile-

age routes, the speedy transportation of farm products and garden truck from the rural district to the cities, the filling of rush orders by telephone and the ability to make fast time and deliver at highway crossings or at store doors. All of these are elements of inducement and recognition to shippers and receivers and absolutely demand an adequate compensation for such valuable service.

The one item of expense in operating an electric express service, and which practically absorbs an enormous part of the net earnings is that of wagon call and delivery. Some roads have a practice of adding a certain per cent to their tariff rates to cover the expense of such delivery, other roads maintain a regular schedule of express rates covering call and delivery service.

I have visited several electric express companies operating in the New England States and find upon investigation that the cost of maintaining teams for delivery service consumes such a large proportion of the profits that managers are considering the cutting out of this item of operation.

It is a fact that the Consolidated Railway Company, which is the holding company for the N. Y., N. H. & H. R. R. electric properties, has eliminated this item of expense in several of the cities in which it operates and is now confining itself strictly to frequent service and cooperation with the shipper, feeling that such methods more than compensate its patrons for any advantage that might be gained in maintaining a call and delivery service by team.

Good sound judgment should be exercised in determining the character of freight and express matter handled. It does not matter whether consignments consist of feathers or lead with some shippers, who insist upon their rights as described in printed folders giving rates and information and demand transportation of their goods accordingly.

Such shipments as wool, rags, paper junk and other material that not only block platforms, but impede the work and fill the cars to the detriment of good paying freight should be termed excepted articles and rated accordingly.

I think also that iron, steam piping (unless short lengths), heavy machinery, doors, sashes and lumber be excepted, and that household goods, such as stoves and furniture, unless properly boxed or crated, be accepted for transportation only upon release from the consignee from all claim for breakage and damage in transit.

The handling of such goods should be well paid for, for it takes valuable time and invariably requires carting to the very extreme of the delivery boundaries. The teamsters in almost every instance require assistance to unload them. This, of course, refers to such service requiring call and delivery.

I believe a rate classification in electric express business should be avoided if possible, if such rate classification is to be considered on the lines of the official classification as used by steam roads. My experience has taught me that local agents do more guessing than they ought to, and in many instances such guessing, when shippers happen to make comparisons, lead to charges of discrimination.

Steam railroads vary in their distinction of classes. Some classes are subject to certain rules. The agent does not take time to think it necessary to perfect himself on these rules and the result is that a conflict is opened between the shipper and the carrier.

To avoid such contingencies on railroads having short mileage hauls, I would recommend or suggest that flat rates be established, with the necessary exceptions; also a minimum rate to suit the locality and the conditions.



I am of the opinion that a first-class commercial agent attached to any electric express company who has the personality to reach the shipper and can offer a tariff which would be a compromise between the freight rates of steam roads and the express rates of regularly incorporated express companies in competition would in a very short time produce astonishing results and materially increase the item of profit to the carrying company.

The United Traction Company is undoubtedly the pioneer in electric express and freight service, having been in operation some thirteen years, and from a business of \$9,000 the first year has steadily increased to \$49,000 for 1907. We owe this phenomenal showing to our constant endeavor to please our shippers and to display a spirit of cooperation, which we are satisfied has had great influence on the growth of our business.

The suggestions, recommendations, or you may say ideas, as set forth in this document are based simply upon the conditions and circumstances that appear locally with our company. Facilities, localities, length of haul, character of the products of the different industries offered for transportation, competition and numerous other things that arise from time to time are to be taken seriously into consideration and treated according to existing conditions to the end that the freight and express department of an electric railway becomes at once a valuable tributary to the revenue and income of the parent company.

After Mr. Armatage had concluded the reading of his paper one of the members of the association presented the interesting cost analysis given herewith:

FREIGHT AND EXPRESS ACCOUNTING

The transportation of freight on trolley lines seems to be the great dream of the majority of promoters, managers and operators throughout the country. In looking over the statistical reports of the different trolley lines it is noticeable that almost all of the lines that have attempted or that are handling freight almost invariably show that the handling of freight is on a paying basis; in some instances even it is claimed to be practically a case of "clean velvet."

For some time the writer thought in the same manner, until a short time ago he was able to get hold of the cost accounts of operating freight departments on several of the roads throughout the country, when it became very noticeable that the only items entered as making up the cost of handling freight were simply those that were purely visible, together with an arbitrary pro rate charge for several of the operating men without regard to the real pro business handled by them.

After looking these reports over the writer began to analyze the same account on his home road and discovered the same practice to be in vogue there. Consequently he decided, in 1906, to reduce the entire traffic of the road, both passenger, freight and work train service, to a basis of a ton carried a mile, and then pro rating the cost of the different operating accounts on this basis between these three services. In arriving at the ton mileage handled over the road the rolling stock was figured as empty cars at their actual weight. The passenger load was figured from the average distance of passenger carried on a basis of 135 lbs. average weight per passenger. The freight and express was figured at the actual weight from point to point. This gave us 27,545,397 ton-miles of passenger, freight and express and work train service chargeable to Accounts 1, 2 and the power, and 26,873,247 ton-miles of passenger, freight and express service chargeable to Accounts 6 and 7; 2,153,412 ton-miles of work train service

chargeable to Account 8, and 2,190,135 ton-miles of freight and express chargeable to Account 39. The above figures include rolling stock and load.

The revenue express was 12,139 ton miles, the local freight 1,070,461 ton-miles and carload freight 108,092 ton-miles. The operating expenses chargeable to combined freight and express per revenue ton-mile were as follows:

Account No. 1.....	.00082
Account No. 2.....	.00003
Power .....	.00262
Account No. 6.....	.00053
Account No. 7.....	.00029
General Expense, less Account 39.....	.00152
Account 39 .....	.01242
making a total of.....	.01824

The revenue freight and express ton mileage amounted to: freight, 99 per cent of the total; express, 1 per cent.

The express is handled on the same basis as by the other express companies operating over the steam roads. The collection and delivery charge for cartage is 40 per cent of the express receipts, consequently in making a pro rated charge between freight and express, this 40 per cent must be deducted from Account 39 and charged direct to the express account, and then the other accounts, together with 39, would come under the pro rate on the basis of 99 and 1 per cent. These pro rate accounts between freight and express would come out as follows:

	FREIGHT	EXPRESS
Account No. 1.....	.0082	.0008
Account No. 2.....	.00003	.0000
Power .....	.00261	.0026
Account No. 6.....	.0063	.0005
Account No. 7.....	.000029	.0002
General Account, less Acc't 39.....	.00163	.0015
Account No. 39.....	.01048	.2103
making a total of.....	.01646	.2159

Recapitulation of operating expenses and income per ton-mile:

Express .....	.50
Local freight.....	.01148
Carload freight.....	.02626
Average of freight.....	.01284
Average of freight and express.....	.0178

Income per ton mile,

Operating	
Express .....	.2159
Freight .....	.01646
Freight and express.....	.01824
Gain or loss,	
Express, gain.....	.2841
Freight, loss.....	.00362
Freight and Express, loss.....	.00044

This same year (1906) under our system of charging against freight and express only such charges to Account 39 as are actually seen, a gain of .00505 per ton mile is shown in receipts over expense, whereas, according to the above analysis, it should have been a loss of .00044 per ton-mile.

From an inspection of the different costs and receipts of the freight and express handled, it will be seen that the entire loss comes through the handling of package freight. The reason for this is that scarcely any of the trolley roads are so situated to be in any kind of shape for properly handling this class of freight. Consequently the continuance of handling this package freight merely resolves itself to a question of policy, whether the railroad company is a gainer in the long run by handling package freight as an accommodation to the public and a loss to the company, or



reorganize the freight business and place it on a paying basis.

Personally, I believe it better for the majority of electric roads to cut out the local freight business and handle nothing but express, dividing it into two classes—one that the roads collect and deliver like the other express companies and the other class involving no collection or delivery. The rates charged for the second class should be 40 per cent lower than the first class, and such roads as have interchange connections with steam roads should only handle such freight as can be transported in carload lots where the shippers do their loading and unloading.

These interesting papers provoked some very interesting arguments on the best methods of estimating the actual profits from this class of business, and the desirability of re-arranging the steam railroad express company classification to suit electric railway conditions. One of the members who has been very successful in the express and freight business, said that last year their profits were 30 per cent of the gross business, the gross earnings being some \$5,000 per mile of track operated in a well populated district. A member from Central New York said that his company averaged about \$1,000 gross earnings per mile of track.

P. E. Wilson, general passenger and freight agent of the Rochester Railway Company, said no one could say definitely whether it is profitable to handle freight and express on a particular road. Much depends upon having suitable warehouses, whether delivery must be made at stores, whether the company owns combination passenger and express cars, and on other factors. The interurban companies had been giving express service at freight rates and it would be very difficult to raise the rates without disturbing the relations with the different towns. It was his idea that express matter should be carried on light passenger runs, and that while freight should continue to be carried it should not be given express service but rather that the freight cars should be operated say twice a week.

C. Loomis Allen, vice-president and general manager of the Utica & Mohawk Valley Railway Company, suggested that a committee be appointed to gather detailed information on the methods of handling, classifying and charging for express and freight service throughout the state. For his part he would gladly furnish such a committee all the information at his command. From the data thus gathered it might be possible to agree upon certain standards. Mr. Wilson, of Rochester, was afraid that such a conference would not be successful, that every line would have to work out its own salvation. J. H. Pardee, secretary of the association, said that the electric railway was attempting to carry freight with an electric car representing an investment of about \$10,000 and two men in competition with a steam railroad hauling freight cars costing about \$1,000 each and requiring say four men for forty cars. He mentioned a case he had noticed in Indiana where a car filled with doors and other bulky woodwork had been hauled 25 miles in a \$10,000 car at regular steam freight rates. That sort of thing did not make electric freight service appeal to him as a profitable proposition.

Mr. Clark, of the Auburn & Syracuse Electric Railroad, said that his company was operating between Syracuse and Auburn on the New York Central classification and rates and was making money.

J. W. Nugent, general freight and passenger agent of the Oneonta & Mohawk Valley Railway, said the locality through which a road was operated had much to do with the

success of the business. His road is a cross-country one with connections to two steam railroads. They are receiving for a 28-mile route practically all of the carload business taken north from the Delaware & Hudson. At the same time they are running a local freight car service and also an express service carried on passenger cars. The express rates are based on a mileage equal to the old line companies graduated scale. The freight rates are somewhere along the lines of steam road charges. He could assure the members that both classes of business were profitable.

One of the members who handles the express business as an independent company said: Nothing that can be charged directly to the express company is overlooked, including rental for the use of terminal stations, a charge of 25 cents per car mile, wages of crew, etc. Despite this the operating expenses do not exceed 80 per cent. Another member whose company also runs the express business as a separate proposition said they paid 40 cents a car mile and all terminal charges, but still made money.

E. J. Ryon, superintendent of transportation of the Schenectady Railway Company, said it should not be overlooked that sometimes the old line express companies make a rate which does not pay in a particular district but is evened up somewhere else. As the electric railway express service is confined to a much more restricted territory it would not be wise to follow the methods of the old line companies too closely.

Mr. Pardee believed that under ordinary circumstances there was money in the express business for an electric railway, but only under exceptional circumstances was the freight business profitable. Too many mistakes had been made in the past by electric railways rushing into it without sufficient study of the conditions. If the managers of different roads would confer and check up the articles upon which they are losing money he was sure that in a short time a revenue-producing tariff could be worked out that would still be low enough to secure the business.

Mr. Walsh said that the present steam railroad classifications were not suitable for electric railways and he was anxious to see something done toward getting up a new classification. Such items as furniture and bulky iron pipes should have a first-class rate placed on them. Mr. Fassett said that the papers and the discussion had brought out the necessity for such a meeting. Mr. Allen then renewed his motion that a committee of three be appointed to consist of one express and freight man, one representative of the accounting department and one manager; that all of the roads turn over full reports of their express and freight business for twelve months to enable the committee to tabulate them properly and work out the question; and that the subject be considered for six months and reported at one of the quarterly meetings.

Mr. Pardee offered an amendment to Mr. Allen's motion to the effect that the number of freight and express men be three and the other members should be one accountant and one manager as proposed by Mr. Allen. He made this suggestion for an increase in freight men because so much of the work would consist of a comparison of tariffs involving too much detail for one man. The amended motion was adopted and Mr. Fassett, acting as chairman, announced that President Wilson would appoint a committee later. The meeting then adjourned for dinner on the boat, after tendering a vote of thanks to Mr. Reel for his splendid efforts in providing for the comfort of the attendants.



**REPORT OF COMMITTEE ON INTERURBAN RULES\***

The rules herein set forth govern the railroads operated by the.....  
 ..... Railroad Company.

They take effect ....., 190., superseding all previous rules and instructions inconsistent therewith.

Special instructions may be issued by proper authority.

To enter or remain in the service is an assurance of willingness to obey the rules. Obedience to the rules is essential to the safety of passengers and employees, and to the protection of property.

The service demands the faithful, intelligent and courteous discharge of duty. To obtain promotion, capacity must be shown for greater responsibility.

Employees, in accepting employment, assume its risks.

**GENERAL NOTICE.**

The safety of passengers and trains is of the first importance, and all operations of working, repairing, or constructing this road must be subservient thereto. To this, with the regularity and punctuality of the trains and the comfort and convenience of patrons, all work must be entirely subordinate.

It is of the utmost importance that proper rules for the government of the employees of a railroad company should be enforced, in order to make such rules efficient. If they cannot or ought not to be enforced, they ought not to exist. Officers or employees whose duty it may be to make or enforce rules, however temporary or unimportant they may seem, should keep this clearly in mind. If in the judgment of any one whose duty it is to enforce a rule, such rule cannot or ought not to be enforced, he should at once bring it to the attention of those in authority.

**GENERAL RULES.**

A. Employees whose duties are prescribed by these rules will be provided with a copy and will be required to have it with them when on duty.

B. Employees must be conversant with and obey the rules and special instructions. If in doubt as to their meaning, they must apply to proper authority for an explanation.

C. Employees must pass the required examinations.

D. Persons employed in any service on trains are subject to the rules and special instructions.

E. Employees must render every assistance in their power in carrying out the rules and special instructions.

F. Any violations of the rules or special instructions must be reported.

G. The use of intoxicants by employees while on duty is prohibited. Their use, or the frequenting of places where they are sold, is sufficient cause for dismissal.

H. Smoking tobacco by employees while on duty, in or about passenger stations or on passenger cars, is prohibited.

I. Employees on duty must wear the prescribed badge and uniforms and be neat in appearance.

J. Persons authorized to transact business at stations or on trains must be orderly and avoid annoyance to passengers.

Employees must treat all passengers with politeness, avoid difficulty and exercise patience, forbearance and self-control under all conditions. They must not make threatening gestures or use loud, uncivil, indecent or profane language, even under the greatest provocation.

K. In case of danger to the company's property employees must unite to protect it.

L. All employees whose duties are in any way affected by the time-tables must have a copy of the current time-table with them when on duty.

M. When an employee is discharged from the company's service he will not be re-employed without the consent of the officer who dismissed him, or that of the head of the department from which he was dismissed.

N. If an employee should be disabled by sickness or other cause the right to claim compensation will not be recognized. An allowance, if made, will be a gratuity justified by the circumstances of the case and the employee's previous good conduct.

O. No employee is allowed to contract any bill or other obligation on account of the company, or to use the company's credit, unless authorized by the proper officer.

P. Employees are required to exercise great care to avoid injury to themselves and others, and are required to inform themselves respecting the location of all structures or obstructions along the line that will not clear them when on the top or sides of cars or motors, also as to the conditions of equipment and track.

Employees are warned that extra and special trains may run at any time, and trains may run on any track in either direction without notice except to those whom it is necessary to advise in order to insure proper movement of such trains. Employees must be governed accordingly and exercise proper care to avoid being injured.

Q. Every employee, while on duty connected with the trains on any division of the road, is under the authority and must conform to the orders of the superintendent of that division.

R. Employees are required to keep the premises in their charge in a neat and orderly condition.

S. No employee will be allowed to absent himself from duty without special permission from the head of the department in which he is employed, nor will any employee be allowed to engage a substitute to perform his duties.

T. In the selection of new men for the service, care should be taken to get only persons of good character, and who give promise of being able to improve and to deserve promotion. Application for employment should be made on the prescribed form.

U. The assignment or attaching of an employee's wages by garnishee proceedings in aid of execution will be sufficient cause for dismissal in absence of satisfactory explanation.

V. All articles furnished by the company for use of employees must, on leaving the service, be returned to proper officer. The right is reserved to withhold from wages due the value of such articles lost or that are not surrendered on leaving the service.

AA. All persons in the employ of the company must devote themselves exclusively to its service during the prescribed hours of the day or night, and must properly obey instructions of executive and general officers and of the heads of their departments in matters pertaining to their respective branches of the company's service. No employee will be allowed to engage in any trade, directly or indirectly, for himself, or as an agent for others, without special permission from his superior officer.

BB. Every employee is hereby warned that before exposing himself in working, or being on the tracks or grounds of the company, or in working with or being in any manner on or with its cars, machinery or tools, he must examine, for his own safety, the conditions of all machinery, tools, tracks, cars, or whatever he may undertake to work upon or with, before he makes use of or exposes himself on or with the same, so as to ascertain, so far as he reasonably can, their condition and soundness; and he is required promptly to report to his immediate superior officer any defect in any track, machinery, tools or property of the company affecting the safety of any one in using or operating upon or with the same, and such superior will report the defect to such agent of the company who has authority to remedy it. It is made hereby the right and duty of every employee under all circumstances to take sufficient time, before exposing himself to danger, to make such examination as is here required and refuse to obey any order which would imperil his life or limb.

Responsibility for Damages.—Employees will be held responsible for any damages caused by their neglect or carelessness or by disobedience of rules.

CC. Give Information to Proper Persons.—No employee shall, under any circumstances, give any information whatever concerning any accident, delay, mishap of any kind or business of the company to any person except to a properly authorized representative of the company, except as provided by law.

DD. All employees should as a first consideration promote safety of trains and passengers by all means in their power, report any defect in track, bridges or equipment to the proper official.

In case of accident to trains or roadway, employees are required to give their best efforts to clear the road or to assist as may be required at the time, whether in the line of their usual duty or not.

Employees, especially track and bridgemen, should notice the condition of passing trains, and if they observe anything in bad order should notify the trainmen by proper signals, giving a signal to stop, if, in their judgment, the train is endangered by the defect. In all cases of doubt take the safe side.

EE. Every employee who may witness any accident which may affect the interests of the company, must forthwith make a detailed written report thereof, including the names and addresses of all witnesses, and send same at once to the proper official.

FF. Hearing by Superintendent.—A hearing will be given by the superintendent to every employee who desires to complain. Reports or suggestions for the betterment of the service will always receive consideration.

GG. In addition to these rules special orders will be issued from time to time, as may be found necessary, and such orders posted on the various bulletin boards, when given by proper authority, whether in conflict with these rules or not, shall be fully obeyed while in force.

HH. Every employee accepting free transportation specifically agrees, in consideration of such free transportation, that the company shall not be liable under any circumstances for any injury to his person or loss or damage to his property while using such free transportation.

JJ. All persons entering the service of this company will be required to sign an acknowledgement that they have read, understand and do agree to obey the rules and regulations of the company.

**DEFINITIONS**

Engine.—A locomotive propelled by any form of energy.

Train.—An engine or more than one engine, or a motor or more than one motor coupled with or without cars displaying markers.

Regular Train.—A train authorized by a time-table schedule.

Section.—One of two or more trains running on the same schedule displaying signals or for which signals are displayed.

Extra Train.—A train not represented on the time-table. It may be designated as \_\_\_\_\_.

Extra.—For any extra train except work extra.

Work Extra.—For work train extra.

Superior Train.—A train having precedence over other trains. A train may be made superior to another train by right, class or direction.

Right is conferred by train order; class and direction by time-table.

Right is superior to class or direction. Direction is superior as between trains of the same class.

Note.—Superiority by direction is limited to single track.

Train of Superior Right.—A train given precedence by train order.

Train of Superior Class.—A train given precedence by time-table.

Train of Superior Direction.—A train given precedence in the direction specified in the time-table as between trains of the same class.

Note.—Superiority by direction is limited to single track.

Time-Table.—The authority for the movement of regular trains subject to the rules. It contains the classified schedules of trains with special instructions relating thereto.

\*Adopted at the Kingston meeting of the Street Railway Association of the State of New York, Sept. 21, 1907.



Division.—That portion of a railway assigned to the supervision of a \_\_\_\_\_.

Subdivision.—A part of a division so designated on the time-table.

Schedule.—That part of a time-table which prescribes the class, direction, number and movement of a regular train.

Main Track.—A track extending through yards and between stations, upon which trains are operated by time-table or train order or the use of which is controlled by block signals.

Single Track.—A main track upon which trains are operated in both directions.

Double Track.—Two main tracks, upon one of which the current of traffic is in a specified direction and upon the other in the opposite direction.

Three (or More) Tracks.—Three (or more) main tracks, upon any of which the current of traffic may be in either specified direction.

Current of Traffic.—The direction in which trains will move on a main track under the rules.

Station.—A place designated on the time-table by name at which a train may stop for traffic or to enter or leave the main track or from which fixed signals are operated.

Siding.—A track auxiliary to the main track for meeting or passing trains, limited to the distance between two adjoining stations.

Fixed Signal.—A signal of fixed location indicating a condition affecting the movement of a train.

Yard.—A system of tracks within defined limits provided for the making up of trains, storing of cars and other purposes, over which movements not authorized by time-table or by train order may be made, subject to prescribed signals and regulations.

Yard Motor or Engine.—A motor or engine assigned to yard service and working within yard limits.

Pilot.—A person assigned to a train when the motorman or conductor or both are not fully acquainted with the physical characteristics or running rules of the road or portion of the road over which the train is to be moved.

RULES FOR SINGLE OR DOUBLE TRACK. STANDARD TIME

- Standard time obtained from \_\_\_\_\_ observatory will be telegraphed to all points from designated offices at \_\_\_\_\_ m. daily.
- Watches that have been examined and certified to by a designated inspector must be used by conductors, motormen and such other employees as may be designated. The certificate in prescribed form must be renewed and filed with \_\_\_\_\_ every \_\_\_\_\_.

FORM OF CERTIFICATE  
CERTIFICATE OF WATCH INSPECTOR

This is to certify that on \_\_\_\_\_, 19\_\_\_\_, the watch of \_\_\_\_\_, employed as \_\_\_\_\_ on the \_\_\_\_\_R. was examined by me. It is correct and reliable, and in my judgment will, with proper care, run within a variation of thirty seconds per week.

Name of maker.....

Brand .....

Number of movement.....

Open or hunting case.....

Metal of case.....

Stem or key winding.....

Signed, \_\_\_\_\_

Inspector, \_\_\_\_\_

Address, .....

- Watches of conductors, motormen and such other employees that may be designated must be compared before starting on each trip with a clock designated as a standard clock. The time when watches are compared must be registered on a prescribed form.

TIME-TABLES

- Each time-table from the moment it takes effect supersedes the preceding time-table and its schedules take effect on any division (or subdivision) at the leaving time at their initial stations on such division (or subdivision). But when a schedule of the preceding time-table corresponds in number, class, day of leaving, direction and initial and terminal stations with a schedule of the new time-table, a train authorized by the preceding time-table will retain its train orders and assume the schedule of the corresponding number of the new time-table.

Schedules on each division (or subdivision) date from their initial stations or such division (or subdivision).

Not more than one schedule of the same number and day shall be in effect on any division (or subdivision).

- Not more than two times are given for a train at any station; where one is given it is, unless otherwise indicated, the leaving time; where two, they are the arriving and the leaving time.

Unless otherwise indicated, the time applies to the switch where an inferior train enters the siding; where there is no siding it applies to the place from which fixed signals are operated; where there is neither siding nor fixed signal, it applies to the place where traffic is received or discharged.

Schedule meeting or passing stations are indicated by figures in full-faced type.

Both the arriving and leaving time of a train are in full-faced type when both are meeting or passing time, or when one or more trains are to meet or pass it between those times.

When trains are to be met or passed at a siding extending between two adjoining stations, the time at each end of the siding will be shown in full-faced type.

Where there are one or more trains to meet or pass a train between two times, or more than one train to meet a train at any station, attention is called to by \_\_\_\_\_.

- The following signs when placed before the figures of the schedule indicate:

- "S"—regular stop.
- "F"—flag stop to receive or discharge passengers or freight.
- "L"—leave.
- "A"—arrive.

SIGNAL RULES.

- Employes whose duties may require them to give signals must provide themselves with the proper appliances, keep them in good order and ready for immediate use.

Flags of the prescribed color must be used by day, and lamps of the prescribed color by night.

- Night signals are to be displayed from sunset to sunrise. When weather or other conditions obscure day signals, night signals must be used in addition.

VISIBLE SIGNALS.

Color.	Indication.
(a) Red.....	Stop
(b) Green.....	Proceed, and for other uses prescribed by the rules
(c) Yellow.....	Proceed with caution, and for other uses prescribed by the rules.
(d) Green and white.	Flag stop. See Rule 28.
(e) Blue.....	See Rule 26

11. A fusee on or near the track burning red must not be passed until burned out.

HAND, FLAG AND LAMP SIGNALS.

Manner of Using.	Indication.
(a) Swung across the track.....	Stop
(b) Raised and lowered vertically.....	Proceed
(c) Swung vertically in a circle at half arm's length across the track when the train is standing.....	Back
(d) Swung vertically across the track in a circle at arm's length when the train is running.....	Train has parted
(e) Swung horizontally above the head, when the train is standing .....	Apply air brakes
(f) Held at arm's length above the head, when the train is standing.....	Release air brakes

13. Any object waved violently by any one on or near the track is a signal to stop.

AUDIBLE SIGNALS

Engine Whistle Signals.

- Note.—The signals prescribed are illustrated by "o" for short sounds, "—" for longer sounds. The sound of the whistle should be distinct, with intensity and duration proportionate to the distance signal is to be conveyed.

Sound	Indication
(a) o	Stop. Apply brakes.
(b) — —	Release brakes.
(c) — ooo	Flagman go back and protect rear of train.
(d) — — — —	Flagman return from west or south.
(e) — — — — —	Flagman return from east or north.
(f) — — — —	When running, train parted; to be repeated until answered by Rule 12 (d).
(g) o o	Answer to any signal not otherwise provided for.
(h) o o o	When train is standing, back. Answer to 12 (c) and 16 (a). When train is running, answer to 16 (d).
(j) o o o o	Call for signals.
(k) — — — o o	To call the attention of yard engines, extra trains or trains of the same or inferior class or inferior right to signals displayed for a following section.
(l) — — — — o o	Approaching public crossing at grade.
(n) — — — — —	Approaching stations, junctions and railroad crossings at grade.

A succession of short sounds of the whistle is an alarm for persons or cattle on the track.

- The explosion of one torpedo is a signal to stop; the explosion of two not more than 200 ft. apart is a signal to reduce speed and look out for a stop signal.

15A. Torpedoes must not be placed near stations or road crossings where persons are liable to be injured by them.

BELL CORD SIGNALS.

Conductor to Motorman

- (a) Two ..... When train is standing, start.
- (b) One ..... When train is running, stop at next station.
- (c) Four ..... When train is standing, back the train.
- (d) Three ..... When train is running, stop at once—emergency.
- (e) Three ..... When train is standing, apply or release air-brakes.
- (f) Four ..... When train is running, reduce speed.
- (g) Five ..... When train is standing, call in flagman.
- (h) Five ..... When train is running, increase speed.



COMMUNICATING SIGNALS (OPTIONAL)

Sound	Indication
(a) Two	When train is standing, start.
(b) Two	When train is running, stop at once.
(c) Three	When train is standing, back the train.
(d) Three	When train is running, stop at next station.
(e) Four	When train is standing, apply or release air-brakes.
(f) Four	When train is running, reduce speed.
(g) Five	When train is standing, call in flagman.
(h) Five	When train is running, increase speed.

Motorman to Conductor

Sound	Indication
(a) One	Come to cab.
(b) Two	Watch trolley.
(c) Five	Pull trolley down to roof.
(d) Four taps	Motorman is signal to conductor that he wishes to back train and answered by conductor before train is backed.

TRAIN SIGNALS

17. The head-light will be displayed to the front of every train by night, but must be concealed when a train turns out to meet another and has stopped clear of main track or is standing to meet trains at the end of double track or at junctions.

18. Yard motors will display the head-light to the front and rear by night. When not provided with a head-light at the rear two white lights must be displayed. Yard motors will not display markers.

19. The following signals will be displayed, one on each side of every train, as markers, to indicate the rear of the train. By day, green flags; by night, green lights to the front and side and red lights to the rear, except when the train is clear of the main track, when green lights must be displayed to the front side and rear.

20. All sections except the last will display two green flags and in addition two green lights by night in the places provided for that purpose on the front of the motor or engine.

21. Extra trains will display two white flags and in addition two white by night in the places provided for that purpose on the front of the engine motor.

22. When two or more motors are coupled the leading motor only shall display the signals as prescribed by Rules 20 and 21.

23. One flag or light displayed where in Rules 19, 20 and 21 two are prescribed will indicate the same as two, but the proper display of all train signals is required.

24. When cars are pushed by a motor (except when shifting or making up trains in yards) a white light must be displayed on the front of the leading car by night.

25. Each car on a passenger train must be connected with the motor by a communicating signal appliance.

26. A blue flag by day and a blue light by night displayed at one or both ends of an engine, car or train, indicates that workmen are under or about it; when thus protected it must not be coupled to or moved. Workmen will display the blue signals and the same workmen are alone authorized to remove them. Other cars must not be placed on the same track so as to intercept the view of the blue signals without first notifying the workmen.

USE OF SIGNALS

27. A signal imperfectly displayed or the absence of a signal at a place where a signal is usually shown must be regarded as a stop signal and the fact reported to the .....

28. A combined green and white signal is to be used to stop a train only at the flag stations indicated on its schedule. When it is necessary to stop a train at a point that is not a flag stop on its schedule a red signal must be used.

29. When a signal (except a fixed signal) is given to stop a train it must, unless otherwise provided, be acknowledged as prescribed by Rule 14 (g) or (h).

30. The engine or motor bell must be rung when a train is about to move.

31. The engine or motor bell must be rung on approaching every public road crossing at grade and until it is passed, and the whistle must be sounded at all whistling-posts.

32. The unnecessary use of either the whistle or the bell is prohibited. They will be used only as prescribed by rule or law or to prevent accident.

33. Watchmen stationed at public road and street crossings must use red signals only when necessary to stop trains.

SUPERIORITY OF TRAINS

71. A train is superior to another train by right, class or direction. Right is conferred by train order; class and direction by time-table. Right is superior to class or direction. Direction is superior as between trains of the same class.

72. Trains of the first class are superior to those of the second; trains of the second class are superior to those of the third, and so on. Trains in the direction specified by the time-table are superior to trains of the same class in the opposite direction.

73. Extra trains are inferior to regular trains.

MOVEMENT OF TRAINS

82. Time-table schedules, unless fulfilled, are in effect for ..... after their time at each station. Regular trains ..... hours behind

either their schedule arriving or leaving time at any station lose both right and schedule and can thereafter proceed only as authorized by train order.

83. A train must not leave its initial station on any division (or sub-division) or a junction or pass from double to single track until it has been ascertained whether all trains due, which are superior or of the same class, have arrived or left.

84. A train must not start until the proper signal is given.

85. When a train of one schedule is on the time of another schedule of the same class in the same direction it will proceed on its own schedule. Trains of one schedule may pass trains of another schedule of the same class and extras may pass and run ahead of extras.

86. An inferior train must clear the time of a superior train in the same direction not less than ..... minutes, but must be clear at a time a first-class train in the same direction is due to leave the next station in the rear where time is shown.

87. An inferior train must keep out of the way of opposing superior trains and failing to clear the main track by the time required by rule must be protected as prescribed by Rule 99. Extra trains must clear the time of regular trains ..... minutes unless otherwise provided, and will be governed by train orders with respect to opposing extra trains.

88. At meeting points between trains of the same class the inferior train must clear the main track before the leaving time of the superior train. At meeting points between extra trains the train in the inferior time-table direction must take the siding unless otherwise provided. Trains must pull into the siding when practicable; if necessary to back in, the train must first be protected as prescribed by Rule 99, unless otherwise provided.

89. At meeting points between trains of different classes the inferior train must take the siding and clear the superior train at least ..... minutes and must pull into the siding when practicable. If necessary to back in the train must first be protected as prescribed by Rule 99, unless otherwise provided.

90. Trains must stop at schedule meeting stations if the train to be met is of the same class unless the switch is right and the track clear. When the expected train of the same class is not found at the schedule meeting station the superior train when on time must approach all sidings prepared to stop until the expected train is met. Trains must stop clear of the switch used by the train to be met in going on the siding.

91. Unless some form of block signal is used trains in the same direction must keep at least ..... apart, except in closing up at stations.

92. A train must not arrive at a station in advance of its schedule arriving time. A train must not leave a station in advance of its schedule leaving time.

93. Within yard limits the main track may be used protecting against ..... class trains. .... class and extra trains must move within yard limits prepared to stop unless the main track is seen or known to be clear.

94. A train which overtakes another train so disabled that it cannot proceed will pass it if practicable and if necessary will assume the schedule and take the train orders of the disabled train, proceed to the next open telegraph or telephone office and there report to the ..... The disabled train will assume the right or schedule and take the train orders of the last train with which it has exchanged and will when able proceed to and report from the next open telegraph or telephone office. When a train, unable to proceed against the right or schedule of an opposing train, is overtaken between stations by an inferior train or a train of the same class having right or schedule which permits it to proceed, the delayed train may, after proper consultation with the following train, precede it to the next telegraph or telephone station, where it must report to ..... When opposing trains are met under these circumstances it must be fully explained to them by the leading train that the expected train is following.

94-A.—Should it become necessary for crews to change off before the completion of their trip they must exchange all orders and special instructions, read them aloud to each other and know that they are understood before proceeding.

95. Two or more sections may be run on the same schedule. Each section has equal time-table authority. A train must not display signals for a following section without orders from the .....

96. When signals displayed for a section are taken down at any point before that section arrives the conductor will, if there be no other provision, arrange in writing with the operator, or if there be no operator, with the switchtender, or in the absence of both, with a flagman left there for that purpose, to notify all opposing inferior trains of the same class leaving such points that the section for which signals were displayed have not arrived.

97. Extra trains must not be run without orders from the .....

98. Trains must approach the end of double track, junctions, railroad crossings at grade and drawbridges prepared to stop unless the switches and signals are right and the track is clear. Where required by law trains must stop.

98-A. Trains must be brought to a full stop at a safe distance approaching railroad crossings at grade and motorman must not proceed until the conductor has gone ahead to the center of crossing, looking both ways, and given the "proceed" signal. Before starting the motorman will look back to see that no passengers are getting on or off, and in no case proceed, even after conductor's signal, until he has also examined the crossing and satisfied himself that it is clear and may be safely used. When there is more than one track the conductor must remain in advance of the train until the last track is reached.

99. When a train stops or is delayed under circumstances in which it may be overtaken by another train the flagman must go back imme-



diately with stop signals a sufficient distance to insure full protection. When recalled he may return to his train, first placing two torpedoes on the rail when the conditions require it. The front of a train must be protected in the same way when necessary by the .....

100. If a train should part while in motion trainmen must, if possible, prevent damage to the detached portions. The signals prescribed by Rules 12 (d) and 14 (f) must be given. The detached portion must not be moved or passed until the front portion comes back.

101. When cars are pushed by an engine or motor (except when shifting and making up trains in yards) a flagman must take a conspicuous position on the front of the leading car.

102. Messages or orders respecting the movement of trains or the condition of track or bridges must be in writing.

103. Switches must be left in proper position after having been used. Conductors are responsible for the position of the switches used by them and their trainmen except where switchtenders are stationed. A switch must not be left open for a following train unless in charge of a trainman of such train.

105. Both conductors and motormen are responsible for the safety of their trains and, under conditions not provided for by the rules, must take every precaution for their protection.

106. In all cases of doubt or uncertainty the safe course must be taken and no risks run.

#### RULES FOR MOVEMENT BY TRAIN ORDERS

201. For movements not provided for by time-table train orders will be issued by authority and over the signature of the .....

202. Each train order must be given in the same words to all persons or trains addressed.

203. Train orders will be numbered consecutively each day, beginning with No. .. at midnight.

204. Train orders must be addressed to those who are to execute them, naming the place at which each is to receive his copy. Those for a train must be addressed to the conductor and motorman and also to any one who acts as its pilot. A copy for each person addressed must be supplied by the operator. Orders addressed to operators restricting the movement of trains must be respected by conductors and motormen the same as if addressed to them.

205. Each train order must be written in full in a book provided for the purpose at the office of the ....., and with it recorded the names of those who have signed for the order, the time and the signals which show when and from what office the order was repeated and the responses transmitted and the train dispatcher's initials. These records must be made at once and never from memory or memoranda.

206. Regular trains will be designated in train orders by their numbers, as "No. 10" or "2d No. 10," adding engine or motor numbers if desired. Extra trains will be designated by motor numbers and the direction as "Extra 798 'East' or 'West.'" Other numbers and time will be stated in figures and words.

207. To transmit a train order the signal "31" or the signal "19" followed by the direction must be given to each office addressed, the number of copies being stated if more or less than three—thus "31 West copy 5" or "19 East copy 2."

208 (A). A train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. The several addresses must be in the order of superiority of trains, each office taking its proper address. When not sent simultaneously to all the order must be sent first to the superior train.

208 (B)—(Optional).

A train order to be sent to two or more offices must be transmitted simultaneously to as many of them as practicable. The several addresses must be in the order of superiority of trains, and when practicable must include the operator at the meeting or waiting point, each office taking its proper address. When not sent simultaneously to all, the order must be sent first to the superior train. Copies of the order addressed to the meeting or waiting point must be delivered to all trains affected until all have arrived from one direction.

209. Operators receiving train orders must write them in manifold during transmission and if they cannot at one writing make the requisite number of copies, must trace others from one of the copies first made.

210. When a "31" train order has been transmitted operators must (unless otherwise directed) repeat it at once from the manifold copy in the succession in which the several offices have been addressed and then write the time of repetition on the order. Each operator receiving the order should observe whether the others repeat correctly. Those to whom the order is addressed, except ....., must then sign it, and the operator will send their signatures preceded by the number of the order to the .....

The response "complete" and the time, with the initials of the ....., will then be given by the train dispatcher. Each operator receiving this response will then write on each copy the word "complete," the time and his last name in full and then deliver a copy to each person addressed.

211. When a "19" train order has been transmitted operators must (unless otherwise directed) repeat it at once from the manifold copy in the succession in which the several offices have been addressed. Each operator receiving the order should observe whether the other repeats correctly. When the order has been repeated correctly by an operator the response "complete" and the time, with the initials of the ....., will be

given by the train dispatcher. The operator receiving this response will then write on each copy the word "complete," the time and his last name in full and personally deliver a copy to each person addressed without taking his signature. When a "19" train order restricting the superiority of a train for it at the point where such superiority is restricted the train must be brought to a stop before delivery of the order.

212. A train order may when so directed by the train dispatcher be acknowledged without repeating by the operator responding "X" (number of train order) to (train number)," with the operator's initials and office signal. The operator must then write on the order his initials and the time.

213. "Complete" must not be given to a train order for delivery to an inferior train until the order has been repeated or the "X" response sent by the operator who receives the order for the superior train.

214. When a train order has been repeated or "X" response sent, and before "complete" has been given, the order must be treated as a holding order for the train addressed, but must not be otherwise acted on until "complete" has been given. If the line fail before an office has repeated an order or has sent the "X" response the order at that office is of no effect and must be there treated as if it had not been sent.

215. The operator who receives and delivers a train order must preserve the lowest copy.

216. For train orders delivered by the train dispatcher the requirements as to the record and delivery are the same as at other offices.

217. A train order to be delivered to a train at a point not a telegraph or telephone station, or at one which the office is closed, must be addressed to "C. and M. .... (at .....), care of ....." and forward and deliver by the conductor or other person in whose care it is addressed. When form 31 is used "complete" will be given upon the signature of the person by whom the order is to be delivered, who must be supplied with copies for the conductor and addressed, and a copy upon which he shall take their signatures. This copy he must deliver to the first operator accessible, who must preserve it and at once transmit the signatures of the conductor and motorman to the train dispatcher. Orders so delivered must be acted on as if "complete" had been given in the usual way. For orders which are sent in the manner herein provided to a train, the superiority of which is thereby restricted, "complete" must not be given to an inferior train until the signatures of the conductor and motorman of the superior train have been sent to the .....

217-A. When necessary for train crews to receive train orders by telephone the conductors must receive and make a written record of the order. The motorman must repeat it back from the record made by the conductor. The order must not be acted upon until "complete" is given by the train dispatcher to motorman and acknowledged by the conductor.

218. When a train is named in a train order by its schedule number alone all sections of that schedule are included and each must have copies delivered to it.

219. Unless otherwise directed, an operator must not repeat or give the "X" response to a train order for a train which has been cleared or of which the motorman has passed his train-order signal until he has obtained the signature of the conductor and motorman to the order.

220. Train orders once in effect continue so until fulfilled, superseded or annulled. Any part of an order specifying a particular movement may be either superseded or annulled. Orders held by or issued for or any part of an order relating to a regular train become void when such train loses both right and schedule as prescribed by Rules 4 and 82 or is annulled.

221 (A) A fixed signal must be used at each train-order office, which shall indicate "stop" when there is an operator on duty, except when changed to "proceed" to allow a train to pass after getting train orders or for which there are no orders. A train must not pass the signal while "stop" is indicated. The signal must be returned to "stop" as soon as a train has passed. It must be fastened at "proceed" only when no operator is on duty. Operators must have the proper appliances for hand signaling ready for immediate use if the fixed signal should fail to work properly. If a signal is not displayed at a night office trains which have not been notified must stop and ascertain the cause and report the facts to the .....

from the next open telegraph or telephone station. Where the semaphore is used the arm indicates "stop" when horizontal and "proceed" when in an inclined position.

222. Operators will promptly record and report to the .....

the time of departure of all trains and the direction of extra trains. They will record the time of arrival and report it when so directed.

223. The following signs and abbreviations may be used:  
Initials for signature of the .....

Such office and other signals as are arranged by the .....

C. & M.—For conductor and motorman.

X.—Train will be held until order is made "complete."

Com.—For complete.

O. S.—Train report.

No.—For number.

Eng.—For engine.

Mot.—For motor.

Sec.—For section.

Psgr.—for passenger.

Frt.—For freight.

Mins.—For minutes.

Jct.—For junction.

Dispr.—For train dispatcher.



Opr.—For operator.

31 or 19—To clear the line for train orders and for operators to ask for train orders.

S. D.—For "stop displayed."

The usual abbreviations for the names of the months and stations.

FORMS OF TRAIN ORDERS

Form A. Fixing Meeting Points for Opposing Trains

- (1).....meet.....at.....
  - (2).....meet.....at.....
- (and so on).

Examples

- (1) No. 1 meet No. 2 at "B."  
No. 3 meet 2d No. 4 at "B."  
No. 5 meet extra 95 east at "B."  
Extra 652 north meet extra 231 south at "B."
- (2) No. 2 and 2d No. 4 meet Nos. 1 and 3 at "C" and extra 95 west at "D."  
No. 1 meet No. 2 at "B," 2d No. 4 at "C" and extra 95 east at "D."

Trains receiving these orders will run with respect to each other to the designated points and there meet in the manner provided by the rules.

STANDARD TRAIN ORDER BLANK FOR 31 ORDER

Form 31 Form 31

(Name) Company

TRAIN ORDER No. 10

March 21, 1906

To \_\_\_\_\_ At \_\_\_\_\_

X \_\_\_\_\_ (Initials) Opr.; \_\_\_\_\_ 1 45 A M

Conductor and Engineman must each have a copy of this order

Repeated at 2 20 A M.

Conductor	Engineman	Train	Made	Time	Opr.
Jones	Brown	45	Complete	2 20 a.m.	Black
	(Omit this column where Engineman is not required to sign.)				

Form B. Directing a Train to Pass or Run Ahead of Another Train

- (1).....pass.....at.....
- (2).....pass.....when overtaken.
- (3).....run ahead of.....to.....
- (4).....run ahead of.....until overtaken.
- (5).....pass.....at.....and run ahead of.....to.....

Examples

- (1) No. 1 pass No. 3 at "K."
- (2) No. 6 pass No. 4 when overtaken.
- (3) Extra 594 east run ahead of No. 6 "M" to "B."
- (4) Extra 95 west run ahead of No. 3 "B" until overtaken.
- (5) No. 1 pass No. 3 at "K" and run ahead of No. 7 "M" to "Z."

When under (1) a train is to pass another both trains will run according to rule to the designated point and there arrange for the rear train to pass promptly.

Under (2) both trains will run according to rule until the second-named train is overtaken and then arrange for the rear train to pass promptly.

Under (3) the second-named train must not exceed the speed of the first-named train between the points designated.

Under (4) the first-named train will run ahead of the second-named train from the designated station until overtaken and then arrange for the rear train to pass promptly.

When an inferior train receives an order to pass a superior train right is conferred to run ahead of the train passed from the designated point.

Form C. Giving Right to a Train Over an Opposing Train.

.....has right over.....to.....

STANDARD TRAIN ORDER BLANK FOR 19 ORDER

Form 19 Form 19

(Name) Company

TRAIN ORDER No. 10

March 21, 1906

To \_\_\_\_\_ At \_\_\_\_\_

X \_\_\_\_\_ (Initials) Opr.; \_\_\_\_\_ 1 45 A M

Conductor and Engineman must each have a copy of this order

Mado complete time 2 16 P M Black Opr.

Examples

- (1) No. 1 has right over No. "G" to "X."
  - (2) Extra 37 east has right over No. 3 "F" to "A."
- This order gives right to the train first-named over the other train between the points named.

If the trains meet at either of the designated points the first-named train must take the siding unless the order otherwise prescribes.

Under (1) if the second-named train reach the point last named before the other arrives it may proceed, keeping clear of the opposing train as many minutes as such train was before required to clear it under the rules.

Form—(A)

(Name) Company

CLEARANCE CARD

Dover 9 15 a. m. March 21 19 06

Conductor and Engineman No. 12

I have (3) (No) (No further) orders for your train.

Signal is displayed for Extra 452

John Jones Operator

This does not affect any orders you may have received.

Conductor and Engineman must each have a copy, and see that their train is correctly designated in the above form.

Under (2) the regular train must not go beyond the point last named until the extra train has arrived unless directed by train order to do so.

Form D. Giving Regular Trains the Right Over a Given Train

Form E. Time Orders

- (1).....run.....late.....to.....
- (2).....run.....late.....to..... and .....late.....to.....etc.
- (3).....wait at.....until.....for.....
- (4).....wait at.....until.....until.....until.....until.....until.....until.....



Examples

- (1) No. 1 run 20 mins. late "A" to "G."
- (2) No. 1 run 20 mins. late "A" to "G" and 15 mins. late "G" to "K," etc.
- (3) No. 1 wait at "H" until 10:00 a. m. for No. 2.
- (4) Nos. 1 and 3 wait at "H" until 10:00 a. m.  
"P" until 10:30 a. m.  
"R" until 10:55 a. m., etc.

(1) and (2) make the schedule time of the train named between the stations mentioned as much later as stated in the order and any other train receiving the order is required to run with respect to this later time as before required to run with respect to the regular schedule time. The time in the order should be such as can be easily added to the schedule time.

Under (3) the train first named must not pass the designated point before the time given unless the other train has arrived. The train last named is required to run with respect to the time specified at the designated point or any intermediate station where schedule time is earlier than the time specified in the order as before required to run with respect to the schedule time of the train first named.

Under (4) the train (or trains) named must not pass the designated points before the times given.

Other trains receiving the order are required to run with respect to the time specified at the designated points or any intermediate station where schedule time is earlier than the time specified in the order as before required to run with respect to the schedule time of the train (or trains) named.

All of these examples may be used in connection with an extra train created by example (3) of Form G and the times at each point stated in that example have the same meaning as schedule times in the foregoing examples.

Form F. For Sections

- (1).....display signals and run as.....to.....
- (2).....run as.....to.....
- (3).....display signals.....to.....for.....
- (6).....is withdrawn as.....at.....
- (7).....instead of.....display signals and run as.....to.....
- (8).....take down signals at.....
- (9).....and.....reverse positions as.....and.....to.....

Examples

- (1) Eng. 20 display signals and run as 1st No. 1 "A" to "Z."
- (2) Eng. 25 run as 2d No. 1 to "A" to "Z."
- (3) No. 1 display signals "A" to "G" for eng. or mot. 65. 2d No. 1 display signals "B" to "E" for eng. or mot. 99.

These examples may be modified as follows:

- (4) Engs. or mots. 20, 25 and 99 run as 1st, 2d and 3d No. 1 "A" to "Z."
- Example (1) is to be used when the number of the engine for which signals are displayed is unknown and is to be followed by example (2), both being single order examples.

Under examples (2) and (3) the engine or motor named will not display signals.

Under example (4) the engine or motor last named will not display signals.

For changing sections:

To add an intermediate section the following modification of example (1) will be used:

- (5) Eng. or mot. 85 display signals and run as 2d No. 1 "N" to "Z."
- Following sections change numbers accordingly.

Under (5) engine or motor 85 will display signals and run as directed and following sections will take the next higher number.

To drop an intermediate section the following example will be used:

- (6) Eng. or mot. is withdrawn as 2d No. 1 at "H." Following sections change numbers accordingly.

Under (6) engine 85 will drop out at "H" and following sections will take the next lower number.

To substitute one engine or motor for another on a section the following will be used:

- (7) Eng. or mot. 18 instead of eng. or mot. 85 display signals and run as 2d No. 1 "R" to "Z."

Under (7) engine or motor 85 will drop out at "R" and engine or motor 18 will run as directed.

If engine or motor 85 is last section the words "display signals and" will be omitted. Following sections need not be addressed.

To discontinue the display of signals the following example will be used:

- (8) 2d No. 1 take down signals at "D."

Under example (8) 2d No. 1 will take down signals as directed and a following section must not proceed beyond the point named.

To pass one section by another the following will be used:

- (9) Engs. or mots. 99 and 25 reverse positions as 2d and 3d No. 1 "H" to "Z."

Under (9) engine or motor 99 will run ahead of engine or motor 25 "H" to "Z," and, if necessary, both engines or motors will arrange signals accordingly. Following sections, if any, need not be addressed.

The character of a train for which signals are displayed may be stated. Each section affected by the order must have copies and must arrange signals accordingly.

To annul a section for which signals have been displayed over a divi-

sion or any part thereof, when no train is to follow the signals, Form K must be used.

Form G. Extra Trains

- (1) Eng. or mot.....run extra.....to.....
- (2) Eng. or mot.....run extra.....to.....and return to.....

Examples

- (1) Eng. or mot. 99 run extra "A" to "F."
- (2) Eng. or mot. 99 run extra "A" to "F" and return to "C."
- Under (2) the extra must go to "F" before returning to "C."
- (3) Eng. or mot. .... run extra, leaving ..... on ..... as follows with right over all trains:

Leave.....  
Leave.....  
Arrive.....

- (3) Eng. or mot. 77 run extra, leaving "A" on Thursday, Feb. 17, as follows, with right over all trains:

Leave "A" 11:30 p. m.  
" "C" 12:25 a. m.  
" "E" 1:47 a. m.  
Arrive "F" 2:22 a. m.

This order may be varied by specifying the kind of extra and the particular trains over which the extra shall or shall not have right. Trains over which the extra is thus given right must clear the time of the extra ..... minutes.

Form H. Work Extra

- (1).....works.....until.....between.....and.....

Examples

- (1) Eng. or mot. 292 works 7 a. m. to 6 p. m. between "D" and "E."
- Under (1) the work extra must, whether standing or moving, protect itself against extras within the working limits in both directions as prescribed by rule. The time of regular trains must be cleared.

This may be modified by adding:

- (2) Not protecting against (eastward) extras.
- (3) Not protecting against extras.

Under (2) the work extra will protect only against (westward) extras. The time of regular trains must be cleared.

Under (3) protection against extras is not required. The time of regular trains must be cleared.

When a work extra has been instructed by order to not protect against extra trains and afterward it is desired to have it clear the track for (or protect itself after a certain hour against) a designated extra an order may be given in the following form:

- (4) Work extra 292 clears (or protects against) extra 76 east between "D" and "E" after 2:10 p. m.

Under (4) extra 76 east must not enter the working limits before 2:10 p. m. and will then run expecting to find the work extra clear of the main track (or protecting itself) as the order may require.

To enable a work extra to work upon the time of a regular train the following form will be used:

- (5) Work extra 292 protects against No. 55 (or ..... class trains) between "D" and "E."

Under (5) the work extra may work upon the time of the train or trains mentioned in the order and must protect itself against such train or trains as prescribed by Rule 99. The regular train or trains receiving the order will run expecting to find the work extra protecting itself.

When a work extra is to be given exclusive right over all trains the following form will be used:

- (6) Work extra 292 has right over all trains between "D" and "E," 7 p. m. to 12 night.

This gives the work extra the exclusive right between the points designated between the times named.

Work extras must give way to all trains as promptly as practicable.

Whenever extra trains are run over working limits they must be given a copy of the order sent to the work extra. Should the working order instruct a work extra to not protect against extra trains in one or both directions extra trains must protect, as prescribed by Rule 99, against the work extra; if the order indicates that the work extra is protecting itself against other trains, they will run expecting to find work extra protecting itself.

The working limits should be as short as practicable, to be changed as the progress of the work may require.

Form J. Holding order

Hold.....

Examples

- Hold No. 2.
- Hold all (or .....ward) trains.

When a train has been so held it must not proceed until the order to hold is annulled or an order given to the operator in the form: "..... may go."

These orders will be addressed to the operator and acknowledged in the usual manner and will be delivered to conductors and motormen of all trains effected.

Form J will only be used when necessary to hold trains until orders can be given or in case of emergency.

Form K. Annulling a Schedule or a Section

.....of.....is annulled.....to.....

Examples

- No. 1 of Feb. 29 is annulled "A" to "Z."
- 2d No. 5 of Feb. 29 is annulled "E" to "G."



The schedule or section annulled becomes void between the points named and cannot be restored.

Form L. Annuling an Order

Order No. .... is annulled.

Examples

Order No. 10 is annulled.

If an order which is to be annulled has not been delivered to a train the annulling order will be addressed to the operator, who will destroy all copies of the order annulled but his own and write on that:

Annulled by Order No. ....

An order which has been annulled must not be reissued under its original number.

Form M. Annuling Part of An Order

That part of Order No. .... reading ..... is annulled.

Examples

That part of Order No. 10 reading No. 1 meet No. 2 at "S" is annulled.

Form P. Superseding An Order or a Part of An Order

This order will be given by adding to prescribed forms the words "instead of ....."

(1) ..... meet ..... at ..... instead of .....

(2) ..... has right over ..... to ..... instead of .....

(3) ..... display signals for ..... to ..... instead of .....

Examples

(1) No. 1 meet No. 2 at "C" instead of "B."

(2) No. 1 has right over No. 2 "G" to "R" instead of "X."

(3) No. 1 display signals for eng. or mot. 85 "A" to "Z" instead of "G."

An order which has been superseded must not be reissued under its original number.

SPECIAL RULES

Train Dispatchers

311. Train dispatchers report to and receive their instructions from the .....

312. They will issue orders governing the movement of trains and see that all such orders are transmitted and recorded according to the prescribed forms and rules, and will keep a careful record of the movement of all trains or engines or motors over the district or division, noting all important incidents on the prescribed forms.

(Transfer)

313. Each train dispatcher going off duty must enter in ink on the train dispatcher's order book, a transfer of all orders that have not been fully executed, and must see that all such orders are understood by the relieving train dispatcher.

(Time of Relief)

314. A train dispatcher and the operator working with him must not be relieved at the same hour.

Station Masters.

Report to:

322. Station masters report to and receive their orders from the superintendent and will comply with the instructions of the .....

Duty:

323. They will have charge of passenger stations and yards and persons employed therein.

324. Inspect all cars, station apartments and grounds and see that they are kept in condition for the comfort and convenience of passengers.

325. See that passenger trains are made up in the order designated that crews report for duty at the prescribed hour and that trains leave on time.

326. They must not permit a train to start with a motorman, conductor or trainman who has apparently been drinking intoxicating liquors or is unfit for duty, nor fail to report such occurrences at once to the superintendent.

(Keep Proper Records)

327. Keep a record of all trains and cars, note all irregularities and see that reports of same are made to the proper officer.

(Announcement)

328. Before the arrival or departure of a train announce in the waiting-room and on the platform its direction, its destination, state whether local or through and mention the next and principal stops.

(This duty may be delegated to doormen or ushers.)

Station Agents

Report to:

329. Station agents report to and receive their orders from the superintendent and will obey the instructions of the .....

Duty:

330. They will have charge of the business of the company at the station, all property connected therewith and all persons employed thereat.

Switching Lists:

331. They must furnish conductors on arrival complete list of all station switching to be done by them and will report failure to properly perform the work.

Condition of Premises:

331. See that the station and grounds are in proper condition for the safety, comfort and convenience of patrons.

Signal Appliance:

332. See that the station is supplied with the necessary lanterns, flags and torpedoes and that they are ready for immediate use.

(Cars at Stations Properly Secured)

333. Know that all cars standing on sidings are entirely clear of passing trains and that brakes are properly set. When on grades, see that wheels are blocked. In case of high winds extra precaution must be taken to prevent cars from fouling adjoining tracks.

Obstructions:

334. See that street crossings and sidewalks are not obstructed by cars standing on sidings.

335. See that lumber or other material is not piled within eight (8) feet of any track.

Insure Safety:

336. Unless otherwise ordered they must know that all switches and frogs at their stations are in safe condition for use and that all signals are in proper working order. They must take every precaution to insure the safety of trains.

Switch Lamps:

337. Be responsible for the care and proper display of switch lamps as per Rule No. 9.

Printed Information for Public:

338. Post in a prominent place time-tables and tariffs and other matter issued by the Freight and Passenger Departments for the information of the public.

Hold Traffic:

339. Use every proper means to secure and hold traffic for the road.

Condition of Cars:

340. Know that all cars are in proper condition before loading and do not permit them to be loaded in excess of the weight given in special instructions nor beyond the proper limits of height and width. The dimensions of loading will be furnished on application to the superintendent. Heavy logs or timber on cars must be properly staked and wired or chained.

Long Timbers:

341. Long timbers reaching over two or more cars must be loaded and placed as per instructions. All such cars must be chained together in addition to the regular coupling.

Order and Politeness:

342. Enforce order and require all persons employed at the station to be polite and considerate in their intercourse with the public.

Passenger Conductors

Report to:

343. Passenger conductors report to and receive their orders from the superintendent and will obey the instructions of the .....

Duty:

344. They will be responsible for the movement, safety and care of the train and for the vigilance and conduct of the men employed thereon and must report any misconduct or neglect of duty.

When there are two or more cars in a train the conductor of the leading car will be in charge of operation.

345. They must know that the men employed on their trains are familiar with their duties.

Report for Duty:

346. Report for duty in uniform at least ..... minutes before leaving time and assist in making up the train when necessary.

Bulletin Rules:

347. Examine bulletin board before starting and at each point possible thereafter and compare time with the motorman before starting.

Registers:

348. At points where train registers are kept enter all the information required by their form.

Handling Passengers:

349. Never permit the train to be moved while passengers are getting on or off.

Running by Station:

350. When a train runs past a station notify the passengers not to alight until the train has backed, which movement must not be executed until the conductor has given the proper signal and motorman has acknowledged same.

Unauthorized Passengers:

351. No persons, excepting those specified in the instructions governing free travel, will be allowed to ride on any train without a proper ticket or pass or payment of fare.

Ejection:

352. If any person shall refuse to produce proper ticket or pass or pay fare cause the train to be brought to a stop at a regular station or near some dwelling-house and request such person to leave the train. In case of refusal remove such person therefrom.

It should not be in such a place in such weather or such unseasonable hour as might ordinarily endanger the health or safety of the person ejected. The person ejected must not be a child, a person of unsound mind or in such feeble or helpless condition as to be unable to take care of himself or herself at the point of ejection.

Protect Passenger:

It is the duty of conductors to protect passengers who are lawfully on their trains from rudeness, threatened violence, abusive or obscene language, and any passenger acting in a disorderly manner or who annoys



passengers as stated above may be removed from train at the next station whether provided with ticket or not.

Each conductor will be held responsible for the exercise of reasonable discretion in the performance of this duty, maintaining self-control and being careful to use no unnecessary force that might subject the company to litigation or annoyance.

When necessary to eject a person from the train ascertain name and address of such person and the names and addresses of a number of passengers who witnessed the removal and report the occurrence to the proper officer on the prescribed form.

Conduct of Train Employees:

353. Train employees must not occupy seats with passengers nor enter into conversation with them further than is required in the discharge of their duty and in answering questions politely.

Seating of Passengers:

355. Passengers must not be allowed to use seats in coaches on which to deposit their baggage when such seats are required for passengers. When necessary conductors will request the owners in a polite manner to remove baggage or packages from seats or aisles, and in case they refuse to do so, conductors will remove them in a careful manner, placing them in the overhead racks or on the floor within easy reach of the owner; but they must not be placed or allowed to remain in aisles of cars. In carrying out this order avoid unnecessary argument with passengers and be courteous.

Accidents:

356. In case of injury to persons, loss of life or damage to property report at once to..... Use utmost care in obtaining a full statement of facts and names and addresses of persons who witnessed or have any knowledge of the accident. Report on the prescribed forms.

Reports:

357. At the end of each trip make out all reports required, observing all special instructions, and deposit such reports in the prescribed places.

Articles Left On Trains:

358. All articles left by passengers should be marked to indicate on what date and train they were found and by whom and left with station master or designated place at division terminal.

Display of Signals:

359. Display proper signals at rear of train and have all appliances ready for use.

Responsibility:

360. When there is more than one car in train the conductor in rear car will be held equally responsible with the conductor of the first car for the display of signals and markers.

361. When there is more than one car in train the conductor of the second or last car will protect train when ordered by the conductor in charge to do so.

362. When a train needs protection the conductor of the second or last car of the train or both must never wait for a signal or order from the conductor in charge when their train needs protection.

Announcing Stations:

363. In announcing the names of stations observe the following:

Just before arriving at a station at which the train stops announce the arrival in the same manner from inside of the car as follows: "This station is ....." (the name of the station to be repeated).

Before a passenger train leaves a junction station announce in each car the destination of the train thus: "This train for ....." ; the next station is ....."

If a train stops before arriving at the station platform after the announcement has been made the conductor must call out: "This is not the station stop," so that passengers will not be misled or tempted to leave the train.

#### Freight Conductors

Report to:

364. Freight conductors report to and receive their orders from ....., and at stations and yards will obey the instructions of the agent.

Duty:

365. They will report for duty at the required time and assist in making up train when necessary.

Examine Bulletin Boards:

366. Examine bulletin board before starting and at each point possible thereafter and compare time with the motorman before starting.

Inspect Train:

367. Look over the train carefully before starting and know that the couplings, brake and running gear are in good order and that the prescribed signals are correctly displayed.

Frequent Inspection:

368. Inspect the train as often as opportunity offers during the trip.

Responsibility:

369. Be responsible for the movement, safety and proper care of the train and for the vigilance and conduct of the men employed thereon.

370. They must know that the men employed on their trains are familiar with their duties.

Authority:

371. Have the proper authority for the movement of each car in the train.

Passengers on Freight Trains:

372. Passengers must not be carried on freight trains without proper authority.

Card Defective Cars:

373. Card any cars found defective between terminals.

Make-up of Trains:

374. See that all cars equipped with air-brakes are placed first in the train and air used on all of them. Cars or tanks containing oil or other inflammable substances must in no case be hauled next to the engine or motor or coupled next to the caboose when there are other cars in the train; they should be at least ..... cars from the engine or motor or ..... cars from the caboose when practicable. Flat cars must be placed on the rear of the train and boarding cars must be placed next to the caboose.

Train Orders:

375. Require flagman or rear brakemen to read all train orders.

Secure Cars:

376. See that brakes are set on cars left on sidings and when on grades or during high winds that the wheels are blocked. So far as possible all cars on sidings must be left coupled.

Switching:

377. In switching where it is necessary to disturb cars that are being loaded or unloaded notice must first be given to all persons in or about the cars that are to be moved.

When cars are so moved they must be returned to the same position as found.

Obstruct Crossings:

378. See that the train does not obstruct any public crossing longer than five minutes. They will be held responsible for violation of local ordinances relating to the obstruction of public crossings.

379. In leaving cars upon side tracks they must see they are entirely clear of any street, highway or private crossing.

Braking:

380. See that hand brakes are applied in such manner as will prevent sliding or excessive heating of the wheels. Braking should be changed in descending long grades.

Collect Material:

381. Collect all brasses, draw-heads, car doors and other material broken from cars when practicable and when not practicable report to the ....., where they are left.

Position On Train:

382. They will station themselves upon the train in the best position possible to enable them to see that their trains are intact and that their trainmen properly perform their duties so as to insure the best possible management of the train. Know that their flagmen go back promptly when necessary to flag.

383. In approaching yard limits ..... distance before reaching and while passing railroad crossings at grade, drawbridges, junctions, water stations and other points where the train may be required to stop, also in ascending and descending heavy grades, trainmen must all be in proper position on top of the train.

Compare Time:

384. They must compare time with the brakeman, who will act as flagman each trip before departure of train, and they must never entrust the duties of a flagman to any person not entirely familiar with them except in emergency and then they must give the fullest instructions in such duties which circumstance will permit.

Cars Not Safe to Run:

385. Do not take cars that are improperly or too heavily loaded or that are not in condition to run safely. Report all such cases to the superintendent.

Disabled Cars:

386. When disabled cars are left on sidings report the fact by telephone or telegraph to the superintendent. In case they are left where there is no agent take the slips or way-bills to the next regular station with endorsements as to action taken.

Way-bills:

387. Carefully check with the way-bills (in conjunction with the agents if possible) all freight loaded or unloaded and make a record of freight over, short or in bad order. When necessary to transfer freight from one car to another record the transfer on face of way-bill together with the number of the car to which it is transferred.

Accidents:

388. In cases of injury to persons, loss of life or damage to property in connection therewith, report at once ....., giving all the information necessary to a clear understanding of the case and the assistance required. Use the utmost care in obtaining a full statement of facts and names and addresses of persons who witnessed or have any knowledge of the accident. Report on the prescribed forms.

Trespassers:

389. Tramps or other persons who have no legitimate business on the trains must not be allowed to ride and every precaution must be taken to prevent cars being robbed while in transit.

Make Out Reports:

390. At the end of each trip make out all reports required, observing all special instructions, and deposit such reports in the prescribed places.

#### Freight Brakemen

Report to:

391. Freight brakemen report to and receive their instructions from the ..... and while on trains are subject to the orders of the



conductor and at terminal stations they must obey orders of the agent or .....

**Duty:**

392. They will report for duty at the required time and assist in making up train when necessary.

**Inspect Train:**

393. Look over the train carefully before starting and know that all couplings, brake and running gear are in good order. Inspect train as often as possible during the trip.

**Braking:**

394. See that hand brakes are applied so as to avoid sliding or overheating the wheels. Braking should be changed in descending long grades.

**Position On Train:**

395. In approaching yard limits ..... before reaching and while passing railroad crossings at grade, drawbridges, junctions, water stations and other points where the train may be required to stop, also in ascending and descending heavy grades, trainmen must be in proper position on top of the train.

**Flagman Compare Watch:**

396. The brakemen acting as flagman will compare watches with the conductor before assuming such duties and they must be governed by the rules of conductors in so far as the rules pertain to their duties.

**Duty of Flagman:**

397. Rear brakemen or flagmen will consider it their special duty to protect the rear of their train in accordance with the rules and they must allow nothing to interfere with the prompt and efficient discharge of that duty. They must obey the signal from the motorman prescribed by the rules, but must never wait for the signal or orders from the conductor when their train needs protection.

**Motormen**

**Report to:**

398. Motorman report to and receive their instructions from the superintendent in all matters connected with the movement of trains and will report to ..... all troubles that may arise with their cars or equipment and receive their instructions from him concerning same.

**Responsibility:**

399. The motorman is jointly and equally responsible with the conductor for the safety of his train and the movement of the same in strict compliance with the rules and he must decline to obey any orders which involve peril to his train or violation of the rules. When there is no conductor, or he is disabled, the motorman will have charge of the train and will be governed by the rules prescribed for conductors.

**Duty:**

400. They must report for duty at the appointed time; see that the engine or motor is in good working order and furnished with necessary stores and supplies and a full set of signals; examine the bulletin board before starting on and at the end of each trip and compare time with the conductor before starting.

401. They will see that the car, motor or engine is supplied with the required tools.

**Signal Appliances:**

402. The motorman must have necessary signal appliances at hand and ready for use and be prepared to protect the front of his train when necessary. He will be held responsible for the proper display of signals on the front of the train.

**Improper Signals:**

403. Report all switch or other signals not properly lighted or not properly displayed.

**Handling of Air-brake and Air Whistle:**

404. Before leaving a terminal station the motorman must apply the air-brakes and allow them to remain on long enough for the inspectors or trainmen to see that the apparatus is in perfect working condition throughout the train, and when cars have been attached to or taken out the brakes must again be applied to know that they are in working order before proceeding on the trip. In making regular stops they must be applied in such manner as to avoid discomfort to the passengers or injury to the equipment. They must also know that the communication signal is in proper working order.

**Air-brake Test:**

Motormen must test the air-brake ..... distance from stations where engines or motors have been changed or where cars have been taken on or left. Also at least ..... before reaching railroad crossings, drawbridges and at other hazardous places and before going down heavy grades and in case the brakes do not hold must at once signal for brakes. Such test to be made by applying the brakes with sufficient force to ascertain whether they are working properly.

**Crossing Bridges:**

405. Brakes must not be applied or released while crossing bridges or trestles except in case of emergency.

**Look Back Frequently:**

406. When running freight trains look back frequently to see that no portion of the train has become detached or derailed.

**Train Orders:**

407. Show their train orders to the forward brakeman and require him to read them.

**Not to Leave Engine, Motor or Car:**

408. They must not leave their car, motor or engine while on duty, except in the case of necessity, and then the conductor or some competent person must be left in charge.

**Running By Station:**

409. When a passenger train runs past a station or other stopping-place the motorman must give the back-up signal and receive a response from the conductor before backing the train. Great care must be exercised in backing the train to avoid injury to passengers or others by a sudden or unexpected movement.

**Not to Cut Out Trains at Stations:**

410. They will use great care in approaching station where a train is due to stop or is receiving or discharging passengers and in no case run between such train and the station.

No one to ride on motor or car's front platform.

411. They will not permit any person to ride on the front platform, except designated employees in the discharge of their duties without a written order from proper authority.

**Accident:**

412. In case of accident motorman must assist conductor in obtaining names of witnesses.

**Law of State of New York:**

413. The attention of motormen is called to the following extract from the laws of the State of New York:

"Section 421. (Amended 1900). Duties of Motormen.—A person acting as motorman, driving a motor or any railway in this State, who fails to ring the bell or sound the whistle upon such motor, or cause the same to be rung or sounded, at least 80 rods from any place where such railway crosses a traveled road or street on the same level (except in cities), or to continue the ringing of such bell or sounding such whistle at intervals until such motor, and the train to which the motor is attached, shall have completely crossed such road or street, or any officer or employee of a corporation in charge of a motor, train or car who shall wilfully obstruct, or cause to be obstructed, any farm or highway crossing with any motor, train or car for a longer period than five consecutive minutes, is guilty of a misdemeanor."

**COLUMBUS MEETING OF CENTRAL ELECTRIC RAILWAY ASSOCIATION**

(By Telegraph)

At the opening of the fall meeting of the Central Electric Railway Association, on Sept. 26, at Columbus, President Nicholl feelingly touched upon the recent death of two members, F. J. Stout, of Norwalk, and A. W. Anderson, of Dayton. Messrs. Spring, Sloat and Ohmer were named a committee to prepare resolutions of condolence and to present them to the families of the deceased. The report of the committee on train rules was presented and accepted, though the reading was dispensed with, the idea being that while these rules should furnish a standard method of operation their use is not obligatory upon members. Chairman F. D. Carpenter stated that they had been selected from rules of systems all over the country. G. D. Nichols read a paper on catenary construction and for an hour afterward was kept busy answering questions regarding the operation of the system on the Indianapolis & Cincinnati traction line. The use of the bow trolley was one of the interesting points discussed. Henry N. Staats, chairman of the committee on insurance, read a detailed report, which called out considerable discussion on rates and plans for securing reductions.

R. C. Taylor, chairman of the standardization committee, read a report on axle journals, journal boxes, brake shoes, tread and flange of wheels and rails for street and inter-urban purposes. The report was adopted. Mr. Starkey read a report from the committee on express in the absence of Chairman A. A. Anderson. This report embodied opinions from twenty different companies as to contracting with old line express companies allowing exclusive rights over lines. While many opposed the plan the majority favored it. The discussion following showed a great variety of opinions.

E. H. Anderson, of the General Electric Company, gave an interesting talk on the 1200-volt direct current system and described several machines made under it.

A more extended account of this meeting will be published next week.



## PREPARATIONS FOR THE ATLANTIC CITY CONVENTION

Those who are expecting to attend the meetings of the American Street & Interurban Railway Association and its affiliated associations at Atlantic City will find an elaborate program prepared for them. During the past two weeks a large number of the committees which are to report at the Atlantic City Convention, have held meetings in New York and elsewhere, to assist in preparing the final drafts of their reports. An account of the meeting on Sept. 12-14, of the Standardization Committee of the Engineering Association, was published in *THE STREET RAILWAY JOURNAL* last week. On Sept. 20 a meeting was held in New York by the chairmen of the committees of the American Association of Municipal Ownership and on Public Relations, with William J. Clark as a representative of the National Civic Federation. On the same day a meeting was held in Baltimore of the Committee on Car House Construction of the Engineering Association. This meeting was attended by Messrs. Adams, Porter, Parker and Pumfrey, members of the committee, and also by members of the fire insurance interests, including C. H. Patton, chairman of the committee of the National Board of Fire Underwriters, and E. R. Townsend, of Chicago. On Sept. 23 a meeting was held in New York of the Insurance Committee of the American Association, which was attended by Messrs. Davies, Estabrook and Stearns, members of the committee. After a preliminary discussion in the morning of the character of the report to be presented at Atlantic City, the committee met in the afternoon prominent members of the insurance interests.

### RAILROAD RATES

The secretary of the association has announced that the Trunk Line Association, the New England Passenger Association, the Eastern Canadian Passenger Association and the Southeastern Passenger Association have granted a rate of a fare and a third on the certificate plan for all points within their territories. The Central Passenger Association has granted a uniform rate of two cents a mile within its territory. The Western Passenger Association grants special one-way rates to its eastern terminals. The Southwestern Passenger Bureau grants reduced one-way rates to St. Louis.

Delegates coming from points in territory governed by the Trunk Line Association, New England Passenger Association, Eastern Canadian Passenger Association and the Southeastern Passenger Association can secure their tickets under the usual regulations which include buying a first-class ticket to Atlantic City not earlier than Oct. 10 and not later than Oct. 16, and securing a certificate. After this certificate is countersigned by the secretary of the association at Atlantic City, the return ticket can be secured at one-third fare.

In the district covered by the Central Passenger Association, special restrictions have been made by the railroads. The lowest rate granted will be two cents per mile in each direction from the starting point in the passenger association's territory to Buffalo, Pittsburg and other Central Passenger Association eastern gateways. From that point the one-and-one-third fare granted by the Eastern Passenger Association will be available. To secure the two-cent per mile rate in the Central Passenger Association territory, it will be necessary for persons purchasing tickets to be provided with card orders identifying them as delegates to the convention. These card orders are all numbered and the street railway association has to guarantee to the railroads

that they will be used only by delegates to the convention. Representatives of railway companies can secure these card orders upon application by mail to Secretary Swenson of the association at 29 West Thirty-Ninth Street, New York. Representatives of the Manufacturers' Association can secure these orders upon application to Secretary Keegan, Park Row Building, New York. These card orders must be secured before the purchase of the ticket, so that all persons residing in the territory of the Central Passenger Association who expect to attend the convention and are desirous of securing the reduced rate should apply promptly to either Mr. Swenson or Mr. Keegan.

Delegates from the territories of the Western Passenger Association and the Southwestern Passenger Association can take advantage of the reduced one-way rates in effect to Chicago, Peoria and St. Louis. Delegates from Pacific Coast points should avail themselves of the daily nine months excursion rates between these points and St. Louis and Chicago. Upon arriving at these points, such delegates should purchase round-trip tickets to Atlantic City, and should follow the regulations applying to persons in the territory of the Central Passenger Association.

### TRAINS FROM NEW YORK TO ATLANTIC CITY

To accommodate those attending the convention, the Central Railroad of New Jersey announces that it will arrange to provide special Pullman parlor cars on New York-Atlantic City trains leaving New York on Oct. 12, 13 and 14, from foot of West Twenty-Third Street at 9.50 a. m. daily (12.50 p. m. Saturday), 3.20 p. m. (except Sunday), 2.20 p. m. (Sunday only), and from foot of Liberty Street at 10 a. m. daily, 1 p. m. (Saturday only), 3.40 p. m. (except Sunday), and 2.30 p. m. (Sunday only). All of the above are through express trains running via Red Bank and Lakewood. If a considerable number advise of their intention to use any one train, a special train composed exclusively of Pullman parlor cars will be operated for their accommodation. The parlor car fare between New York and Atlantic City is \$.75 in each direction. Passengers by this route have the privilege of stopping over at Lakewood and also of returning via Philadelphia.

The Pennsylvania Railroad will operate through fast express trains to Atlantic City, leaving New York, West Twenty-Third Street station at 9.55 a. m. and 2.55 p. m. week days and 7.55 a. m. Sundays only, with through Pullman cars. Special parlor cars will be reserved for the accommodation of the delegates and a special train will be operated if there is a sufficient number to justify it.

### HOTELS

Convention Bulletin No. 4, just issued by Secretary Swenson, describes fully all these railroad arrangements and also refers to hotel matters. Those who have not yet secured hotel accommodations at Atlantic City and who expect to attend are urged to secure hotel accommodations promptly. As has already been announced, the American Association and the Manufacturers' Association have their headquarters at the Marlborough-Blenheim, the accountants will be at the Chalfonte, the engineers at the Dennis and the claim agents at the St. Charles.

The exhibition will be at the Steel Pier, and over 200 manufacturing companies have been assigned space. The total amount of floor space occupied will be considerably greater than at the 1906 convention at Columbus.

### CONVENTION PROGRAM

The complete program of the four associations as announced in Convention Bulletin No. 3 was published in



THE STREET RAILWAY JOURNAL for Sept. 14. Since that bulletin was issued Wm. J. Clark, of New York City, has promised to present a paper on "Municipal Ownership in Great Britain and in the United States." It will be read at the meeting of the American Association on Friday morning. Changes in titles of three papers have also been made. They are:

American Association. Paper by P. P. Crafts, changed from "Package Express Business" to "Light Freight Handling by Electric Lines." Paper by H. H. Polk changed from "Freight Interchange with Steam Roads" to "Freight Service on Electric Railroads."

Engineering Association. Paper by J. R. Bibbins changed from "Double Flow Turbines" to "Recent Developments in Steam Turbine Power Station Work."

The secretary of the American Association calls special attention to the fact that the Committee on Standards of the Engineering Association will present its report to that association on Tuesday afternoon, Oct. 15. The report of the American Association Committee on Standardization will probably be short and will be based upon the work of the Engineering Association Committee. The attendance and participation of members of the American Association at the meeting of the Engineering Association will therefore be greatly appreciated by the officers of both associations.

ROLL CALL

It is expected that there will be a roll call at each session of the various conventions. Notices will be sent to the various companies immediately after the convention, informing them at what sessions their representatives were present. The official list of delegates will be used in connection with the roll call.

ENTERTAINMENT

President Beggs and the Executive Committee of the American Association have decided that there will be no annual banquet. The Entertainment Committee of the Manufacturers' Association has practically completed its plans for the convention week. On Thursday evening there will probably be a theater party to take the place of the banquet. Other events will be announced later.

EFFICIENCY TEST OF RETURN TUBULAR BOILER USING CRUDE OIL

In accordance with instructions from Chas. C. Moore & Co., engineers, of San Francisco, J. F. Borden, instructor in the University of California, made a test to ascertain the evaporative power of a return tubular boiler installed at the Alameda municipal electric plant with special regard to the economy of oil burned for a period of ten hours continuous running. The conditions of the test were as nearly constant as possible, and the rate of evaporation approached closely that of full load. Full load was taken as the evaporation of 2.65 lbs. of water (from and at 212 degs. F.) per sq. ft. of water heating surface per hour. This is the same as allowing 13 sq. ft. of heating surface per boiler horse power.

The boiler consists of one drum 72 ins. in diameter and 16 ft. long, containing 100 tubes, each 3½ ins. outside diameter and 16 ft. long. The boiler is one of a pair connected to the same stack, each having a separate furnace, and the entire boiler plant comprises two of these couples.

The feed water enters the drum through an open ended 1½-in. pipe. The water column is located on the left side of the front end of the drum, the gage glass being 16 ins.

long and bottom valve of glass being 5 ins. above top row of tubes.

The furnace is of the common type used for coal burning with tubular boilers, only in this case the grate bars are replaced with fire-brick through which air is admitted to the burning oil from below. The furnace is 17 ft. x 4 ft. 10 ins., the bridge wall being 4 ft. 8 ins. from the front of the furnace. The distance of the furnace floor from the lowest point of the drum surface varies from 2 ft. 2½ ins. in front to 1 ft. 5 ins. in the back.

The total heating surface of the boiler is 1639.8 sq. ft.

One burner is used. It is of the internal mixing type and installed between the two front doors of the furnace. The flame is thrown backward into the combustion chamber, and the hot gases return through the tubes back to the front of the boiler and then up the stack. Air enters the setting through the regular ash pit door of the boiler.

The oil enters the burner through a ½-in. pipe at right angles to the flow of the steam. This oil pipe is surrounded by the shell of the burner, and gives up the oil through small holes made in its surface. Thus the oil mixes with the steam and is atomized on the inside of the burner within a few inches of the tip.

The fuel oil was taken from the regular oil heater of the plant, hot and under pressure. It was led into a tank weighed upon platform scales, and then run, by gravity, into a second tank. From this tank it was pumped by an independent fuel oil pump—3 ins. x 2 ins. x 3 ins.—to the burner.

The flame from the burner was carefully watched during the test through a peep hole in the front. The flame was generally well up near the shell and well spread. However, one could not but notice the inadaptability of the oil burner as generally used to this type of boiler, since only a small portion of the shell was actually in contact with the flame, while at the same time the tubes themselves were scarcely reached by the flame, the flame reaching only to the back of the boiler in the case of the particular load carried during the test.

Smoke observations were made frequently, but during the entire test no smoke was visible at the top of the stack.

The following were the principal data found by the test:

Barometer—inches of mercury.....	29.87
Main steam pressure—gage.....	119.1
Main steam pressure—absolute.....	133.8
Temperature feed water—degrees F.....	142.0
Quality of steam.....	99.5
Factor of evaporation.....	1.116
Temperature of oil—degrees F.....	155.5
Temperature of flue—degrees F.....	452.0
Temperature of boiler-room—degrees F.....	78.0
Pressure of oil.....	65.0
Draft—inches of water.....	0.4
Water level before putting fires out.....	5.5
Water level after putting fires out—three minutes....	5.25
Drop in water level—three minutes.....	.25
Average water level during test—	
Above bottom of glass.....	6.4
Above top row of tubes.....	.....
Total water actually evaporated—ten hours.....	39,046.0
Total water evaporated into dry steam.....	38,850.8
Total water evaporated from and at 212° F.....	43,357.5
Water evaporated per hour from and at 212° F.....	4,335.75
Steam used by burners—	
Pounds per hour.....	96.99
Per cent of steam generated.....	2.49
Water per cent moisture in oil.....	None
Heat value of oil—B. T. U.'s.....	18,883.0
Total oil burned—ten hours.....	3,166.0
Water evaporated per square foot heating surface per hour from and at 212° F.....	2.64



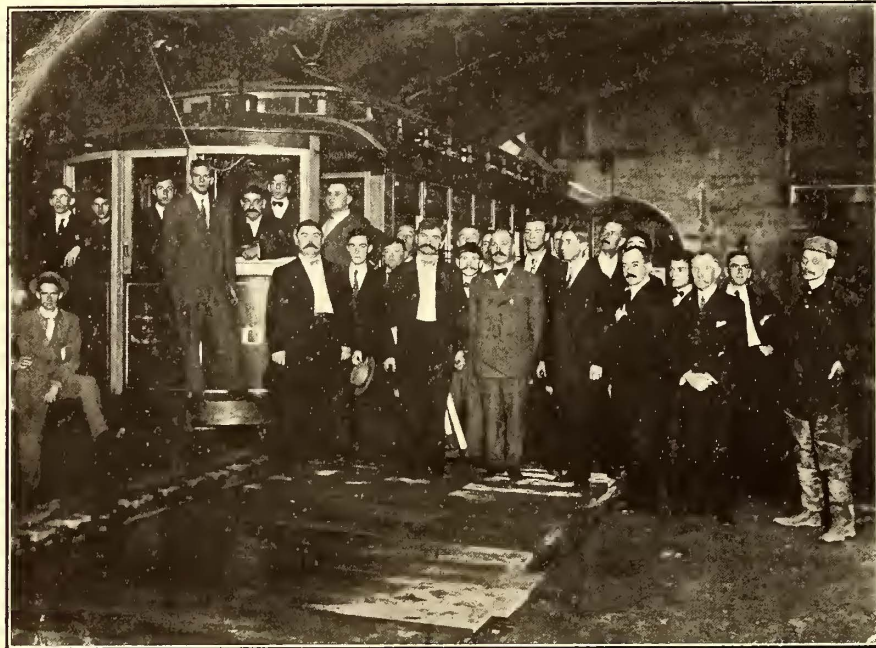
Horse power developed.....	125.6
Square feet water heating surface per horse power..	13.0
Water evaporated per pound of Oil—from and at 212°	
F. dry steam and dry oil.....	13.6
Efficiency of the boiler.....	59.5

### INSPECTION TOUR THROUGH EAST RIVER TUNNEL

The first official trip through the Belmont tunnel under the East River at Forty-Second Street took place Tuesday, Sept. 24, about noon. Eventually, if the plans of its promotors succeed, this tunnel will be the connecting link between what are now really three entirely different systems: The Interborough-Metropolitan, in Manhattan, owning all subway and surface lines; the Queens County Railroad Company, owning many of the important surface lines running out of Long Island City; the Long Island Railroad Company, sub-

### STORAGE BATTERIES APPLIED TO THE SINGLE PHASE SYSTEM OF THE SPOKANE & INLAND RAILWAY

The Electric Storage Battery Company has developed a number of systems for regulating fluctuating alternating current loads by storage batteries, thereby maintaining a practically constant demand upon the source of power irrespective of the variation in the load itself. The first application to electric railways of storage batteries for this purpose was at Spokane, Wash., where the Spokane & Inland Railway (now a part of the Inland Empire System) installed a storage battery for reducing the cost of the electric power purchased under a contract with the Washington Water Power Company. By the terms of this contract the cost of power is based upon the maximum demand during each month, and the closer the maximum demand can be kept to the average load the less is the cost of the current consumed.



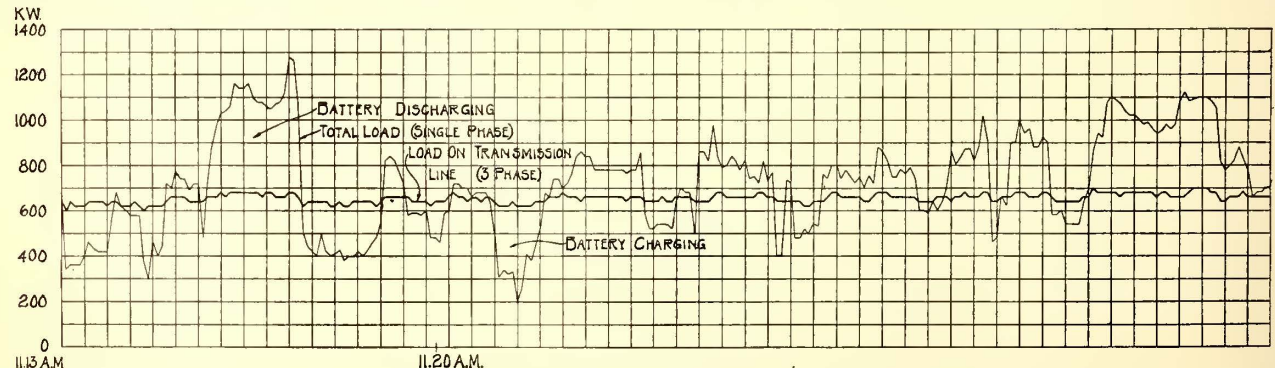
THE PARTY THAT MADE THE TUNNEL TRIP

The problem to be solved in this particular case was different from that ordinarily presented, in that the supply consisted of 4000-volt 3-phase 60-cycle alternating current, while the road was to be operated on 2200-volt single-phase 25-cycle current. This made the introduction of frequency changers necessary as well as voltage and phase transformers.

J. B. Ingersoll, general manager of the company, in consultation with the engineers of The Electric Storage Battery Company, conceived the idea of combining in one piece of apparatus an induction motor to operate from the power supply, a single-phase generator to deliver the required power to the road and a direct current machine to act either as a generator or a motor, according to whether the railway load is momentarily below or above its average value, the three

subsidiary company of the Pennsylvania Railroad, controlling all the railroad business on Long Island, and the New York

machines being direct connected and mounted on a common bed plate. The d. c. machine gives power to or takes



INPUT AND OUTPUT CURVES OF THE SPOKANE & INLAND RAILWAY, SHOWING THE EFFECT OF STORAGE BATTERIES

& Long Island Traction Company, which controls many of the important surface lines in the interior of Long Island.

power from a battery of Chloride Accumulators connected across its terminals in series with a regulating booster controlled by battery company's carbon regulator. The latter is operated by the a. c. in the 60-cycle supply line, and insignificant changes of current in this line acting on the regulator cause the battery to charge from or discharge into the d. c. machine and relieve the line of the load fluctuations. The action of the combination is as follows:

The Fort Wayne & Wabash Valley Traction Company has decided to establish a buffet service on its new limited cars which are to be put on between Fort Wayne and Lafayette on Oct. 1.



The single-phase generator delivers current to the railway according to the demand, power for driving it being furnished by the 60-cycle 3-phase induction motor so long as the railway load is equal to the average. Under this condition the battery "floats" across the d. c. generator, neither charging nor discharging. As soon as the railway load falls off, however, the carbon regulator causes the d. c. machine to charge the battery and take the surplus power from the induction motor. On the other hand, when the railway load increases beyond the average, the d. c. machine immediately inverts and runs as a motor to assist the induction motor, drawing power from the battery, which, of course, is forced to discharge. The action of the carbon regulator in maintaining a constant load has been so often described that nothing need be said on this point here, except to add that by a proper design of its actuating solenoid it can be made to act as well on a. c. as on d. c. systems.

Mr. Ingersoll's ideas were put into practice and four of the special 3-unit sets were installed with suitable motor-driven exciters for the fields of the single-phase machines. Each set consists of a 1000-hp 4000-volt 60-cycle 3-phase induction motor, rated at 126 amps. per terminal, direct connected to a 1000-kw 2200-volt 25-cycle single-phase generator and also to a constant speed direct-current machine rated at 1100 amps. and 550 volts. The synchronous speed of the set is 500 r. p. m. These sets are all operated in conjunction with a battery of Chloride Accumulators with two boosters and a carbon regulator.

The battery consists of 275 cells of Type R-33 and each cell consists of 16 positive plates of the standard "Manchester" type and 17 negative plates of the "Box" type, contained in wood tanks, lined with sheet lead. The plates which are separated by wood diaphragm separators are lead burned to rolled lead bus-bars at either end of the cell. Lead covered copper bar is used to connect the ends of rows of cells and to connect the battery to the switchboard. The cells are mounted on wood stringers and are insulated from the floor and from each other by a double tier of glass insulators. The boosters are motor driven, and are of the shunt regulating type, operating in parallel in conjunction with one exciter and carbon regulator. The single-phase machines are excited from one or more of three exciter sets. Each set consists of a 400-volt 75-hp induction motor direct connected to a 125-volt 50-kw d. c. generator.

The power from the Washington Water Power Company is transmitted 2.2 miles over three 500,000 circ. mil cables at 4000 volts. It is fed directly to the induction motors without transformation through the usual disconnecting and automatic oil switches. Two busses are operated from the high-tension feeders, and any machine may be operated from either bus. The single-phase current is fed through five 1250-kw 2200-45,000-volt water cooled step-up transformers at 25 cycles for transmission to distant points. Three 375-kw 2200-6600-volt transformers feed the local section of the railway, while three 75-kw 60-cycle 4000-400-volt sets connected in delta on the 60-cycle supply line operate the exciter sets for the single phase generators.

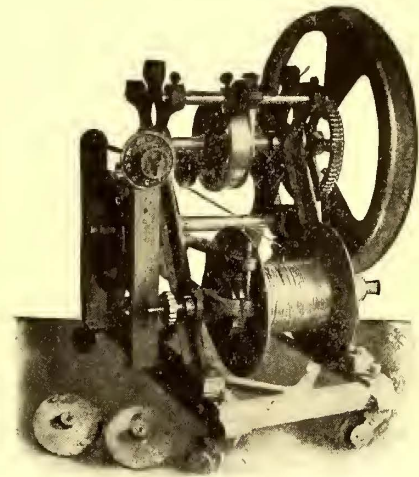
The cars operate over the city track on 600-volt direct current, and continue thus for two miles from the terminal station. There the change to 6600-volt a. c. is made.

On page 476 are shown in graphic form the input and output of the station. It is evident at a glance that all but a fractional part of the fluctuating load is cared for by the battery through the special transformer sets, leaving a practically constant load on the supply line. When it is borne in mind that current is paid for on the basis of maximum demand, it is seen at once how large is the saving effected.

## BAND WIRE TENSION MACHINE

The Device Improvement Company, of Hanover, Pa., has designed a machine to fill the need of a precise device for acquiring an accurate and uniform tension in all sizes of armature band wire which can be regulated by means of a pointer on the index dial to produce any tension desired within wide practical limits. Furthermore, when the pointer is returned to the same index number the tension is exactly the same in all cases. As all the friction to produce the tension is absorbed by the external brake, the wire itself simply revolving around the tapered drum, the device will not heat or injure the wire. The machine is entirely self-contained. The cast-iron spool holding fifty to sixty pounds of band wire is mounted on the frame, winding centers being supplied to fill the spool in the lathe from a large wooden reel, which operation takes but a few minutes.

The machine may be used in connection with the Peerless banding machine or an ordinary lathe. It may be bolted to wall or as it is provided with casters may be quickly and easily placed in front of a banding machine or lathe for use, and then pushed under the work bench or any place



COMBINED TENSION AND BANDING MACHINE

in the barn where it is out of the way. The large drum which is used for the tension on the magnet wire in connection with the field-coil winding is applied to the machine with three cap screws, the same excellent feature applying as when used for band wire. The machine in brief, consists of two side frames mounted on angle-steel sills and casters. The lower shaft runs in babbitted bearings and one end carries the brake pulley. On the other end is a pinion which engages with the gear on the upper shaft, this ratio being 3 to 1. On the gear is mounted the large drum for insulated wire and on the shaft the tapered flanged band-wire drum. The taper is so designed that the tendency of the band wire to crawl up is neutralized by the tendency of the taper to slide down. Six or seven turns of the band wire on this drum will hold any tension desired. At the front end of the frame is mounted the cast-iron wire spool with the small retard brake as shown. The band wire passes off the spool to the grooved lead on pulley, thence to the drum, around the drum to the grooved lead-off pulley and thence to the armature. The tension index is plainly shown and has ten divisions, each division corresponding to different tension. The machine affords an accurate and reliable means of producing the right tension for banding armatures.



**GOVERNING MECHANISMS OF THE CURTIS TURBINE**

As very little has been published on the methods of governing steam turbines, engineers may find some interesting points in the following illustrated description of the

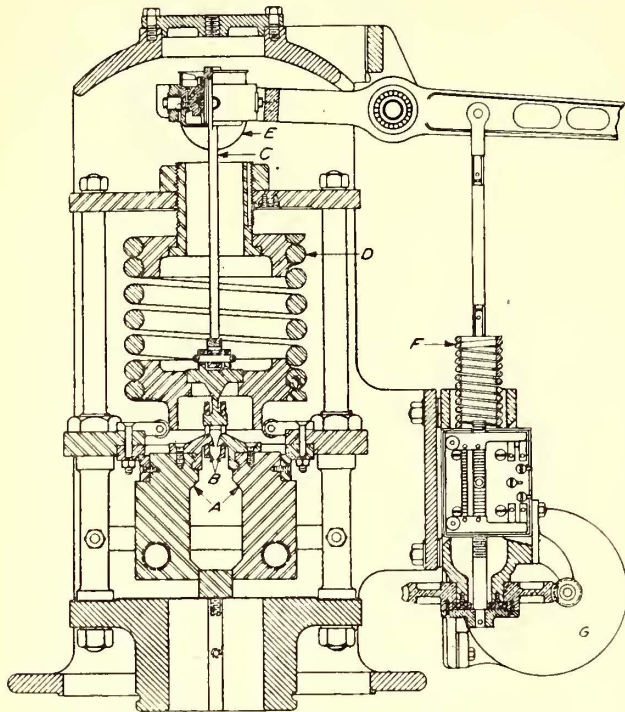


FIG. 1.—CROSS-SECTION OF GOVERNOR

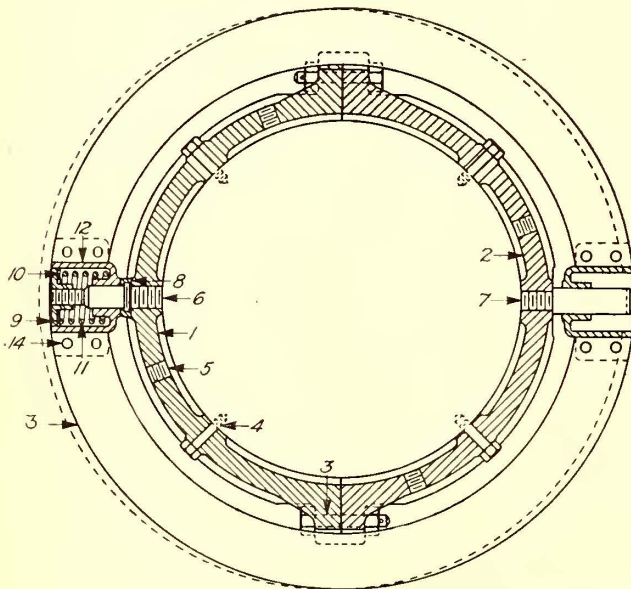


FIG. 2.—SECTION OF ECCENTRIC RING FORMING PART OF SPEED LIMIT DEVICE

The governor is provided with an auxiliary spring *F* for varying the speed when synchronizing. In larger machines the adjustment of this spring can be made from the switchboard by the small motor *G*. The movement of the governor arm is transmitted through levers to the pilot valve of an oil cylinder containing the piston which operates the main arm. The latter transmits the motion either by a rack and pinion or by cranks to the rod carrying the cams. These cams act directly on the valves, opening and closing the number called for by the condition of the load.

An important advantage of this type of governor is that it is a slow moving mechanism and therefore not dependent on lubrication for successful service.

Since any steam turbine can accelerate rapidly and this increase in speed is not easily perceptible, it is important to have these machines equipped with simple speed limiting devices. The contrivance shown in Fig. 2 consists of a ring placed around the shaft between the turbine and the generator. This ring is placed in a slightly eccentric position and the centrifugal strain thus caused is counteracted by helical springs. When the speed increases the centrifugal effort overcomes the spring and the ring moves into a still more eccentric position. In this position it strikes a lever which trips the throttle valve through tension rod (Fig. 3). This rod, released by the emergency ring governor, is connected at the other end to crank *D* and the operating force is supplied by spring *S* which pulls up the gear and throws out hook *G*, which holds the valve suspended. The valve then descends with a very positive motion due to its own weight and the unbalanced area of the valve stem.

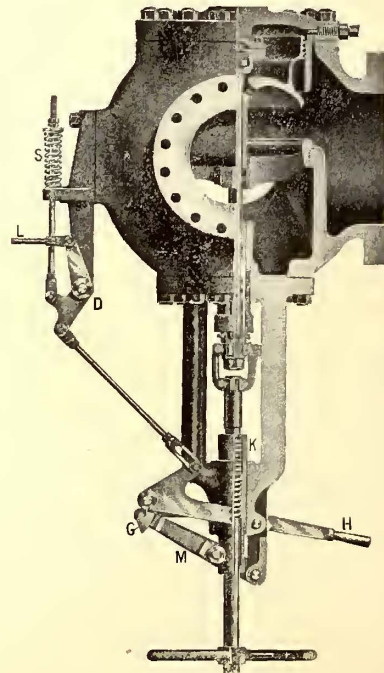


FIG. 3.—EMERGENCY STOP VALVE

Curtis turbine governor recently made available by the General Electric Company.

The governor is of the centrifugal type and its action depends on the balance between the forces exerted by springs and the centrifugal effort of weights. In the accompanying sectional view Fig. 1, *A* is the moving weight which acts through the knife edges *B* to pull down the rod *C* against the action of the heavy spring *D*. At *E* a ball-bearing gimbal joint, thoroughly lubricated, forms a junction point between the revolving mass of the turbine and the stationary lever of the governor arm.

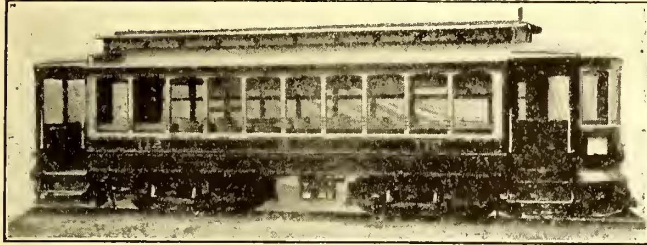
This valve opens again very easily owing to the opening by the initial movement of the hand wheel of the by-pass with which it is fitted, the pressure thereby being equalized when the valve is closed.

Local street railway men and motormen and conductors on the Fort Wayne & Wabash Valley Company's line at Logansport, Ind., have completed the organization of a mutual benefit association to accumulate a fund to pay sick, accident and death benefits. There are 340 charter members in the organization.



**SEMI-CONVERTIBLE CARS FOR WESTERN NEW YORK**

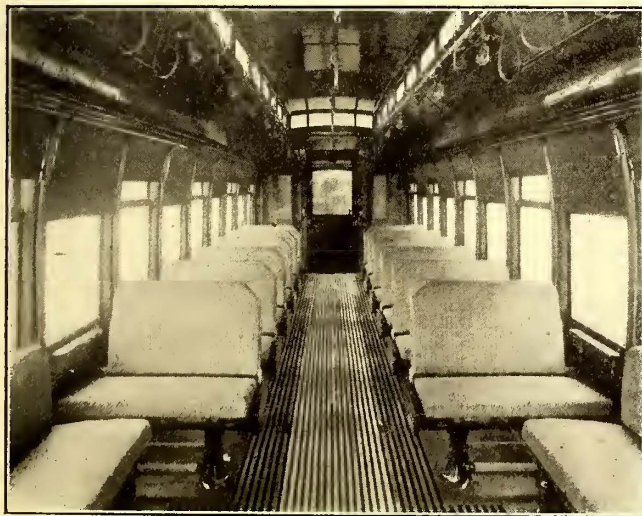
The Western New York Construction Company of Buffalo, which operates the electric railway lines in Erie, Pa., Dunkirk and Fredonia, N. Y., West Seneca and Hamburg, has adopted the Brill semi-convertible car as standard, and all these roads operate with a 28-ft. car of the type mentioned. The 28-ft. semi-convertible car shown in the engraving is one of nine turned out recently by the G. C.



SEMI-CONVERTIBLE CAR FOR WESTERN NEW YORK

Kuhlman Car Company, which built the cars for the other cities mentioned. These nine cars will do service in Erie, Dunkirk, West Seneca and Hamburg. The Western New York Construction Company also has an order with the G. C. Kuhlman Car Company for six cars for suburban service, slightly longer than those mentioned and of the combination passenger and baggage type and each car will be equipped with four motors of 60-hp capacity each.

The service for which the cars are intended is both city and suburban and the seating arrangement includes longitudinal corner seats for four passengers each which increases the aisle space near the doors. The seating capacity of a car is forty. As the window sills of this type are extra low, namely 24 $\frac{5}{8}$  ins. from the floor to top of sill, four-bar window guards are provided which are made in a single section. The bottom framing is made unusually substantial by the use of 15-in. x  $\frac{3}{8}$ -in. sill plates



INTERIOR OF SEMI-CONVERTIBLE CAR

which are on the inside of the sills and to which the bases of the posts are attached. The usual dimensions of sill plate for this length of car is 12 in. x  $\frac{3}{8}$  in. The outside platform timbers are reinforced by angle irons and the pair of angle irons which form the center knees extend well back of the body bolsters. The window curtains at the ends of the car are arranged to be operated in grooves with the same type of fixture as is used on the side curtains, instead of the ordinary type of curtain usually placed at end

of car body and held down by a flap with fastener beneath the window. Other features of the cars are the same as usual in the semi-convertible type. The exterior illustration shows two of the window sashes opened at different heights, window stops being provided to permit the windows to be held at  $\frac{1}{4}$ ,  $\frac{1}{2}$  or  $\frac{3}{4}$  heights. The sash locks used with this window system are made with a steel core to prevent any chance of bending should the windows be dropped from one stop to another. The width over the sills, including the sheathing, is 8 ft. 1 $\frac{1}{2}$  ins.; over posts at belt, 8 ft. 5 ins.; size of side sills, 4 ins. x 7 $\frac{3}{4}$  ins.; end sills, 5 $\frac{1}{4}$  ins. x 6 $\frac{3}{4}$  ins.; sill plates, 15 in. x  $\frac{3}{8}$  in. The builder's track scraper is installed on these cars and numerous specialties of the same builder are furnished, namely, angle-iron bumpers, gongs, signal bells, etc. Cherry forms the interior finish, but the ceilings are of poplar tinted Nile green. The trucks are of the 27-FEI type with 4-ft. 6-in. wheel base. Two 60-hp motors were installed on each car.

**REINFORCED CONCRETE POLES**

The American Concrete Pole Company, of Richmond, Ind., is preparing to construct and also to sell the right to construct reinforced concrete poles as designed by W. M. Bailey, its vice-president and general manager. A line of these poles has been installed across the Whitewater River at Richmond.

With the reinforcement of twisted rods and spiral binding wires properly distributed in the column of cement, the poles are not only substantial and durable, but are also said to be of remarkable elasticity. For instance, a pole 30 ft. long will permit a deflection of 30 ins. before the cement cracks. Even then the cracking of the cement does not impair the strength of the pole for after this takes place the reinforcement becomes active and takes the entire strain. As the rods are guaranteed to withstand a breaking strain of 50,000 lbs. per sq. in. it is easy to understand why this construction should be so safe and durable. In shape, the poles are square with the corners beveled off 2 ins. or 3 ins. so that the top of the pole is octagonal in shape. This gives it a pleasing form, leaves the corners substantial and avoids sharp edges that would be likely to chip off.

The rods are placed within  $\frac{3}{4}$  in. of the surface of the cement at the corners and then bound by a spiral wire encircling the four rods from top to bottom. This serves to tie the rods together and prevents shearing of the cement, as the rods have a tendency to move outward when the pole is subject to a lateral strain. Another important function performed by the spiral-binding wire is that it ties the concrete and increases the flexibility of the entire body.

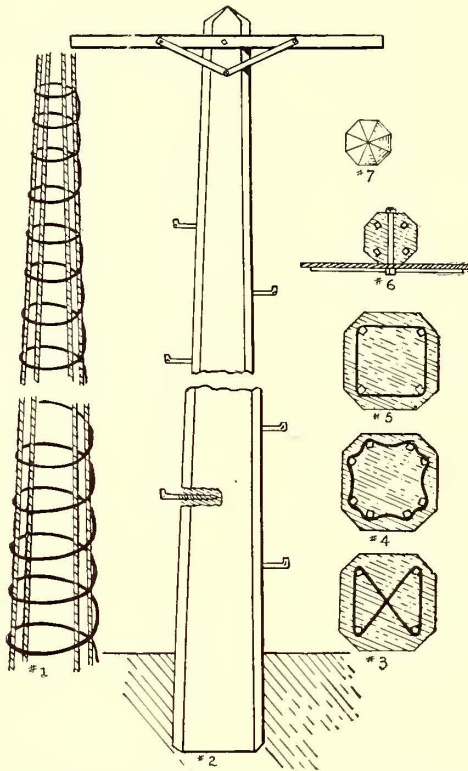
The smaller poles, up to and including 35 ft., are molded lying on the ground. The forms are laid with the butt near the hole and the reinforcement placed. Then the concrete is poured in and allowed to remain three to seven days, according to the weather. The forms are then removed, so that they can be used again and the pole is left to season. This process requires about three or four weeks and the poles are then ready to be set and used. All poles should be built on the ground upright in the hole in position to be set up, thus saving the cost of unnecessary handling. Poles 40 ft. and longer should be built standing, as this is most economical. First, the hole is dug and then the form is set in place directly over it, lined up perpendicular and temporarily guyed to hold it in position. The spiral binding wires are then put in place and the rods drawn up on the inside of the form and set. After the reinforcement has been properly secured, the side of the form left out to re-



ceive the steel work is put in place and the bands or ties around the outside secured. The equipment is then ready to receive the concrete.

There are several methods of placing this material. One is by using a large bucket with pulleys and a horse. With this method a 50-ft. pole can be filled in about two hours, including the mixing of the concrete. But the most economical plan is to have a wagon equipped for the purpose with a gasoline engine concrete mixer and grain elevator to handle the material as rapidly as it is mixed. The company is now building such wagons.

The accompanying cut marked with Figs. 1, 2, 3, 4, 5 and 6 gives the detail construction of pole and reinforcement as follows: Fig. 1 shows the four rods as they are placed in



DETAILS OF CONCRETE POLE REINFORCEMENT

the cement body with the spiral binding wires pulled in place. Fig. 2 shows the general view and shape of cement body as finished. The steps and other bolts and holes are very easily made while the concrete is plastic. Figs. 3, 4 and 5 show cross sections of pole with three different methods of bindings and also two different methods of reinforcement. The scheme represented in Fig. 4 is only intended for extremely heavy construction. Fig. 6 shows how cross arms are secured. A bolt or rod is placed in the form and removed within twenty-four hours after concrete has been placed. This becomes a clean hole through which the bolt that is intended to hold a cross-arm can be placed and the arm securely bolted. Fig. 7 represents the top of the pole which is easily put on after the pole is finished but is not necessary except for appearance. Mr. Bailey has also planned forms varying in sections from 5 ft. to 15 ft. each and divided to be easily handled.

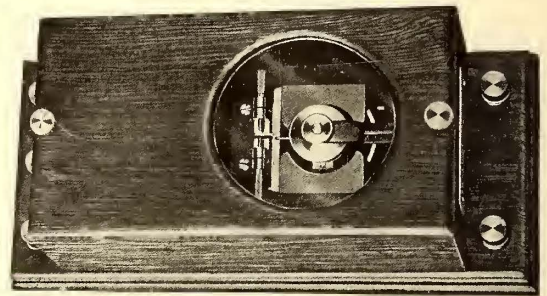
### STANDARD T RAIL

The sub-committee of steam railroad managers and steel manufacturers who have been entrusted with the drawing up of recommendations for the manufacture of an improved railroad rail have submitted a report to George L. Peck, chairman of general railroad committee on steel rails.

The sub-committee consists of Joseph T. Richards, of the Pennsylvania; J. D. Isaacs, of the Southern Pacific; R. Montfort, of the Louisville & Nashville; P. H. Dudley, consulting engineer; F. W. Wood, of the Maryland Steel Company, W. A. Bostwick, of the Carnegie Steel Company; P. E. Carhart, of the Illinois Steel Company, and F. E. Abbott, of the Lackawanna Steel Company.

### A NEW PORTABLE RELAY

In addition to its well-known line of voltmeters and ammeters for both portable and switchboard work, the American Instrument Company, of Newark, N. J., has recently developed an exceedingly sensitive, yet rugged and reliable portable relay. This instrument is built on the same principles as the regular type of "American" voltmeter, having a movable coil mounted in jewel bearings in such a way that it can turn between the poles of a powerful permanent magnet. Instead of the usual pointer, a short platinum contact arm is securely attached to the moving coil. On each side of this contact is mounted an adjustable platinum contact point, so that a local circuit may be closed when the moving arm is deflected to either one side or the other of its normal position. The instrument may be closely adjusted, so that, within reasonable limits, any desired movement of the contact arm can be provided for. The



PORTABLE RELAY

winding of the moving coil and the controlling spring can be adapted to give the best results under special conditions.

At maximum sensitiveness this relay requires .000,000,002 watt to actuate it, this being on .000,002 amp. and .001-volt potential difference. The resistance of the instrument usually supplied is approximately 500 ohms. Throughout, the workmanship is the best, special machinery having been designed for the manufacture of some of the parts. The instrument is suitably mounted in a polished wooden case as shown in cut. James G. Biddle, of Philadelphia, is general sales agent for the company.

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., is issuing a thirty-two page booklet entitled "Lost Time," in which are described the various private branch exchange systems and equipments of the company. The publication is very artistic. It has a beautiful cover in four colors and bronze, stippled and roughed both sides, and should prove an excellent inquiry provoker. The inside pages are in three colors, the illustrations being for two colors with key plates in half-tone and auxiliary color in zinc tint plates. The main text is set in "MacFarland" type. All headings, index designs and initial letters are mainly of special design from engraved plates. The inside page stock is satin enamel. The binding is wire, saddle stitched. The book will be mailed free to all interested in P. B. X. systems. Regular customers of the company will receive the book without making application.



## FINANCIAL INTELLIGENCE

WALL STREET, Sept. 25, 1907.

### The Money Market

There has been no material change in the monetary situation during the past week. The dulness prevailing in the general securities market has resulted in a somewhat smaller demand for money on the part of stock commission houses, and the inquiry from corporations has also practically ceased. Money, however, continues in active demand at all of the principal Western and Southern points, not only for crop moving purposes, but for general business requirements as well. The demand at the interior was emphasized during the week by an advance in the rate of exchange on New York at Chicago to 50 cents per \$1,000, and the indications are that the shipments of currency to the West and South this week will be somewhat larger than in the past. The relief measures put into effect by the Treasury Department are largely responsible for the present ease in the local market, and had it not been for the Government deposits in the interior banks, as well as in the local institutions, rates for money would doubtless be ruling much higher than those prevailing at this time. Notwithstanding the lack of demand for money here, the local institutions are not at all inclined to press their money upon the market, and the general belief is that rates will rule at about the present level for some time to come. Money on call was in plentiful supply at rates ranging from 4 to 2 per cent. Sixty-day money was obtainable at  $5\frac{1}{4}$  per cent, as against  $5\frac{1}{2}$  per cent asked a week ago, while ninety day funds were offered at  $5\frac{3}{4}$  per cent. Some demand was reported for four months' money at 6 per cent, which is considered a choice maturity, as it carries the borrower well into January, when rates for money are generally easy. Five and six months' money was offered at 6 per cent. The foreign exchange market has ruled somewhat firmer, but the impression in foreign exchange circles seemed to be that it is only a question of time when Europe will be compelled to buy liberally of our cotton and grain. The offerings of bills against such purchases thus far this season, have been comparatively small, and a more liberal export movement is looked for in the near future. The fact that the advances made by foreign bankers on cotton and grain this year have been extremely small, together with the high prices which our commodities are likely to realize will result in a larger import movement of gold this Autumn. The European money markets have been easy, especially at London, where private discounts have declined to below  $3\frac{3}{4}$  per cent, or fully  $\frac{3}{4}$  per cent below the official rate. It is not likely, however, that any reduction in the Bank of England rate will be made at this time, owing to the heavy demands for gold to finance the Egyptian cotton crop and for other purposes.

The bank statement, published last Saturday, made a satisfactory exhibit, inasmuch as the cash holdings of the banks were increased by \$4,529,200. The reserve required, however, was \$3,042,800 more than in the preceding week, thus increasing the surplus reserves by \$1,486,400. The surplus now stands at \$8,405,100, as against \$11,315,925 in the corresponding week of last year, and \$5,235,050 in 1905.

### The Stock Market

One of the most encouraging developments in connection with the securities market that has occurred for a long time past transpired during the week just brought to a close, in the shape of a considerable increase in the demand for railway and other bonds, which was stimulated by the great success of the recent New York City bond sale, and the subsequent big inquiry for the new  $4\frac{1}{2}$  per cents at very decided advances over the prices at which they were awarded. This demand was not of sufficient magnitude to cause any great increase in the volume of business in the bond department, but it was of such proportions as to attract a good deal of attention, and to indicate an almost complete restoration of confidence on the part of investors. As a matter of fact, leading bond houses in Wall Street reported a larger demand for this class of securities than at any time for two years, and this was regarded as a very significant straw. As a result of this condition of affairs, bullish sentiment in the stock market was further augmented, and during the fore part of the week prices for railway and industrial shares, alike scored additional advances, even though the buying came chiefly from the shorts. Re-

newed ease in the money markets here and abroad continued favorable, weather conditions in the crop growing sections of the South and West, with assurances that our farmers will receive for their harvests this year a sum largely in excess of any amount ever before secured by them, which naturally led to expectations of greater or less importations of gold from Europe later on materially assisted in the work of raising stock prices to a higher plane. Still another factor operating in the same direction was the report of the National banks of this country, showing in the year to Aug. 22 last an increase in their cash holdings of \$77,000,000.

As the week drew to a close, however, there was a check to the upward movement, occasioned, in part, by prospects of a temporary hardening in the local money market consequent upon the Oct. 1 interest and dividend disbursements, but more directly traceable to the investigation being conducted into the affairs of the Standard Oil Company; the evidence of a recession in the iron and steel industry, and finally by a further cut in copper metal prices, and the announced determination of many of the larger producers to curtail their output even to a greater extent than was at first proposed, the intention now being to reduce production to 60 per cent of the normal, as against the 50 per cent restriction originally agreed upon. While in some quarters it was felt that these more or less drastic measures would bring about a settlement of the differences that have long existed between producers and consumers of the red metal, the prospect that they would eventuate in a reduction in dividends by some of the other copper mining companies, proved exceedingly distasteful to stockholders in all such corporations and induced considerable selling of these shares. The balance of the market was sympathetically affected and in the latter portion of the week much of the ground that had previously been gained in the direction of higher prices was lost. There were no signs of the demoralization that characterized the share speculation a few weeks since, and practically all the selling emanated from the bearish professional element, nevertheless the general list wore a rather unsettled aspect. Relatively speaking, the railway shares ruled firmer than the industrials, and there was an apparent disposition on the part of the former to cut loose from the depressing influence of the retrograde movement in the latter.

By far the most important development in the local traction situation during the week was the appointment of receivers for the New York City Railway Company, lessee of practically all of the traction properties in Manhattan and the Bronx. This action had been expected for some time, and had not the slightest effect upon the prices for the shares of the various traction properties. It is understood that the receivership proceedings are of a friendly nature, and in well-informed quarters they are considered to be the first step in the general reorganization of the local traction system. Prior to announcement of the appointment of receivers for the New York City Railway Company, fluctuations in price for the local traction stocks were quite general in keeping with those in other sections of the market, and after early substantial rallies all the shares in this class reacted. The same talk of a receivership for the Metropolitan Street Railway was again in evidence, but there were no developments of a tangible nature in that direction.

### Philadelphia

There was a material falling off in the dealings in the local traction issues during the past week, and, while prices moved with more or less irregularity, the general trend of values was toward a higher level. Philadelphia Rapid Transit was comparatively quiet, nevertheless, it furnished the active feature of the group, and ended the week with a substantial gain. At the outset there was a disposition to sell the stock and the price eased off to  $18\frac{3}{8}$ , but later on the price was advanced to  $22\frac{1}{4}$ . At the high figure profit-taking developed which carried the price off to  $20\frac{7}{8}$ , but the final figure was  $13\frac{1}{8}$  above last week's closing price. About 4,500 shares of the stock changed hands, as against almost 35,000 shares in the preceding weeks. Union Traction also developed considerable strength, the stock advancing from 49 to  $51\frac{3}{4}$ , a net gain for the week of  $2\frac{1}{4}$  points. Philadelphia Traction lost a point to 88, on light trading. Philadelphia Company common advanced  $1\frac{1}{2}$  to 40, but subsequently lost half of the gain. Other transactions included American Railways, at 47; United Companies of New Jersey at 240 and Consolidated Traction of New Jersey at  $67\frac{1}{4}$ @67.



**Chicago**

Very little interest was manifest in the local traction issues, and apart from the sale of a small amount of City Railway stock at 155, the trading was devoid of interest. South Side Elevated sold at 79, and Northwestern Elevated sold at 21½ @ 21.

**Other Traction Securities**

Dulness was the chief feature of the Baltimore traction market, trading being practically confined to United Railway issues, all of which showed weakness. The 4 per cent bonds declined a point to 14½, while the incomes lost ½ to 51¼. The funding 5s, after selling at 18½, dropped to 77¾, and closed at 78. United Railway stock lost ¾ to 12⅞ on a single transaction involving 100 shares. Knoxville Traction 5s sold at 102½. At Boston the dealings were rather light, but the undertone was firm. Boston Elevated, after an advance to 130, reacted to 129. Boston & Worcester common was fractionally lower, 750 shares changing hands at from 18¾ to 18¾. Massachusetts Electric common was strong, at 13¼, while the preferred rose from 49¾ to 51, on light purchases. Boston & Suburban advanced to 14. West End common brought 84½, and the preferred 100½ and 100.

Traction securities were not especially lively on the Cleveland Stock Exchange last week and the opening of the present week was not at all auspicious. Ten shares of Cleveland Electric sold at 50 on Wednesday, but on Thursday the same number went at 49. This week the bid price dropped to 47, but there was no stock for sale for less than 50. Northern Ohio Traction & Light has varied from 20½ to 21 and 22, with ten shares sold at the latter figure. The closing quotations were 21 bid and 25 asked. Twenty-five shares of Washington Baltimore & Annapolis pooling certificates sold on Friday at 11¾, but on Saturday an advance of ¼ was shown and 400 changed hands. This week opened with these securities at the same figure. Ten shares of Aurora, Elgin & Chicago sold at 33, while thirty-six shares of preferred went at 74.

**Security Quotations**

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

	Sept. 18	Sept. 25
American Railways .....	47¼	46½
Boston Elevated .....	129	129
Brooklyn Rapid Transit.....	45¾	46¾
Chicago City .....	150	150
Chicago Union Traction (common) certificates.....	—	25½
Chicago Union Traction (preferred) certificates.....	—	—
Cleveland Electric .....	—	50
Consolidated Traction of New Jersey.....	67	66
Detroit United .....	62	62¾
Interborough-Metropolitan .....	9	9¾
Interborough-Metropolitan (preferred).....	25½	25½
International Traction (common).....	—	—
International Traction (preferred) 4s.....	—	—
Manhattan Railway .....	114	118
Massachusetts Elec. Cos. (common).....	12½	12½
Massachusetts Elec. Cos. (preferred).....	449½	—
Metropolitan Elevated, Chicago (common).....	21	220
Metropolitan Elevated, Chicago (preferred).....	61	260
Metropolitan Street .....	41	39
North American .....	59½	58½
North Jersey Street Railway.....	40	40
Philadelphia Company (common).....	38½	39¾
Philadelphia Rapid Transit.....	19¾	20¾
Philadelphia Traction .....	89	88
Public Service Corporation certificates.....	65	—
Public Service Corporation 5 per cent notes.....	92	92
South Side Elevated (Chicago).....	80	79
Third Avenue .....	50	49
Twin City, Minneapolis (common).....	91	95
Union Traction (Philadelphia).....	49¾	51¾

a Asked.

**Iron and Steel**

The "Iron Age" says that the heavy orders entered in the wire trade lately are considered significant, since that brand reflects better than any other the demand from a very wide range of sources, and from the agricultural community in particular. In the heavy lines business is undeniably dull, and a considerably lessened output during the winter months seems inevitable. The steel trade is steady and the rail trade is awaiting the results of the conference on the new specifications. The feeling is growing that copper has come down to a basis which justifies at least moderate purchases. It is true, however, that electrolytic copper has sold this week at 14¾ cents.

**LIMA & TOLEDO COMPANY SECURES RIGHTS IN TOLEDO**

The Lima & Toledo Traction Company, now a part of the Ohio Electric Railway Company, has been granted a perpetual franchise to cross a number of streets in Toledo. For the present the company's tracks will be allowed to cross at grade,

**CONSOLIDATING MAINE ROADS**

The permanent organization of the Lewiston, Augusta & Waterville Electric Railway Company has been effected. The officers are: President, John R. Graham, Bangor; vice-president, H. L. Clark, Philadelphia; treasurer, D. S. Hahn, Lewiston; clerk, Herbert M. Heath, Augusta. Directors, John R. Graham, Bangor; John F. Hill, Thomas J. Lynch, Augusta; W. H. Newall, Lewiston; H. L. Clark, C. A. Pierson, Jr., Philadelphia; Frank Silliman, Scranton, Pa. This is the merger company, which was authorized by the recent legislature to acquire street railway properties in the counties of Androscoggin, Kennebec, Somerset, Waldo, Knox, Lincoln and Sagadahoc. It has acquired the Lewiston, Brunswick & Bath, with 58 miles of line in Auburn, Lewiston, Lisbon, Topsham, Brunswick, West Bath, Bath and Webster in Androscoggin, Cumberland and Sagadahoc counties; and the Augusta, Winthrop & Gardiner, with 27 miles in Augusta, Hallowell, Farmingdale, Manchester, Winthrop and Gardiner in Kennebec County. The road in Cumberland County is building 33 miles of line via Webster and Wales in Androscoggin County, and Monmouth, Litchfield, West Gardiner and Gardiner in Kennebec County; and 24 miles to connect Augusta with Vassalboro, Winslow and Waterville. Mr. Graham is the general manager for the Bangor Railway & Electric Company, with 59 miles of line in Bangor, Veazie, Orono, Old Town, Glenburn, Kenduskeag, Corinth, Charleston and Hampden, all in Penobscot County. Mr. Graham's backers are reported to be the Clarks of Philadelphia.

**JOINT MEETING AND RECEPTION OF NEW YORK STREET RAILWAY AND GAS & ELECTRIC ASSOCIATIONS**

In connection with the annual convention of the Empire State Gas & Electric Association, to be held in the auditorium of the New York Edison Company, on Wednesday, Oct. 2, a joint meeting and reception has been arranged to be held under the auspices of the Street Railway Association of the State of New York, and the Empire State Association, in the concert hall of Madison Square Garden, on the evening of Oct. 1. At this meeting addresses will be made as follows: Frank W. Stevens, chairman, Public Service Commission, Second District, "The Work of the Public Service Commission, Second District, and its Policies with Relation to the Corporations under its Supervision." Henry T. Pierce, president, International Railway Company, Buffalo, N. Y., "The Electric Railway Situation of To-Day." Dr. Alexander C. Humphreys, president, Stevens Institute of Technology, "Control of Gas Companies by State Commissions." Everett W. Burdett, chairman of Committee on Public Policy, National Electric Light Association, "Public Control from the Corporate Standpoint."

It is expected that the members of the Public Service Commissions of the First and Second Districts will be present and a cordial invitation is extended to everyone interested in public service corporations to attend the meeting and reception.

At the morning sessions of Empire Gas and Electric Association there will be presented the report of the executive committee and the reports of the various sub-committees which have been appointed during the year. There will also be an account of the publicity work done on behalf of the association. In the afternoon several very interesting papers will be presented and discussed. The subjects chosen will be of equal interest to representatives of gas or electric companies.

The electrical show will be in progress in Madison Square Garden from Sept. 30 to Oct. 5, and should prove an attraction to the representatives of the electric companies especially. An invitation has been extended to the association by the Consolidated Gas Company for delegates to the convention to visit the company's plant at Astoria on Wednesday morning, Oct. 5. Both associations extend a cordial invitation to the representatives of their respective interests to attend, and have arranged their program with the end in view of providing special entertainment for visitors.



**TRACTION MATTERS IN NEW YORK—RECEIVER FOR NEW YORK CITY COMPANY**

On Tuesday, Sept. 24, application was made before Judge Lacombe, in the United States Circuit Court, by the Pennsylvania Steel Company and the Degnon Contracting Company, creditors, for a receiver for the New York City Railway Company. The application was in the form of a bill in equity, asking that the court take charge of the affairs of the company and by the appointment of receivers provide for the liquidation of the company's indebtedness without its corporate disintegration. Adrian H. Joline and Douglas Robinson were appointed receivers, and they immediately qualified in the sum of \$250,000 each.

On behalf of the Interborough-Metropolitan Company, August Belmont, chairman of the board of directors, made this statement:

The receivership of the New York City Railway in no way affects the solvency of the Interborough-Metropolitan or of the Interborough Rapid Transit Company, and it cannot be too positively stated that a receivership of either of those two companies has at no time been even considered. The Interborough-Metropolitan Company has no debt except its issue of 4½ per cent collateral trust bonds secured by Interborough Rapid Transit stock and about \$8,000,000 of collateral notes representing advances made to the surface system under the agreements entered into last May, which then contemplated an advance aggregating \$15,000,000. The Interborough-Metropolitan Company has over \$6,000,000 cash in the bank.

The actual results of the operation of the surface lines in the last year and a half have disappointed all expectations, with the result that there has been such a large decline in the earnings of the New York City Railway that there is no immediate prospect of its being able to earn its fixed charges or to procure the very considerable sums of money which will be required for the improvement of its lines. Accordingly the board of directors of the Interborough-Metropolitan Company has determined that it is not wise for the Interborough-Metropolitan Company to make further advances to the surface system.

In the interest of the public, as well as of every one interested in the securities of the various companies, it is clear that a comprehensive re-adjustment should be effected promptly, in order that the essential improvements may be made as quickly as possible. The receivership is a long step in this direction.

The list of bond issues in the system recited by the bill of complaint is as follows:

**METROPOLITAN BOND ISSUES**

	Amount Outstanding.
Metropolitan Street Railway Company, general and collateral trust mortgage.....	\$12,500,000
Metropolitan Crosstown Railway Company, first mortgage .....	600,000
Lexington Avenue & PAVONIA FERRY RAILROAD COMPANY, first mortgage.....	5,000,000
Columbus & Ninth Avenue Railroad Company, first mortgage .....	3,000,000
South Ferry Railroad Company, first mortgage.....	350,000
Broadway Surface Railroad Company, first mortgage	1,500,000
Metropolitan Street Railway Company, refunding mortgage .....	16,604,000
Second Avenue, first consolidated mortgage.....	5,631,000
Christopher Street & Tenth St. Railway, first mortgage .....	210,000
Fulton Street Railroad Company, first mortgage....	500,000
Thirty-Fourth Street Crosstown Railroad Company, first mortgage .....	1,000,000
Twenty-Eighth & Twenty-Ninth Streets Crosstown Railroad Company, first mortgage.....	1,500,000
Union Railway Company of New York, first mortgage .....	2,000,000
Yonkers Railroad Company, first mortgage.....	1,000,000
Westchester Electric Railroad Company, first mortgage .....	500,000
Tarrytown, White Plains & Mamaroneck Railway Company, first mortgage.....	300,000
Southern Boulevard Railroad Company.....	250,000
Dry Dock, East Broadway & Battery Railroad Company, general mortgage.....	950,000
Dry Dock, East Broadway & Battery Railroad Company, certificates of indebtedness.....	1,100,000
Forty-Second Street, Manhattanville & St. Nicholas Avenue Railway Company, first mortgage.....	1,200,000
Forty-Second Street, Manhattanville & St. Nicholas Avenue Railway Company, second mortgage income	160,000
Broadway & Seventh Avenue Railroad Company, second mortgage .....	500,000
Broadway & Seventh Avenue Railroad Company, first consolidated mortgage.....	7,750,000
Central Crosstown Railroad Company, first mortgage	250,000
Central Crosstown Railroad Company, first and con-	

solidated mortgage (deposited with the Morton Trust Company as collateral security for the three-year-old notes of said railroad company to the face amount of \$2,250,000).....	2,490,000
Third Avenue Railroad Company, first mortgage....	5,000,000
Third Avenue Railroad Company, first consolidated mortgage .....	37,560,000
Bleecker Street & Fulton Ferry Railroad Company, first mortgage .....	700,000
Second Avenue Railroad Company, first mortgage...	1,280,000
Second Avenue Railroad Company, debenture bonds.	89,000

The bill of complaint which contains the receivership petition recites the organization of the Pennsylvania Steel Company and the Degnon Contracting Company, and that of the New York City Railway as lessee of the Metropolitan Street Railway. The list of leased lines is next set forth, together with the mortgage indebtedness of the system already stated, and the fact that the Metropolitan Street Railway has outstanding \$13,000,000 of its \$20,000,000 capital stock. In connection with the mortgage indebtedness of the leased lines the petitioners state their belief that in default of payment of the interest in the various mortgages will operate as a default under the mortgages themselves, thus rendering the mortgages unenforceable and tending to break up the system. After reciting the administrative unity of the Metropolitan system in some detail, the bill names as the specific claims of the Pennsylvania Steel Company and the Degnon Contracting Company, two items of \$36,831.38 and \$11,173.27, respectively, one for rails and the other for construction work done. Beyond this, however, it is declared that the petitioners are informed and believe that the New York City Railway has spent on extensions and improvements on leased lines upward of \$20,000,000, and has also spent large sums in electrification—all to the great advantage and betterment of the system, but in excess of the resources of the New York City Railway. Contracts entered into for electrification are also mentioned as being now in the course of performance which require \$4,000,000 that the Metropolitan cannot pay, and that, as a result, electrification work must be suspended, notwithstanding the outlay already of large amounts whereby the defendant has incurred heavy liability. Prospective liabilities for new equipment which the defendant is under contract to buy are also recited, as well as several thousand damage suits in various courts which will entail a material expenditure under judgments to be obtained.

At the time of the appointment of the receiver for the New York City Company, the Interborough-Metropolitan Company and the Metropolitan Securities Company turned their books over to the Public Service Commission for use in the work which the commission is carrying on. As a result, there was an adjournment of the hearing until Thursday to give Mr. Ivins and the members of the commission an opportunity to go over the books. In connection with the receivership and its effect upon the work of the commission, Mr. Ivins said:

The appointment of the receivers by Judge Lacombe will have no effect whatever upon the conduct of the investigation, except in certain respects possibly to change its order. In such a case as the present there would have ultimately to be a judicial determination of the rights of the different parties among themselves not only, but a general judicial liquidation, which will undoubtedly result in a reorganization.

One of the effects of the application for the appointment of a receiver will be to relieve the Commission of the very burdensome work of determining the precise relations of the parties between themselves, but will not in any respect affect the inquiry as to the causes for the insolvency as growing out of agreements to pay rentals which could not be earned, and of overcapitalization, overbonding and overborrowing as well.

I do not believe it is the intention of the railroad companies to attempt to deprive the Commission of any jurisdiction in the premises, but rather to recognize the actual fact of the long-existing insolvency, and take steps which will permit of a reorganization that will ultimately tend to facilitate rather than to hinder the work of the Commission, first, because the work of the receivers will probably be done rapidly, in view of the necessity for maintaining and restoring the company's credit; second, because it will undoubtedly result in leaving the company in a position where it will be able financially to carry out the large general orders of the Commission, which it is certainly financially unable to do at the present time, and because, in respect of any reorganization, the Commission will have the final regulative voice as to the class, character and amount of new securities to be issued.

One of the things that the Commission is already prepared to go into is the investigation of the construction and equipment account of the subway, and the cost of the new tunnels, but that will now have to be deferred until a general survey has been made of the books of the two holding companies.

The session of the commission on Wednesday, Sept. 18, was devoted to the consideration of charts showing the comparative density of subway and elevated traffic on Aug. 21, 22 and 23 last. These charts were prepared on the basis of observations taken by clockers for the commission. They will be compared later with similar charts made up from observations by the company's men. It developed that the commission's charts



make a rather better showing for the subway and elevated than do those which the company has prepared. However, all the present charts show conditions at the time of lightest travel in mid-summer, as is evidenced by the deduction read into the record that on the three days in question there were "a few" standing passengers in the subway expresses leaving Brooklyn Bridge, northbound, between 5 and 6 o'clock in the evening. Another indication was that there was no great congestion on the downtown expresses in the morning. The observations discussed were taken at two or three points on the Second, Third, Sixth and Ninth Avenue lines and on the Subway, the points being so distributed as to take in most of the places where there is congestion.

The session on Thursday was devoted to the consideration of certain details of finance and to traffic statistics. Mr. Root, as vice-president and general manager of the New York City Railway Company, was the witness. He insisted that the car mileage was no criterion of the service rendered on the ground that weather conditions and the congestion of vehicular traffic varied the car mileage quite distinct from the number of cars operated. As an illustration, Mr. Root said that in December of last year the company increased the number of cars it ran by  $3\frac{1}{2}$  per cent, with a resultant increase of but one-third of 1 per cent in the car mileage. After the car-mileage subject had been dismissed, Mr. Ivins took up the subject of flat-wheels. Mr. Root said that things were a little worse than usual in this respect because of the destruction of the 146th street repair shops, but that in 1906 over 12,000 flat wheels were removed over the entire system. Mr. Root also spoke highly of the brake system in use on the Metropolitan and said that the only practicable fender for the traffic conditions that prevail in New York was one placed under the cars ahead of the trucks.

On Friday Mr. Root told the commission about the troubles of the manager of a surface traction system under the conditions existing in New York, and also discussed a set of proposed ordinances for the regulation of traffic sent to the commission by President Shonts of the Interborough-Metropolitan. In connection with these ordinances, for which the Metropolitan asks the support of the commission, there is the suggestion for the use of the "pay-as-you-enter" car. The traffic regulations propose, in the first place, that not only shall all vehicles keep to the right-hand curb, but that where a street is so narrow that there is only a single car track on it there shall be a diversion of vehicular traffic, so that only vehicles moving in the same direction that the cars are going shall be allowed on the street with the car tracks. It is proposed, also, that the city, in removing snow after a storm, shall open up at the earliest moment a street either north or south of any cross street where car tracks go through, so that teams will not jam in on the car tracks and tie up the operation to an indefinite extent, as is the case under present conditions. In connection with this same matter of snow removal, it is suggested that on streets having wide sidewalks, like Twenty-third street, instead of clearing all the snow off the sidewalks to the edges of the street, as the first step toward removal, and thus forcing the vehicular traffic upon the car tracks, some of the snow be allowed to remain on the outer edges of the sidewalks, so that the tracks may be kept, to a certain extent, free for the operation of cars.

The regulations contemplate, further, that no vehicle shall be allowed to stop on a crossing, and that on a street where there are car tracks no stop, other than an emergency stop, shall be allowed except to deliver goods or passengers. In case of such a stop in any way interfering with car operation, it is provided that the block shall not be allowed for more than five minutes at a time. More than this, the proposed ordinances stipulate that where a residence or business house fronting on a street where there are car tracks has also an entrance on a side street there shall be no stop to unload goods at the front entrance unless under a permit from the police department. The ordinances provide that all teams standing at the curb must face in the same direction in which the traffic is going on that side of the street, and may not stand within 100 feet of a street corner where there is a crossing of car tracks, nor within ten feet of the curb line of any corner. It is proposed to give all traffic going north and south the right of way over traffic going east and west, and to give cars the right of way, so far as that part of the street occupied by car tracks is concerned, over all traffic going at a less rate than ten miles an hour. There is a provision in this section that was believed by some who saw it yesterday to have been tucked in for its possible

bearing in damage-suit claims. It added the word "persons" to the clause giving cars the right of way over vehicles being driven or standing on the car tracks. Additional restrictions for the pushcart men are contemplated. It is proposed not to allow them to stand within twenty-five feet of any corner or less than ten feet apart, and to keep them altogether off streets where surface cars are being operated. Coal trucks, which cause more trouble to surface cars than any other kind of vehicles, are, under the proposed ordinances, subjected to the London rule, which provides that between the hours of 7 a. m. and 7 p. m. they may not haul or deliver coal on any street where there are surface tracks without a permit from the police department for every such delivery. The last of the regulations proposes that on crosstown streets where surface cars are operated vehicles may be driven only when they are going to destinations in the block that they enter. The effect of such a move as this would be to throw east and west traffic off the cross streets where cars are operated into the next streets above and below until they approach the block in which their destination lies.

The receivers of the New York City Railway Company were in conference Wednesday with President Vreeland, General Manager Oren Root, General Solicitor Quackenbush and a member of Mr. Masten's firm. The only announcement following the meeting was the appointment of Mr. Masten and the fact that the receivers would proceed first to make up a definite statement of the assets and liabilities of the New York City Railway, which would be presented to the court as soon as it was ready.

The Interborough Rapid Transit Company on Thursday, Sept. 26, notified the Public Service Commission of its willingness to increase the elevated and Subway service at each end of the half-hour of greatest crush. In most instances the increases offered yesterday by the Interborough were less in amount than the 20 per cent general increase proposed some time ago for discussion at a later hearing, and the time within which the increased service is afforded is materially shorter than was proposed.

Mr. Hedley said that the first increase in the Subway service in the morning would be accomplished by running two additional trains from West Farms between 7 and 7:30 o'clock. Between 8:30 and 9 o'clock there will be one additional Subway train started from West Farms, and at the end of the day there will be an additional Subway West Farms express between 5 and 5:30 o'clock, and another between 6 and 6:45.

On the Second Avenue line, where an increase of 40 per cent is scheduled, two cars will be added to eight consecutive trains passing Forty-Second Street northbound shortly after 6 o'clock. Between 6:15 and 7 o'clock three additional trains will be started on the Second Avenue line from 129th Street and run to South Ferry; from 7 to 8:30 o'clock one additional South Ferry train will be started from 129th Street.

In the evening between 5 and 6:30, where a 4-per cent overcrowding was indicated by the commission's charts, one additional Second Avenue train is to be put on; from 6:30 to 7, two additional trains, and beginning with the third train passing Forty-Second Street after 7 o'clock when seven-car trains will be run instead of five cars for ten consecutive trains. Two cars will also be added to the five trains passing Forty-Second Street shortly after 8 o'clock in the evening.

On the Third Avenue line between 6 and 6:30 one additional train will be run down-town and two trains additional will be run between 6:30 and 7 o'clock. From 7:30 to 8 o'clock there will be four additional seven-car trains, and the same number additional from 8:30 to 9 o'clock. In the afternoon, beginning at 5 o'clock, there will be six additional trains in the first hour of the evening rush, some originating at 129th Street and some at 179th. Then there will be a break of half an hour with no trains additional, but at 6:30 the increase starts again with an additional seven-car train between that hour and 7 o'clock. Between 7 and 7:45 o'clock there will be additional Third Avenue trains, north bound, and shortly after 9 o'clock, instead of reducing the Bronx Park trains from seven to five cars, the seven-car trains will be continued for five intervals on the schedule.

On the Sixth Avenue line between 7:30 and 9 o'clock trains south bound are to run with seven cars instead of six, and the seventh car will be added to trains running north between 5 and 6:30 o'clock at night. On the Ninth Avenue line the only increase is to be between 5 and 6 o'clock at night, when three additional six-car trains will be run from Rector Street to 135th Street.



**ANNUAL REPORT NORTHWESTERN ELEVATED RAILROAD COMPANY FOR THE YEAR ENDED JUNE 30, 1907**

The report of the Northwestern Elevated Railroad Company for the year ended June 30, 1907, show that the gross earnings (including Loop net earnings), were \$2,100,315.97, an increase of \$151,588.69, or 7.7 per cent. The total expenses were \$1,752,737.84, an increase of \$84,508.57, or 5 per cent. The increase in expenses was due principally to increased taxes and increased Loop compensation to city, and to improved service requiring additional car miles, with a corresponding increase in pay roll and power accounts, to an increased rate of wages, and to additional insurance. The net income was \$347,578.13, an increase of \$67,080.12, or 23.9 per cent. The surplus at the close of the year was \$1,649,013.01. The income account follows:

**COMPARATIVE STATEMENT OF INCOME ACCOUNT**

For the Years Ended June 30, 1906 and 1907

EARNINGS		
	1906	1907
Passenger earnings .....	\$1,456,454.01	\$1,550,816.37
Other earnings (including loop net earnings) .....	492,273.27	549,499.60
<b>Total earnings .....</b>	<b>\$1,948,727.28</b>	<b>\$2,100,315.97</b>
OPERATING EXPENSES		
Maintenance of way and structure.....	\$65,092.09	\$50,681.25
Maintenance of equipment.....	147,387.13	141,738.23
Conducting transportation .....	415,555.80	458,773.64
General expenses .....	77,537.76	93,110.90
<b>Total operating expenses.....</b>	<b>\$705,572.78</b>	<b>\$744,304.02</b>
<b>Net earnings .....</b>	<b>\$1,243,154.50</b>	<b>\$1,356,011.95</b>
CHARGES		
†Taxes .....	\$171,624.04	\$217,311.32
Bond interest .....	783,466.53	794,122.50
Other interest .....	7,565.92	.....
<b>Total charges .....</b>	<b>\$962,656.49</b>	<b>\$1,008,433.82</b>
<b>Surplus .....</b>	<b>\$280,498.01</b>	<b>\$347,578.13</b>
Ratio of operating expenses (including maintenance reserves) to earnings (excluding loop net earnings).....	46.62	46.38
Ratio of operating expenses, maintenance reserves, loop account and taxes to earnings (excluding loop net earnings).....	62.72	64.36

†Includes compensation to city on account of loop. The above figures for 1907 include \$35,054.07 set aside as a reserve for maintenance.

**GENERAL BALANCE SHEET**

(Including Loop Division)  
June 30, 1907

ASSETS	
Cost of road and equipment.....	\$31,575,603.08
Land and buildings.....	442,022.42
Stocks and bonds.....	32,515.14
Cash and bills receivable.....	1,028,141.81
Accounts receivable.....	142,757.55
Materials and supplies on hand.....	3,805.17
Unadjusted accounts .....	415,766.59
	<b>\$33,640,611.76</b>
LIABILITIES	
Capital stock—preferred .....	\$5,000,000.00
Common stock .....	5,000,000.00
	<b>\$10,000,000.00</b>
Bonds .....	\$22,624,000.00
Less bonds owned.....	3,698,000.00
	<b>\$18,926,000.00</b>
Mortgages .....	122,350.00
Reserve for taxes.....	91,523.48
Accrued interest on bonds.....	248,611.68
Reserve for maintenance .....	250,000.00
Accounts and notes payable.....	2,322,338.33
Unadjusted accounts .....	30,775.26
Profit and loss .....	1,649,013.01
	<b>\$33,640,611.76</b>

**COMPARATIVE STATEMENT OF PASSENGER TRAFFIC**

	Total Passengers.	Daily Average.
Year ended June 30, 1901.....	18,950,167	51,918
Year ended June 30, 1902.....	21,769,079	59,641
Year ended June 30, 1903.....	24,305,704	66,591
Year ended June 30, 1904.....	25,497,079	69,664
Year ended June 30, 1905.....	26,812,825	73,460
Year ended June 30, 1906.....	29,132,871	79,816
Year ended June 30, 1907.....	31,022,575	84,993
Average daily increase 1907 over 1906, 5177 passengers, or 6.48 per cent.		

In presenting the report President M. B. Starring said in part:

The physical condition of the property has been maintained at a correct standard, and adequate reserves have been established to care for the future.

Thirty-four new combination motor cars were purchased, and their operation proved satisfactory; the wide door entrance space and the pneumatically operated door add much to the

loading and unloading facilities of these cars, and will be adopted in future purchases.

The Wilson Avenue surface terminal station has been completed and now affords not only all possible convenience to the company's patrons, combined with satisfactory operative conditions, but also is an attractive addition to the neighborhood in which it is located.

A 2000-kw rotary converter was installed in an addition to the Chicago Avenue storage battery building, and placed in operation Feb. 6, 1907; current being purchased under a contract with the Commonwealth Electric Company, which contract will provide the electrical energy used in connection with the additional rotary converters hereafter mentioned.

An addition to the Fullerton Avenue power house is under construction for sub-station purposes, and two 2000-kw rotary converters will be installed therein; the first in September, 1907, and the second prior to Dec. 1, 1907; in addition to these the efficiency of the storage battery has been increased over 40 per cent by additions made thereto, thus amply providing for the demands for electrical energy for the coming winter.

The Ravenswood extension, although not completed, was opened for business on May 18, 1907, and gives promise of developing all the traffic that had been expected of it. Its completion, including the surface extension, will be accomplished early in the autumn.

Acceptable ordinances have been passed by the City Councils of Chicago and Evanston, authorizing the Chicago, Milwaukee & St. Paul Railway Company and the Northwestern Elevated Railroad Company to operate the Evanston division of the St. Paul Company by means of electricity, which will result in the extending of this company's service to Evanston under an operating agreement with the Chicago, Milwaukee & St. Paul Railway Company, the terms of which have been substantially agreed upon.

Active steps were taken to obtain the frontage consents necessary for the passage of an ordinance for a stub terminal on North Water Street, to be introduced at the first fall session of the City Council.

The question of extending the Loop platforms so as to facilitate the operation of more cars per train than are at present operated, is being actively pushed before the Corporation Council of the city, and a decision is expected early in the fall.

The entire Loop situation is being carefully checked and examined by expert engineers, with a view to ascertaining in just what way changes in or additions thereto may be made so as to best accommodate the patrons of the lessees, and subserve all interests.

**SAN FRANCISCO CAR STRIKE**

The strike of the carmen which has been in force for over four months in San Francisco, has practically been called off, the boycott having been raised by the union leaders on Sept. 12. In addition the general strike committee has voted to allow all union men to ride on the street cars, but to consider the strike in force and effect and continue paying assessments until a settlement shall be effected between the carmen's union and the United Railroads.

Four killed and 252 known to have been wounded, is the record of the 131 days of the car strike period that began on May 5 and continued until the boycott was removed. In addition to the injury of 209 employees, the car company had 3529 car windows broken by rioters. It also had its Turk and Fillmore car house fence battered down; its high-tension electric wires short-circuited two different times; car rails greased and soaped dozens of times to cause runaway cars, and it ran over or found scores of torpedoes and other explosives on the rails, apprehended two dynamiting plots, found barriers of stone, of hardened cement, felled trees, and, in one instance, a small house placed across the track to block the progress of its cars.

The day before the strike was declared the United Railroads had 1700 platform men in its employ. It now has 1450 platform men at work, many of whom are deserters from the union.

The company not only has all the platform men it needs at present, but it is daily receiving from 50 to 75 applications for positions on the cars. Altogether, the company is in much better condition to handle traffic than it was before the strike. It has more cars and more new cars, and it has more lines open to traffic. The only present handicap is temporary shortage of power from the California Gas & Electric Corporation.



## IMPORTANT RULING ON PETITIONS BY MASSACHUSETTS COMMISSIONERS

The railroad commissioners of Massachusetts on Wednesday, Sept. 18, issued their findings in the case of the four important interurban railway petitions before the board for certificates of exigency. Of the four the Boston & Providence, backed by the interests behind the Boston Elevated Railway, was the only successful road. The petitions of the Boston, Lowell & Lawrence and of the Boston & New York companies were dismissed, while that of the Boston & Eastern Company, which proposes to build to Lynn, Beverly and Salem, was held in abeyance in order that the company may file more satisfactory plans.

The petitions were all brought under the recent act of the Legislature which provides that a company which desires to build an electric railway must first secure a certificate that public necessity and convenience require its construction. In effect the statute declares that indiscriminate competition is undesirable, and that the resources of a monopoly, provided the management be efficient and progressive, may provide the largest and best public service; that established companies conducting their business in a proper manner are to be given a reasonable measure of protection, and that the extraordinary right of eminent domain is not to be exercised at the will of those who, professing public purposes, have in view merely private gain. An abstract follows of the report of the commissioners:

Though a road between Boston and Providence must openly compete with an excellent steam railroad service, it would offer equal speed with more frequent trains and with freedom from smoke and cinders. Physical conditions are favorable for an electric road of modern type, and as matters now stand it cannot be said that the adventure would be unprofitable. The question is simply which of the two companies that desire to build shall receive the necessary certificate, for it has been taken for granted from the first that there is room for only one.

The route of the Boston & Providence Interurban is the choice of experts who in the beginning had different lines in view. Their investigation has been exceptionally thorough and their plans have on the whole popular preference in the communities that would be served. The route of the New York & Boston Electric Railroad is of recent suggestion. While this project, as the name indicates, is more ambitious than that of the Boston & Providence Company, its future would be far more uncertain and speculative, success being dependent upon the ability of the company to prosecute the enterprise in other states where as yet nothing of a definite or tangible nature appears to have been accomplished. In our opinion a certificate ought to be issued to the Boston & Providence Interurban Electric Railroad Company as the company by comparison is in better position to make us of it for the public advantage.

The Boston, Lowell & Lawrence Electric Railroad as planned would pass through Charlestown, Somerville, Medford and Arlington, connecting with the Boston Elevated system in Charlestown. Residents of these cities and towns earnestly remonstrate against the building of this railroad. It cannot be gainsaid that the railroad which is proposed would interfere with important extensions of the Boston Elevated system which have long been awaited in these suburban towns. In general, it may be said that the method pursued in placing this project before the public at different times and in different places in the early days of its promotion was notable for indifference to law and conditions and to the possibility that promises made might call for performance. Then, too, the structure which the company proposes in Sullivan Square is undesirable and unsightly and the selection of that connection with the elevated system makes rapid transit improbable and aggravates conditions that already vex and menace the public at this terminal. Nor can the company build the structure which it has planned without special legislation, and such legislation has been expressly denied. The more careful the study and the closer the scrutiny of the history and character of this transportation scheme the less there is found in it to call for a certificate that public necessity and convenience require it.

It does not follow from what has been said that there is no call for an electric railroad in the territory which lies to the north of Boston, and a carefully studied plan for such a railroad has been presented by the Boston & Eastern Electric Railroad Company. Existing railroad and railway companies have argued that they are now giving all needed facilities in this territory, but the argument falls short of the mark. It is true that the Boston, Revere Beach & Lynn Railroad, within the limitations

of a steam railroad hampered by ferry connection, is furnishing an admirable service to and from Lynn, and that much commendation is due the management of the Boston & Maine for a service along the North Shore that proves its interest in the comfort and convenience of patrons. But this is not the whole story. With all the railroad and railway lines that now serve it this densely populated territory, especially its rapidly growing cities, needs additional facilities both for immediate use and for the development of a commercial prosperity that might be realized were larger instrumentalities at hand. The plan of the Boston & Eastern Electric Railroad, though carefully studied, is not satisfactory in the way it provides for Lynn, and is fatally defective at the Boston end of the undertaking in proposing a connection with the Boston elevated railway at Sullivan Square. That feature of the enterprise is absolutely prohibitive. The travel which now comes to Sullivan Square as a connecting point between elevated and surface lines overloads the railway and the relief which is promised through changes soon to be completed cannot with our consent be endangered by conducting an additional tide of travel to this point.

In our opinion no electric railroad can successfully reach Boston from the north that does not secure an entrance to the city independent of the existing elevated structure in Charlestown. Without intending to define any exclusive route it may be suggested that the present tunnel or a second tunnel under the harbor might well be the connecting link.

Our conclusion is that, while public necessity and convenience call for enterprise in this field, the present route of the Boston & Eastern Electric Railroad does not meet the emergency. Its petition, however, is not dismissed, but held to await further study and development of plans by this or by any other public agency desirous of furnishing additional transportation facilities in this territory.

## PROGRAM OF THE AMERICAN STREET AND INTER-URBAN RAILWAY ACCOUNTANTS' ASSOCIATION

The program is announced of the eleventh annual convention of the American Street Railway & Interurban Accountants' Association, held at Atlantic City on Oct. 15, 16, and 17. The headquarters of the association will be at the Chalfonte Hotel, and the general headquarters the Marlborough-Blenheim. As the meetings will be held in the hotel, it is urged that members select the Chalfonte as their stopping place, for it will then be possible to have the meetings called promptly and insure a better attendance. The regulations as to securing reduced fare are published on another page of this issue. The Accountants' bulletin also suggests that as excursion tickets are available to the Jamestown Exposition from all parts of the country that allow stopovers at Philadelphia, advantage be taken of them. The program in detail follows:

### PROGRAM.

TUESDAY, OCT. 15—10 A. M. TO 1.30 P. M.

Convention called to order.

Address—Mr. John I. Beggs, President American Street & Interurban Railway Association.

Annual Address of President.

Annual Report of Executive Committee.

Annual Report of Secretary-Treasurer.

Paper—"Park Accounting," by Frank J. Pryor, Jr., Comptroller the American Railways Company.

Question Box—Frank R. Henry, Auditor, United Railways Company, of St. Louis, editor.

Appointment of Convention Committees and New Business.

Lunch and social afternoon, 2.00 P. M.

WEDNESDAY, OCT. 16—9.30 A. M. TO 1.00 P. M.

Joint Meeting with "American" Association (on Steel Pier).

WEDNESDAY, OCT. 16—3.00 P. M. TO 6.00 P. M.

Paper—"Mechanical Devices for Office Use," by F. E. Smith, Auditor, Chicago Union Traction Company.

Report of Committee on "Standard Classification of Accounts and Form of Report."

Report of Committee on "International Standard Form of Report."

THURSDAY, OCT. 17—10.00 A. M. TO 2.00 P. M.

Paper—"Where Maintenance Ends and Depreciation Begins," by J. H. Neal, Auditor of Disbursements, Boston Elevated Railway Company.

Reports of Convention Committees.

Election of Officers.

Installation of Officers.



## PROGRESS ON THE WASHINGTON STREET TUNNEL, BOSTON

The Washington Street tunnel, in Boston, is now nearly completed as far as the tunnel proper is concerned, except for the roadbed and surfacing. With the exception of work near the west end of State Street, which does not admit of free passage, the tunnel is now clear between Castle Street and the North Station. Most of the stations are finished, and sample tiling has been done at the Temple Place and Lagrange Street stations. The tunnel will be more attractive in appearance than either the Tremont Street subway or the East Boston tunnel. The station tiling will be arranged to conceal all the overhead fixtures, including wires, pipes, rods and girders, producing a smooth, glossy surface in artistic designs. White tiling will cover the walls to a height of about 6 ft., after which colored ceramic mosaic work will be affixed up to the ceiling, and the narrow arches above will be finished with the same material. Different color schemes are to be used in the different stations, and the names will also be worked into the mosaic, as in the New York subway. The Boston Elevated Railway Company has suggested that the Boylston Street and Essex Street stations, which furnish access to both the north and southbound tracks at nearly the same spot, be finished in yellow; that the Temple Place, Winter Street, Summer and Franklin Street stations be finished in black; the Milk Street—old State House station—in gray; and the Union Street station in orange. Instead of using arc lights over the platforms the illumination will be by incandescents, placed in the ceiling about 10 ft. apart. The Castle Street connection with the elevated structure, and the track changes at the north station will keep men busy all winter.

## THE CLEVELAND SITUATION

Tom L. Johnson has been renominated for Mayor of Cleveland by the Democrats to oppose Congressman Theodore E. Burton, who was chosen by the Republicans a few weeks ago. The platform says that the administration fostered the growth of a company devoted to building and operating street railways, wholly in the interests of the people, preserving the control of the highways by granting revokable franchises only, and that the grants on the West Side and on the Woodland and Kinsman Avenue routes, which will expire within five months, will be taken over by the new company and operated on the three-cent fare plan. Both sides are now engaged in organizing for the campaign, and while the fight will not be made on the street railway question alone by the Republicans, Mayor Johnson will probably make it his keynote.

In sustaining an objection made by attorneys for the Forest City Railway Company, in the trial of the injunction cases against it last week, Judge Lawrence ruled that a collateral attack cannot be made upon the original grant to the Forest City Railway Company, as the Circuit Court has already adjudicated the matter of franchise in favor of the company. The court refused to follow the findings of Judge Phillips, also of the Common Pleas Court, and stated that his decision was manifestly wrong. The decision of the Circuit Court, to which Judge Lawrence refers, was rendered, it seems, before Mayor Johnson's financial interest in the company became a factor in the litigation, but at the same time it is held that the decision must be respected, and that the grant cannot be attacked collaterally in this trial to support the contention of the Cleveland Electric Company's attorneys that the grants for extensions are illegal, because the original grant is illegal, in consideration of the Mayor's interest in the company. Attorney John G. White, for the Cleveland Electric, read a decision of the Supreme Court, in which he claimed that tribunal supported the course the attorneys desired to take, but this the court did not seriously consider.

A. B. Du Pont and H. J. Davies will possibly give the City Council the details of how they arrived at the amount to be paid the city for the use of Central Avenue and Quincy Street from January until April of this year. President Andrews said there was no profit on the business for the time the lines were operated on a three-cent fare. The company does not care to turn its books over to a committee again, since there is no obligation, and it is turning over the \$84,000 voluntarily.

## AFFAIRS IN CHICAGO.

The contract between the Northwestern Elevated Railroad and the St. Paul Railroad contemplates all switching north of Wilson avenue to be done with electric power as soon as the electrification of the line is completed. The purchase of electric locomotives is already under way, the plans and specifications having been completed and submitted to builders, who will file bids at once. The Northwestern Company has awarded the contract for all the overhead work in the electrification of the St. Paul tracks north of Wilson avenue to the Brennan Construction Company, the consideration being \$100,000. The poles will be iron and the wire will be 21 feet above the bed of the track. The overhead trolley will be used until the tracks are elevated to Davis street, Evanston, when the third-rail system will be installed.

It is said that the Eastern bondholders of the Chicago traction companies plan another attempt to frustrate the issuance of rehabilitation bonds which would have priority over existing bonds, by applying for a motion before the United States Circuit Court for an injunction against the receiver of the companies, prohibiting the diversion by him of funds from the payment of the fixed charges of the company to the improvement of the property now in his hands. The injunction is desired in order to prevent default on the bonds of the companies as a result of which foreclosure proceedings might be begun, in the course of which the bondholders feel their interests would suffer.

## CENSUS OF THE STREET CAR INDUSTRY SHOWS NUMBER OF ESTABLISHMENTS AND TOTAL PRODUCTS

A bulletin containing special reports on carriages and wagons and the steam and street railway car industry has just been issued by the Bureau of the Census. These reports were prepared under the supervision of William M. Steuart, chief statistician for manufactures, and present statistics relating to 4,956 establishments making carriages and wagons, and 1,314 steam and street railroad car construction and repair shops as reported at the census of 1905.

The great development of street railroads since 1890 has caused an extraordinary growth in the industries engaged in the construction and repair of street railroad cars, and, according to the report, the value of products for these industries nearly quadrupled during the fifteen-year period from 1890 to 1905, increasing from \$6,268,462 in the earlier year to \$24,281,317 at the last census. The increase for the decade from 1890 to 1900 was \$10,407,717, or 166 per cent, and that for the five years from 1900 to 1905 was \$7,605,138, or 45.6 per cent. Street cars also are manufactured by two classes of shops, one being independent of the railroads and the other being operated by the street railway companies and doing repair work.

Of the 100 establishments engaged in the street car industries at the census of 1905, 86 were street railway repair shops. Notwithstanding the fact that there were six times as many repair shops as establishments engaged primarily in the manufacture of street railway cars, the latter represented an investment of \$12,975,703, or 50.1 per cent of the capital employed in the combined industry, and manufactured a product valued at \$10,844,196, or 44.7 per cent of the value of products for the two branches of the industry. The repair shops, however, employed 11,052 wage-earners and paid in wages \$7,012,798, which constituted 70 and 71.2 per cent, respectively, of the totals for the combined industries. As in the case of steam cars, less than 5 per cent of the value of the products of the street railroad repair shops resulted from the manufacture of cars. With the car construction establishments, on the other hand, 76.6 per cent of the value represented the building of cars.

The number of street railway cars built during the year was 4694. These cars were valued at \$9,902,310. Practically all of the cars were electric. No cable cars were reported and only 42 were cars for horse power. Of the electric cars built in the shops that were independent of the railroads 2621 were closed, 554 were open, and 502 were combination, and the remaining 251 were of other varieties.

Ohio was the leading State in the value of products of the independent shops, furnishing \$1,828,326, or 16.9 per cent of the total value of products for such shops. New York ranked first in the value of products of the repair shops, with \$3,879,933. The other states with products valued at more than \$1,000,000 were Pennsylvania, \$1,258,542; California, \$1,228,443; Missouri, \$1,210,961, and Illinois, \$1,142,562.



## ELECTRIC RAILWAY DEVELOPMENTS IN NEW MEXICO

In the description of the Las Vegas (N.M.) Railway & Power Company's system published in the Jan. 26 issue of the *STREET RAILWAY JOURNAL*, brief reference was made to plans the company was formulating for tapping a rich agricultural territory for some 45 miles out of Las Vegas. These plans are now taking more definite shape and Las Vegas citizens have already subscribed for \$40,000 of the bonds to be issued. The work of raising the funds is in the hands of Wm. A. Buddecke, president, and August Barthels, vice-president of the Las Vegas Railway & Power Company, with headquarters at East Las Vegas. It is figured that not more than \$30,000 is required for additional power equipment, so that all the money to be still raised will be for track and overhead construction as well as rolling stock.

The population served by the extension would be about 25,000 and cover about 17 post offices. The chief value of the line, however, would be in the development of freight traffic, which is a large factor even on the present system.

The following information on the character of the territory to be exploited was furnished by Mr. Buddecke:

The line will pass through some very fertile valleys that have been cultivated for years, yielding enormous crops of wheat, oats, alfalfa, and sundry other farming products, which would, however, be very largely increased with better transportation facilities. The road will also tap very valuable timber districts and coal lands, from which it can get all the fuel necessary for its own use and sufficient more to supply the local demand. Aside from this, there are copper mines and other mining propositions that could be developed, which are not being worked now on account of the lack of transportation.

With the opening of this road into this territory there will be abundant opportunity for various enterprises, such as beet sugar refineries, tanneries, smelters, flour, paper and woolen mills, and canneries for peas, beans and other products.

In addition to the foregoing 45-mile extension, there is a 255-mile new railroad proposition to be had, all of which radiates from Las Vegas, making in all 300 miles of lines, crossing and connecting three separate steam systems, which the company hope to undertake after completing the first 45 miles. It would require close to \$6,000,000 to build the two extensions and equip them, but when finished this line of 300 miles would form a link in a new transcontinental railroad, besides being in itself a feasible proposition.

## A PECULIAR DAMAGE SUIT

The Evansville & Southern Indiana Traction Company is made defendant in a peculiar damage suit. The accident grew out of the recent street railway strike, and for this reason the company denies its liability under the peculiar circumstances. The company's answer to the complaint is in three paragraphs, in which a detailed history of the accident and events leading up to it are given. The company says it was in no way responsible for the accident in which the child was injured because it was operating cars according to the franchise. The accident, it says, was due to ineffectual appeals on its part to the city authorities to protect the company's property against the mob. It seems that soon after the car left the barns at the usual hour on the morning of May 17, a mob of 500 people was encountered arrayed against the company, with stones, clubs and other missiles, which were used to interfere with the operation of the car. The particular car was in charge of a competent and skilled crew, and while it was making its run on the Walnut Street line it was boarded by five of the mob, who pulled the motorman and conductor from their positions and took possession of the car. Increasing the speed they continued to run the car in reckless fashion until it left the track and ran into the house where the complainant was playing.

## CONVENTION OF THE COLORADO ELECTRIC LIGHT, POWER & RAILWAY ASSOCIATION

The Colorado Electric Light, Power & Railway Association held its fifth annual convention at Denver, Sept. 18, 19 and 20, at the Savoy Hotel. The first session was called to order about 11.30 Wednesday morning, Sept. 18, with George B. Tripp, of Colorado Springs, president, in the chair. The most

interesting part of President Tripp's address was that relating to revolutionizing changes in the power situation in Colorado about to take place and due to cheap water power being developed by some of the large power companies soon to commence operation in different portions of the state. This cheap power would, he thought, make possible much mining development otherwise impossible. He predicted that in five years there would be a 50-per cent decrease in the amount of coal used by Colorado mines and mills due to the increase of the use of hydro-electric power, and that ultimately coal will mainly be confined to domestic uses.

There were no papers relating direct to railway operation, but several of them had to do with branches of street railway management. Among them was a paper by B. E. Buttles, of the Denver Gas & Electric Company entitled "Notes on Modern Boilers," which was presented Wednesday afternoon. He called attention first to the fact that boilers are not selected with the same care as engines with respect to refinements and suitability to the work in hand, and laid specific emphasis on ease of cleaning and repair, and the difference between test conditions with new boilers and operating conditions with old ones. Tests of boiler efficiencies are likely to be confused with furnace efficiencies. That boiler will probably be cleanest which is easiest to get at. He criticized points about various boilers which make both internal and external cleaning difficult. Soot and dust lodged in large quantities around a boiler are likely to cause damage as well as loss of efficiency.

Another feature of interest to street railway delegates was the discussion on Friday of "Lightning Protection in Colorado." Leonard Wilson, of the General Electric Company, opened this discussion with an address describing the kinds of arresters used in Colorado and their behavior, and various members then gave their experiences. It is the purpose of the association to print this as a symposium later, after those taking part in the discussions have furnished more complete data.

The secretary and treasurer's report showed five new active members gained during the year, two lost by consolidation, and two applicants at this convention. Expenses for the year were \$199.50, the balance in the treasury being \$1,076. The new officers elected were as follows: W. G. Matthews, of the Denver City Tramway Company, president; C. K. Durbin, of the United States Light & Traction Company, of Denver (controlling companies in several surrounding states), vice-president; Mr. J. F. Dostal, of the Denver Gas & Electric Company, secretary and treasurer; Geo. B. Tripp, W. T. Wallace and the officers, executive committee; John A. Beeler, W. J. Barker, J. F. Vail, I. J. Hale and J. J. Cooper, advisory committee; T. W. Cargo, E. P. Dillon, B. K. Sweeny, membership committee; V. A. Sickman, W. E. Robertson, Geo. H. Maxam, finance committee.

At the close of convention a special car was provided to take delegates to visit the plants of the Denver Gas & Electric Company and the Denver City Tramway Company. On Thursday afternoon the delegates took a special train to Lafayette, about 25 miles north of Denver, where the power station of the Northern Colorado Power Company is just being completed. This is a steam plant located at the coal mines for the purpose of supplying current to a number of towns in that part of the state and to operate the single-phase electric service which the Colorado & Southern (a steam road) is preparing to inaugurate. It is equipped with Parsons turbines and obtains condensing water from a lake. The transmission voltage is 44,000, and below the line, the entire length, is to be a 23,000-volt, three-phase circuit for supplying farmers along the line.

## STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED SEPT. 17, 1907

866,085. Brake Shoe; Julius Stromeier, Philadelphia, Pa., and William Morton, Camden, N. J. App. filed Oct. 15, 1906. A shoe of cast iron having its braking surface provided with a series of chambers having a filling consisting of a mixture of sand and hydraulic cement.

866,193. Trolley Guide; Frank G. Clark, San Francisco, Cal. App. filed Feb. 20, 1907. A pair of upwardly projecting arms mounted on the trolley pole below the wheel, the upper portions of which are adapted to yield rearwardly when passing an obstruction.



866,224. Trolley Pole; Alexander Ross, Rochester, N. Y. App. filed Feb. 5, 1906. The pole is made up of telescoping sections and has a rubber hood to keep rain out of the telescoping joints.

866,261. Railway Traffic Controlling System; Clarence W. Cleman, Westfield, N. J. App. filed Jan. 10, 1907. Relates to complete mechanical features and electrical circuits of a signal system having sectional track rails energized by a direct current and operating home and distance signals.

866,281. Railway Signal; William H. Jordan, Brooklyn, N. Y., and George T. Hanchett, Hackensack, N. J. App. filed June 14, 1905. A signal system in which the signals derive their power from the same source as that employed to propel the cars; has tappets adjacent the track rails instead of the usual sectional rail construction.

866,331. Railway Signal; Frederic B. Camors and Charles Pelletier, New Orleans, La. App. filed May 1, 1906. Relates to details of a signal system having special trolleys between the usual track rails and having depending brushes from the locomotive to establish signal circuits to the engine cab.

866,349. Trolley Pole Support; Hugh W. Fellows, Cahuenga, and Ira A. Cammett, Hollywood, Cal. App. filed Sept. 15, 1905. Means for holding the trolley wheel in contact with the wire and automatically releasing and dropping it when the wheel jumps from the wire, said means being set in action by the abrupt upward movement of the pole.

866,363. Trolley Wheel; Henry L. Humphrey, Monroe, Mich. App. filed Oct. 12, 1906. The trolley wheel axle has a globular enlargement at its middle.

866,380. Switch Operating Mechanism; George F. Mooney, Philadelphia, Pa. App. filed May 29, 1907. A pair of depressible shoes for throwing the switch when actuated by a lever on the car or train.

866,390. Track-Laying Machine; William M. Saxton, Peter J. Henselwood and Andrew A. Johnson, Portage La Prairie, Manitoba, Canada. App. filed May 29, 1907. Details of construction.

866,448. Pressure Governing Device for Pumps; Clyde C. Farmer, Chicago, Ill., and Walter V. Turner, Wilkesburg, Pa. App. filed Jan. 14, 1904. Relates to pressure governing apparatus for air compressors which are driven by electric motors, such as are commonly employed on electric cars, and provides means whereby the pumps of a series of motor cars coupled in a train, and having their main reservoirs connected, may be automatically started and stopped simultaneously.

866,484. Alarm; Thomas R. Kinsella and Christopher W. Hodgetts, Hartwell, Ohio. App. filed March 21, 1907. The handle of the motor controller has a push button inset therein so that the motorman may operate an electric gong whenever desired in a convenient way.

866,521. Automatic Safety Apparatus for Railways; George E. Ryan, New York, N. Y. App. filed Sept. 27, 1906. An apparatus set by one train to cut off the steam in the locomotive of a too closely following train.

866,595. Self-Acting Safety Appliance for Street Cars; Lowell M. Maxham, Boston, Mass. App. filed May 14, 1907. Provides improved means for cushioning a street car buffer; for locating a drop fender beneath the overhanging end section of the car; for causing the fender to be dropped through the action of the body lying on the track in front of the car.

## PERSONAL MENTION

MR. EDWARD DROYLES, of Bellefontaine, Ohio, has been appointed claim agent of the three divisions of the Ohio Electric Railway Company.

MR. H. C. KAERCHER has resigned as superintendent of the Juniata Valley Street Railway Company, of Huntingdon, Pa., to accept a position with the United Traction Company, of Albany, N. Y., as assistant to Mr. H. A. Benedict, mechanical and electrical engineer.

MR. I. H. McEWEN has been appointed assistant superintendent of the West Shore Railroad between Utica and Syracuse, in charge of the affairs of the Oneida Railway Company. Mr. McEwen has been identified for some time with the office of General Superintendent J. H. Hustis, of Syracuse, as general agent. At one time he served the R., W. & O. division as superintendent.

MR. F. E. DRAKE, the managing director of the Société Anonyme Westinghouse of France, has arrived in America and expects to remain until after the middle of October. Mr. Drake says his company is now doing the largest and best business in its history, with most favorable prospect for large increase in all branches of its trade.

MR. CHAS. E. FRITTS has been appointed chief electrical engineer of the Kansas City Railway & Light Company, of Kansas City, Mo., to succeed Mr. Charles N. Black, who, as noted in the last issue of the STREET RAILWAY JOURNAL, has been appointed vice-president and general manager of the United Railways, of San Francisco. It is announced that no general manager will be appointed at present.

MR. J. A. EMERY, who recently resigned as vice-president and general manager of the Birmingham Railway, Light & Power Company, of Birmingham, Ala., is one of the organizers of the Emery Steel Company, of Birmingham, just incorporated, which will do a general business in castings and machinery. Associated with Mr. Emery in the company are Mr. R. C. Foster and Mr. J. H. Pritchard.

MR. O. R. STURGINGER has been appointed superintendent of the Toledo, Port Clinton & Lakeside Railway, to succeed Mr. H. C. Warren, who resigned recently to take a similar position on the Toledo & Indiana Company. Mr. Sturginger has been with the company for some time as master mechanic, and the appointment comes in the nature of a promotion. He has already entered upon his duties.

MR. J. T. BURKE, connected with the Southern Pacific Company, has been elected president of the Peninsular Electric Railway Company of San Jose, Cal., which is building the cut-off from Mayfield to Los Gatos, a distance of 20 miles. He has taken the place made vacant by the death of Mr. O. A. Hale, of San Jose, the former president. The Peninsular cut-off has all its grading done and track is laid from Mayfield southeastward four miles to Los Altos.

MR. JOHN I. BEGGS, of Milwaukee, president of the United Railways Company, of St. Louis, was the guest of honor one evening last week at a dinner at Hotel Jefferson commemorating his sixtieth birthday. A handsome silver loving cup was given President Beggs by his hosts, whose names were engraved thereon. Those present were Mr. and Mrs. Richard McCulloch, the latter, Mr. Beggs' daughter; Mr. and Mrs. Charles H. Huttig, Mr. and Mrs. Robert McCulloch, Miss Roberta McCulloch, and Miss Grace McCulloch.

MR. WM. E. MOORE, who will be succeeded on Nov. 1 as general manager of the West Penn Railways Company, of Connellsville, Pa., by Mr. Geo. R. Folds, as previously mentioned in THE STREET RAILWAY JOURNAL, will become associated as consulting engineer and adviser to the Kuhn interests of Pittsburg. Mr. L. H. Conklin will hold the title of general superintendent and J. W. Brown will continue in the capacity of superintendent of transportation. Mr. Moore has been in Connellsville four and one-half years, part of the time as general superintendent and part of the time as general manager.

MR. GEORGE R. FOLDS, who has recently resigned as general manager of the South Chicago City Railway Company, Chicago, was waited on by a committee of employees at the general offices of the company Saturday, Sept. 14, and presented with a pair of jeweled cuff links. Appreciation was expressed of Mr. Folds' personality and of his courteous attitude toward all the company's employees. Mr. Folds left for California Sept. 15, and will be married in that State Oct. 12. He will assume his new duties as general manager of the West Penn Railways Company, with headquarters at Connellsville, Pa., early in November.

MR. GEORGE STONE, who has been connected with the Public Service Corporation of New Jersey in Paterson for the past two years, and who for the past nine months has been superintendent of the Passaic County district succeeding Mr. W. B. Graham, has been made a division superintendent, and the Paterson district, of which he has charge, has been raised to a division. Instead of Mr. Stone's superintendency being confined to the county, he will have charge of all lines within the county and extending to the Delaware and the Hackensack bridge, in Bergen County. Mr. Stone was for many years employed by the Twin City Rapid Transit Company, and for three years was with the Brooklyn Rapid Transit Company.



# 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 station and sub-stations.
4. Car houses and repair shops.
5. Parks and amusement attractions.

1-3†HUNTSVILLE, ALA.—Manager Lawton, of the Huntsville Railway, Light & Power Company, states that plans have been drawn for the doubling of the capacity of the power house and for the extension of the street railway system. The Merrimack end of the line will be extended half a mile to Sanaqua wells, while the Dalls end will be looped around to the Meridianville pike and back into the city by way of the Southern depot.

\*MONTGOMERY, ALA.—Richard Tullis, of Montgomery, has announced that he would soon begin the construction of an electric railway from Geneva to Dothan, Ala., to cost \$500,000. It is his intention when this work is completed to extend the line to Union Springs, Troy, Eufaula, Clayton and Montgomery.

1†LOS ANGELES, CAL.—It has been announced that the Los Angeles Railway Company plans for immediate construction the following lines: The Main Street Garvanza line will be extended in two branches and the West Ninth Street line is already building west from its present terminus at Vermont Avenue and Tenth Street. It will run on Tenth Street west for a distance of something more than a mile to Gramercy Place.

1†LOS ANGELES, CAL.—A temporary franchise for a third rail on Sixteenth Street from Burlington Avenue to the city limits has been granted the Los Angeles-Pacific road. The company asked only for a temporary permit to lay a third-rail during such time as the work of broadening the gauge of the entire road is in progress.

1†LOS ANGELES, CAL.—It is believed that the formal transfer of the San Bernardino Traction Company to H. E. Huntington means the immediate construction of the Colton-Riverside electric line.

†LOS ANGELES, CAL.—Since the Los Angeles-Pacific Company was granted a permit to construct its subway from Temple Street to Sunset Boulevard, the company has changed its plans and now proposes to build a large subway. The old ordinance provided for a subway 26 ft. high and 22 ft. wide. Recently the City Council passed an ordinance providing for a subway 24 ft. high and 28 ft. wide. The Hill Street tunnel is to be large, and it is desired to make both holes correspond. It is the intention of the company to begin work on the subway at once. The difficulty of purchasing the property of the Red Men, arising out of the conditions of the title, will be overcome by condemnation proceedings. In the mean time the company has obtained permission from the City Council to maintain a grading track on Hill Street north of First Street, so as to start grading at once.

oNAPA, CAL.—The extension of the San Francisco, Vallejo & Napa Valley Electric Railway has been completed to Yountville and a regular service has been established. The construction crew is now concentrating its efforts toward pushing the line to St. Helena.

1†REDDING, CAL.—It is reported that the Northern Electric Company plans not only to extend its line to Red Bluff, but also to Redding and probably Kennett, just as soon as its Chico-to-Sacramento line is in good running order.

1†SAN DIEGO, CAL.—E. B. Webster, owner of the South Park & East Side Railroad, has filed petitions for the extension of his line on Fourth Street, through the northern and northeastern portion of the city. The line is to be about six miles long.

†SAN FRANCISCO, CAL.—The Northwestern Pacific Railway is to spend \$150,000 in improving its North Shore electric branch from Sausalito to Marin County points, California. Improved electric generating equipment will be installed immediately at San Anselmo, and it is reported that the company will electrify the road to Point Reyes. At San Anselmo a substation equipped with two 500-kw motor-generators is to be installed, leaving room for four more motor-generators to provide for the future extension of the electric service to Point Reyes.

oSAN RAFAEL, CAL.—Work has commenced on the Bay Counties Electric Railroad by two construction gangs working each way from the Towne ranch, two miles out of San Rafael. Richard Hotaling is president of the road.

1†TRINIDAD, COL.—It is reported that extensive improvements to the street car system are contemplated by the Trinidad Electric Railway Company and within a year the company proposes to connect Cokedale, Sagundo, Hastings and interlying coal camps with Trinidad. One of the branches will extend west and the other north.

oAUGUSTA, GA.—It is reported that W. L. Hodges, of Hartwell, president of the Georgia-Carolina Railway Company, will soon award a contract to survey a route from Athens, Ga., to Anderson, S. C. The company will operate electric trains.

1†COLUMBUS, GA.—It is reported as very probable that the building of the new bridge across the Chattahoochee River at Dillingham Street will be followed by the extension of the Columbus Railway Company's line into lower Girard.

1†BOISE, IDA.—The Boise & Interurban Railway Company has decided to build a street railway line in Caldwell and to extend its present line from that city to the Canyon County fair grounds, which are located about a mile distant. Work on the fair ground extension is to be commenced within a few days and be pushed rapidly, so that it may be ready by the time the fair opens, the first week in October.

\*SAND POINT, IDAHO.—An ordinance will soon be placed before the Council asking for a 25-year franchise granting right to Chas. R. Foss, John C. Cleary and Peter Johnson to build, maintain and operate a steam or electric railway on the streets of Sand Point. They offer to have the road in operation within a year, and state that they have the capital to put the project through.

oSPRINGFIELD, ILL.—A petition has been filed by the Mississippi Valley Electric Railway Company with the State Board of Railroad and Warehouse Commissioners asking for permission to cross at grade the Wahash Railroad at Carthage, Hancock County, and the Toledo, Peoria & Western Railroad at Elvaston, Hancock County. The railroad in question is to be constructed from Carthage west to Keokuk, Ia., and from Hamilton, opposite from Keokuk, Ia., through Nauvoo to Fort Madison, crossing the Santa Fe bridge at Fort Madison and the Keokuk & Hamilton bridge at Keokuk. R. R. Smith is the principal assistant engineer and is located at the Chicago office of the company, 1034 Rookery Building.

oCRAWFORDSVILLE, IND.—The commissioners of Montgomery County have granted a franchise to the Chicago & Western Indiana Traction Company, known as the "Educational Route," to construct and operate an electric railway through the county.

1†CRAWFORDSVILLE, IND.—C. C. Reynolds, general manager of the Indianapolis & Eastern Railway Company, announces that the contract for the construction of a branch line from Crawfordsville to Danville, Ill., will be let this year, work to begin early in the spring.

†EVANSVILLE, IND.—The first car was operated over the new Darmstadt-Evansville route of the Princeton Traction Company's line Sept. 16. Regular traffic over the line with an hourly service was begun Sept. 20.

oELKHART, IND.—A contract has been entered into between the Chicago, South Bend & Northern Indiana Railway Company and the St. Joseph Valley Traction Company for the exchange of track privileges in this city. Work on the Elkhart-Middlebury extension connecting the St. Joseph Valley Traction Company's line with the St. Joseph Valley Railway will be commenced at once to afford through service.

oINDIANAPOLIS, IND.—The City Park Board has granted to the Grand Central Traction Company a right of way across the western side of Garfield Park for an electric railway. This completes the company's right of way to the southern border line of the county.

1†PRINCETON, IND.—The Evansville & Southern Indiana Traction Company has awarded the contract for the construction of its extension from this city to Patoka to Jones Bros., of Columbus, Ohio. The distance or length of the extension is four and one-half miles, and includes five bridges, which will be erected by the Lafayette Engineering Company.

oSAPULPA, I. T.—It is reported that Ed. C. Reynolds and his associates have begun work on the Sepulpa electric street car lines. The franchise was granted on the condition that the line be completed within six months, and that it be extended as a motor line to the Midland Valley Railroad going through the Sapulpa oil fields.

oATLANTIC, IA.—The officials of the Atlantic Northern & Southern Railway Company announce that they have completed arrangements for the right of way for the entire distance between Atlantic and Kimbalton. The work of grading has been started. It is expected that the first 5 miles of grading will be completed by the last of this month. The line will be in all about 20 miles in length and the company expects to have all the grading done by the first of December.