

Electric Railway Journal

A CONSOLIDATION OF

Street Railway Journal and Electric Railway Review

VOL. XXXV.

NEW YORK, SATURDAY, APRIL 30, 1910

No. 18

PUBLISHED WEEKLY BY THE
McGraw Publishing Company
239 WEST THIRTY-NINTH STREET, NEW YORK

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TERMS OF SUBSCRIPTION:

For 52 weekly issues, and daily convention issues published from time to time in New York City or elsewhere: United States, Cuba and Mexico, \$3.00 per year; Canada, \$4.50 per year; all other countries, \$6.00 per year. Single copies, 10 cents. Foreign subscriptions may be sent to our European office.

Requests for changes of address should be made one week in advance, giving *old* as well as new address. Date on wrapper indicates the month at the end of which subscription expires.

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Entered as second-class matter at the post office at New York, N. Y.

Of this issue of the ELECTRIC RAILWAY JOURNAL 8,500 copies are printed.

NEW YORK, SATURDAY, APRIL 30, 1910.

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Increase in Wages

One of the most notable features of electric railway operation during the past year has been the announcement in many cities that the wages of the trainmen would be advanced. These increases have not been brought about through strikes or under the pressure of threatened strikes, but have been justified in most instances because of the increased cost of living, of which so much has been said recently. Without taking up the question of whether there has been a halt in the upward course of the prices of necessities, as seems to be the case from the latest compilations, it is pertinent to inquire how long electric railway companies can continue to increase their expenses of all kinds unless there is a corresponding addition in the average rate of fare. Manifestly the time will be reached—indeed has already come on many roads—when the rising tide of expenses will absorb all of the profits. Such a result is one which would be equally unfortunate to the employees, the company and the public, but is inevitable in many instances unless some radical improvement is made in the conditions surrounding electric railway operation.

Transfer Abuse the Great Problem

Chairman Stevens of the New York Public Service Commission, Second District, in an address made at Detroit recently, characterized the abuse of the transfer system as the great problem with traction companies in New York. What is true of New York in this respect is true of all sections of the country. It is the intent of the companies, and undoubtedly of the law also, to make the reasonable use of transfers legal and to make the abuse of the privilege illegal. How this application of the system is to be attained in practice in large cities as well as in theory, however, no one has yet been wise enough to determine. The transfers have been furnished by the companies, but the public authorities have not enforced the laws against their abuse. When it is understood that the solution is of just as much importance to the general public as to the companies, better progress may be made. Excessive burdens, such as those that result from widespread perversion in the use of transfers, deplete railway revenues and necessarily hamper the railway companies in rendering good service and earning fair returns upon their investments. Correction of the impositions of those who take unwarranted advantage of transfer benefits is a public service that may well engage the attention of the State commissioners.

Defining the Fields of High and Low Tension D. C. Lines

Mr. Evelth's recent paper before the Philadelphia section of the American Institute of Electrical Engineers is notable as the first comprehensive statement "with facts and figures" on the 1200-volt d. c. railway. The data given show the superiority of this higher potential over 600 volts for railway lines within a field ranging from a light interurban service

with stops every half mile and a schedule speed of 15 m.p.h. to the heavy service calling for stops every five miles and a schedule speed of 45 m.p.h. It will be seen that these upper and lower limits fairly coincide with those of most American interurban railways. Mr. Eveleth could have expatiated even further than he did upon the advantages of the wider spacing of substations permissible with the 1200-volt system. For instance, under most traffic conditions, 600-volt substations are just too near together to secure the best economy in attendance, but with an opportunity of placing them two or three times farther apart it would often be a simple matter to locate a substation at a passenger station where one set of attendants would answer for both. The author made no comparison with single-phase equipment because he apparently had in mind the use of even higher d. c. voltages than 1200 for interurban railways with city connections, and it cannot be denied that the interurban field affords the greatest possibilities for the use of 1200 and 2400-volt systems because these systems do not involve the complexities of mixed current operation. If this principle should be generally recognized as correct, the principal application for the single-phase system, as indeed Mr. Murray remarked during the discussion, would be for trunk line traffic.

Steam and Electric Traffic Agreements

In the past interurban roads have found it difficult to convince steam lines that the business of both had so many points of contact that concerted, harmonious action in traffic matters was desirable. One reason for the inability of the electric companies to impress their views upon the steam railroad companies has been that the limited field which each electric line has usually served has not given it sufficient standing to permit its officials to present a strong case when discussing rates with the steam railroad. The condition is rapidly changing, however, with the growth of electric systems, a fact which is instanced by a recent agreement made by the Illinois Traction System. This road has nearly 600 miles of interurban track and is handling more than 1500 carloads of freight each month. In addition, it operates hourly passenger trains, fast limited trains and a sleeping-car service. Its strong position from the traffic standpoint has just been recognized in a passenger-rate conference, which included the Chicago & Alton, Illinois Central, and Chicago, Peoria & St. Louis steam railroads, and the steam lines suggested that rates affecting passenger traffic in competitive territory should be maintained. Heretofore no recognition in this respect has been given the electric railway company, which in consequence has been at a disadvantage, because it was not a member of the steam line traffic associations. But at the recent conference a readjustment of passenger rates was discussed, whereby the Illinois Traction System can enjoy the same rates as steam lines in the local territory and receive a slight differential on long-haul business, commensurate with the conditions that exist. The result of the conference shows that all steam railroad companies do not look now upon traction lines as "pirates."

Public Service Commissioners

A great deal of attention is being given by the legislatures of different States to framing laws to organize new public service commissions or to amend the statutes under which they act, but experience has shown that the personnel of a commission is equally as important as the extent and scope of

its powers. In their work the members of such a commission are required to pass upon technical questions where an expert knowledge of the conditions which they have to consider is almost essential to enable them to reach correct decisions, yet the announcement of the establishment of one of the most recent of these commissions—that in Maryland—where there are three commissioners, was followed by the statement that positions on the commission had been offered to two lawyers and one newspaper man. So far as the published records of these gentlemen show none had any experience with the operation of steam or electric railroads nor of any of the other public utilities whose services they are to control, although this qualification would seem to be one of the most important to be considered. In Massachusetts, on the other hand, where the railroad commission is composed of three members, it has been the practice for a long time for the Governor to make his appointments so that one member of the commission shall have a practical knowledge of railroad operations, one shall be a business man and one shall be a lawyer. The statute under which the Wisconsin Railroad Commission acts provides that one of its three members shall have a general knowledge of railroad law and that each of the others shall have a general understanding of matters relating to railroad transportation. It is by no means improbable that the success of these two commissions in the adjudication of matters which have come before them has been due largely to this method of selection.

NECESSITY FOR REVISING BLANK FORMS

A periodical examination of the blank forms used by a railway organization is very desirable. One city railway has just reviewed all its printed stationery and found, not only a possible saving of \$5,000 in the cost of the paper and forms, but it has learned of many little details of its organization that can be improved. Such a large saving, of course, is only possible by a big railway, but scarcely any road can afford not to devote some serious attention to its operating blanks and record sheets. The study will no doubt be the means of suggesting simpler and better ways for handling some of the steps in routine work. This feature alone should make profitable the time spent in reviewing the forms.

Perhaps the best plan of undertaking this work systematically is for the heads of departments to analyze the forms as a yearly event. Advancements made in operating methods during one year often afford reason for a change in the manner of keeping the records. The primary purposes to be borne in mind in this criticism are standardization, simplification and elimination. A consideration of the blanks from these viewpoints will clearly show the responsible head of each department just how well the forms are serving their purposes and quite possibly will bring out more efficient methods for obtaining the desired information. So long as a blank is available for some step in the operating system, some one must be responsible for filling it out. A good way to gage the value of a blank is to ask: Will it save clerical work and will the information it requests sufficiently cover the needs of the case?

A form is justified as a part of an operating organization only when a number of employees are concerned in a given operation or when one operation is repeated many times. Notwithstanding this principle, which axiomatic, as an organization grows new forms accumulate until there is danger lest their real purpose is defeated.

Some observations upon this subject may be of value

elsewhere. Considering first the question of standardization, it is advisable to reduce all stationery to some multiple of 17 in. x 22 in., in which size all grades of paper may be obtained. This brings an economy in the purchase of material, eliminates waste at the printer's and makes it convenient for him to print a number of different blanks at one time. Also, with standard sizes the space for storing and filing is fully utilized. A good grade of railroad manila stock can be purchased in the open market for about 3½ cents per pound, and it is hard to justify the use of more expensive stock for general operating blanks. A railroad can well afford expensive stationery for outside correspondence if the inter-department blanks are printed on cheap paper. Very many forms now ruled in colors would serve equally well if printed in black ink. This would reduce the cost and the lines could be accented as desired by a variation in width or by the use of dots.

A good way to analyze a set of forms is to submit to each department head copies of all forms in which he or his subordinates are interested. The official then should consider each form from the standpoint of the coming year, noting his criticisms of it on each blank. At a general conference the entire system of blanks should be discussed as a unit. No blank should be used unless it will save clerical work and meet the needs more fully than would a written statement. We have seen a great many forms which by a critical study of this kind could be greatly simplified, if not eliminated altogether.

Blank forms are tools of the men who operate a road and the maxim, "No man should be a servant of his tools," is applicable.

INTERURBAN RULES IN IOWA

Revision of the standard code of interurban rules of the American Street & Interurban Railway Transportation and Traffic Association was the subject of a committee report presented last week at the annual convention of the Iowa Street & Interurban Railway Association. The report, which is printed elsewhere in this issue, was only preliminary and tentative as the committee was unable to complete its work of considering all the rules in time for the meeting. As far as the committee went, however, it recommended numerous changes, consisting for the most part, of the elimination of some rules which it considered useless, and the substitution in others of the phraseology of the standard code of steam railway rules of the American Railway Association. It will be remembered that at the time the standard code of interurban rules was adopted at the Denver convention, many members of the association objected to the rules offered by the committee, and urged the adoption, substantially as a whole, of the American Railway Association code. Those who have been trained under steam railway rules are naturally prejudiced in their favor; to them, the meaning is perfectly clear and any other wording seems confusing or unnecessarily explanatory. This was the attitude, no doubt, of the members of the committee of the Iowa Association who seem to favor the steam railway rules in preference to any others.

We believe, however, that the conditions of employment on most steam and electric lines, particularly as regards the apprenticeship served by the men, are so unlike as to justify a difference in the wording of the rules. Steam railroad conductors learn their duties by prior service for several years as brakemen and a locomotive engineer is promoted only after

a long period of employment in the round house and as a fireman. Knowledge of the rules on the part of these men is absorbed by long familiarity with them and many things which are not specifically stated in the rule book become second nature to a steam railroad employee. On the other hand, previous railroad experience is not a prerequisite for engagement as conductor or motorman on many electric lines; indeed, a large number of companies prefer men without previous training of this kind, provided they are otherwise fitted for the work and show an aptitude to learn. But such men must be told exactly what to do in the rules which are given them for their guidance.

A German professor once said: "It is never possible to overestimate the stupidity of your pupils," and this axiom applies in the framing of a code of rules for the instruction of any class of men who have had no extended experience in the occupation in which they are to be engaged. Hence, we believe that it is better to err in the direction of making the rules clear, even at the expense of some repetition and profuse explanation, and we hardly agree with the committee that the general rules of the standard code Nos. 1 to 32 "set forth a great many things which are in a measure an insult to the average intelligence of trainmen." A man must learn these things either when he is hired or when he is fired; and it is better to have these commandments in black and white in the rule book than to have them delivered by word of mouth from the superintendent. Later examples of rules which the committee considered were unnecessary to a man of ordinary intelligence were Rules 65 and 66, which define respectively a meeting point and a passing point. The terms "meeting point" and "passing point" are used frequently in the rules covering the movement of trains, and a different procedure is required when meeting an opposing train and when passing a train moving in the same direction. The terms in railway parlance are, of course, entirely opposite in meaning, yet they are so nearly synonymous to the beginner that their definition in the rule book seems advisable, so that there shall be no doubt as to their sense when employed in subsequent rules.

Substantially the only change in operating methods recommended by the committee was the modification of Rule 54 by the addition of a clause conferring on trains superiority by direction. The committee explains its position in recommending this change by stating that superiority by direction is not applicable in all cases to short lines, but that on an average interurban road the provision of superiority by direction has many advantages from an operating standpoint.

The action of the Iowa Association in appointing a committee to propose changes in the standard code is evidence of the interest which is being taken in this important matter. The present standard code by no means is perfect, but it is a good beginning, and fair criticism will promote future improvement. The committee of the American Association is collecting information regarding accidents caused by failure to observe or to understand rules now in effect on interurban roads throughout the country and, undoubtedly, will be very glad to have suggestions and criticisms such as are contained in the report of the committee of the Iowa Association. It is to be hoped that any others who have fault to find with the rules, as they now stand, will give the committee of the American Association the benefit of their views so that it can be guided intelligently in recommending at the convention next fall any changes which should be made in the present code.

NEW TURBINE STATION AT CINCINNATI

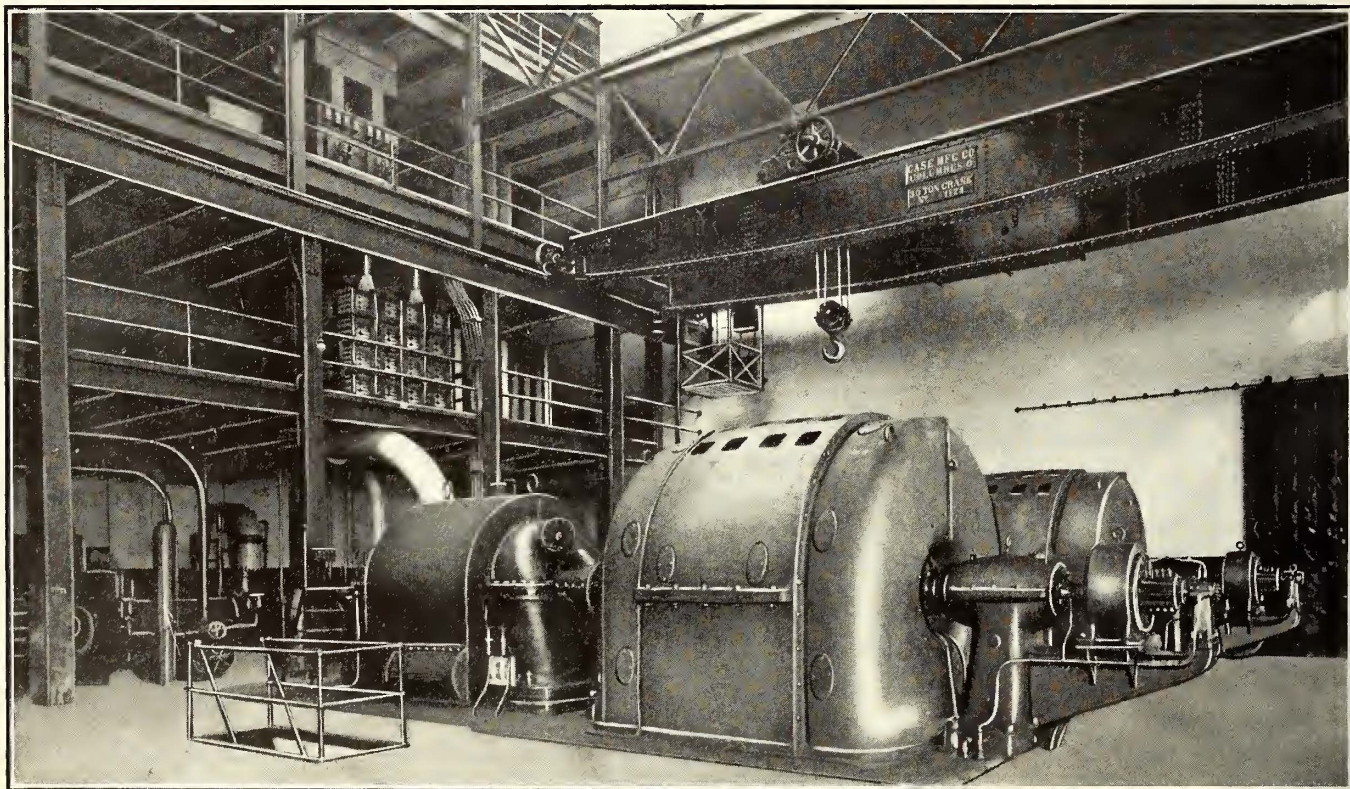
The Cincinnati Traction Company has just completed an 18,000-kw generating station at Pendleton, on the Ohio River, about 5 miles above the commercial center of Cincinnati. The company plans later to double the capacity of this plant by adding a duplicate section with three 6000-kw turbo-generator units. Because of the great variation in the level of the Ohio River, approximately 70 ft., the design and construction of the power-plant substructure and the circulating-water system involved especially noteworthy features.

GENERAL POWER SCHEME

Previous to the installation of the new Pendleton station, all the current for running the 700 cars normally scheduled was furnished by four d.c. generating stations located at advantageous points in Cincinnati. These stations are equipped with Corliss engines and large d.c. generators. The company is installing rotary-converter substations which are fed with power from the new Pendleton plant and thus the d.c. generators are to be released from active service.

The boiler-house structure is of a type very economical to construct. The most noteworthy feature is the arrangement of the coal bunker and roof. The bunker is carried on a single row of structural steel columns, spaced 20 ft apart, and standing parallel with the boiler fronts and 14 ft. therefrom. These columns are 33 ft. high and carry the bottom of the bunker structure 28 ft. above the boiler-room floor. They also support the main header and a steel runway directly thereunder. The coal bunker is 9 ft. wide at the top, 2 ft. wide at the bottom and 6½ ft. deep. It is made of riveted steel plates reinforced with structural sections. This V-shaped structure has two sloping webs which are riveted to a 24-in. I-beam laid flat for a base and are tied together at the top with I-section tension pieces supporting a coal-car track. The bunker structure serves as the ridge section of the roof over the firing aisle.

The roof over the boilers is supported by 10-in. 25-lb. I-beam rafters carried on 12-in. stringers resting on the tops of the vertical columns at the corners of the boiler settings. These rafters carry a reinforced concrete roof slab which has a pitch of ½ in. per foot. The flat concrete roof extends inwardly



Cincinnati Turbine Station—Interior View

The new Pendleton generating station is built on the same property with one of the older plants, which at first was equipped with five engine-driven d.c. generators and later with a 1500-kw, 6600-volt, three-phase, 25-cycle Westinghouse turbine unit. The old boiler plant has just been rebuilt and now its two sections will form a part of the ultimate station scheme. The new engine-room building will accommodate three 6000-kw units, two of which are now operating. When this plant is extended to its ultimate capacity of six 6000-kw units the property occupied by the older plant will be appropriated and occupied by the enlarged boiler house and turbine room.

BOILER PLANT

The newly rebuilt boiler plant furnishes steam for the old engine-driven units as well as the new turbo-generators. This plant comprises two sections, one of which has four and the other eight boilers. These sections are on opposite sides of the old engine room. A typical section across one bay of one of the two boiler houses is shown. At the present time the installation on one side of the center line only has been completed, but the company plans to complete the entire installation according to the design here illustrated.

from the boiler fronts 5 ft. 6 in. toward the bunker, and at its extremity supports a line of stationary sash which extends the full length of the boiler room. The upper ends of the sash are fastened against the top of the coal bunker. This long skylight furnishes excellent illumination in the firing-aisle space directly below. The type of roof designed for this boiler house is very economical to construct. The coal bunker supports the section over the aisle, and the flat concrete covering is carried directly by the boiler framework.

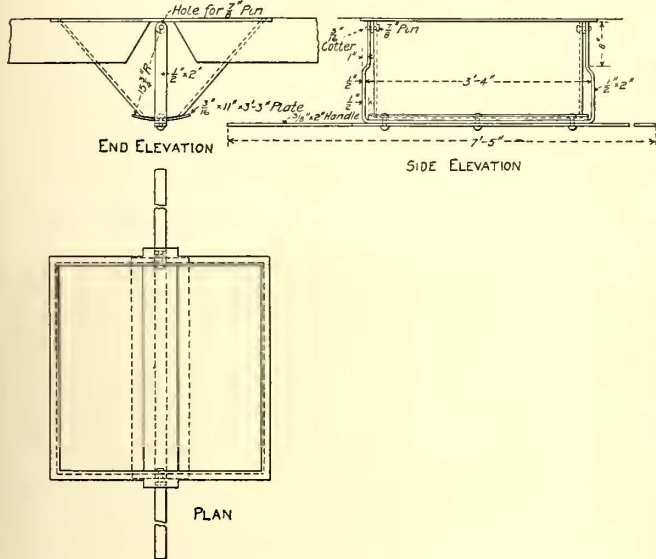
The present boiler equipment includes eight 525-hp B. & W. boilers with Murphy automatic smokeless furnaces and four similar boilers with Roney mechanical stokers. Foundations have been prepared for the installation of five more boilers in the section of the plant nearer the turbine building. Each boiler is equipped with a B. & W. superheater designed to raise the temperature of the steam 75 deg. above saturation at 160 lb. Each main steam header is 14 in. in diameter and is carried on the line of bunker columns between the boiler fronts. The boiler connections are 8 in. in diameter. The main steam headers of the two boiler houses are tied together with a line extending across one end of the old engine room. Thus

either or both boiler plants can supply steam to the reciprocating engine station or to the large turbines in the new station.

The combustion chambers exhaust into rectangular-shaped flues leading to two stacks 180 ft. high and 12 ft. in internal diameter. These stacks are made of radial brick furnished by H. R. Heinicke. The ashes from the automatic furnaces fall into hoppers below the boiler fronts and are drawn away in push cars. A much appreciated feature of this boiler plant is the large door leading from the basement space into the bot-

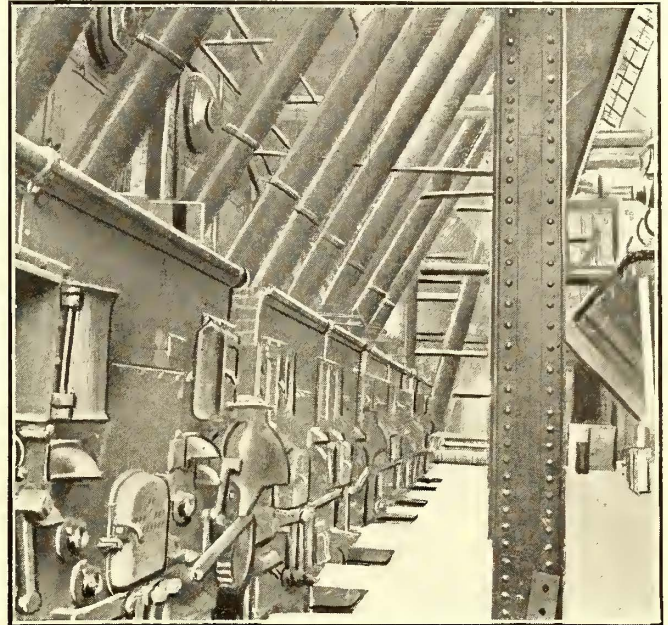
tom of the elevator house, so that all coal may be weighed before it is dumped into the bunkers.

Two views of the coal-handling plant are presented. One shows the elevator tower and bridge across the street and the other shows the roof of one of the boiler houses, with a car of coal standing on the track above the bunker. A sketch of the hopper valve designed for use in loading the coal cars is pre-



Cincinnati Turbine Station—Plan of Hopper Valve

tom of each boiler setting. These doors are large enough to admit a wheelbarrow for removing ashes and dust from the combustion chambers. The settings have a large space below the combustion chambers, and therefore frequent cleaning is not needed.

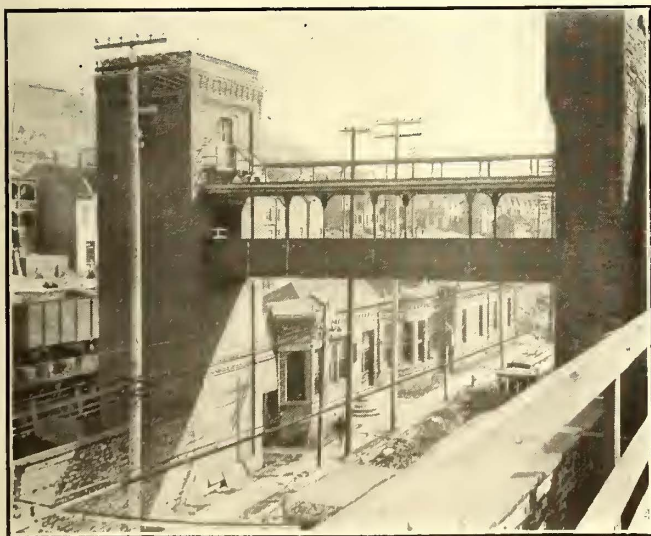


Cincinnati Turbine Station—Boiler Plant

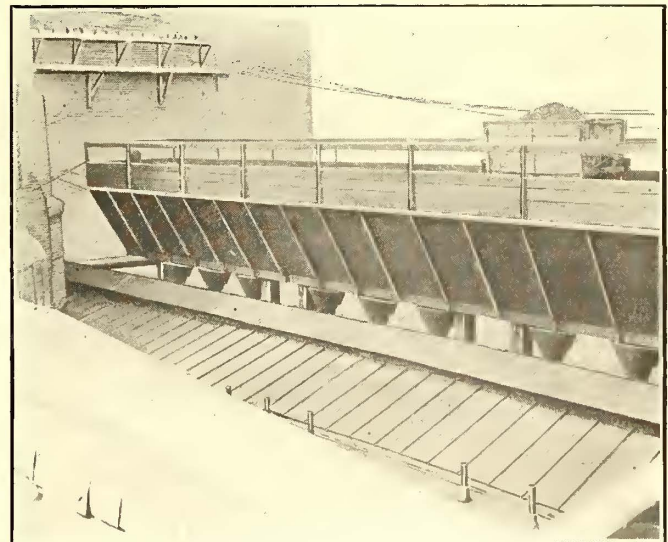
sented. This valve is of simple construction, and has given excellent satisfaction.

NEW GENERATOR BUILDING

The building which encloses the turbines, auxiliaries and electrical equipment was designed with a view to doubling the



Cincinnati Turbine Station—View of Elevator Shaft Bridge for Coal Tracks



Cincinnati Turbine Station—Coal Bunker Above One Boiler House

COAL-HANDLING SYSTEM

The coal-handling plant includes a Hunt industrial railway with two-ton side-dump cars, which are pushed along tracks extending over the tops of the bunkers. Coal is received on a steam railroad siding about 100 ft. away from one end of one boiler house. The push cars are loaded by gravity from a tunnel underneath the railroad siding and pushed onto the floor of a steam elevator, which raises the loads to the elevated tracks. These reach the boiler house bunkers over a plate-girder bridge spanning Eastern Avenue. A track scale is pro-

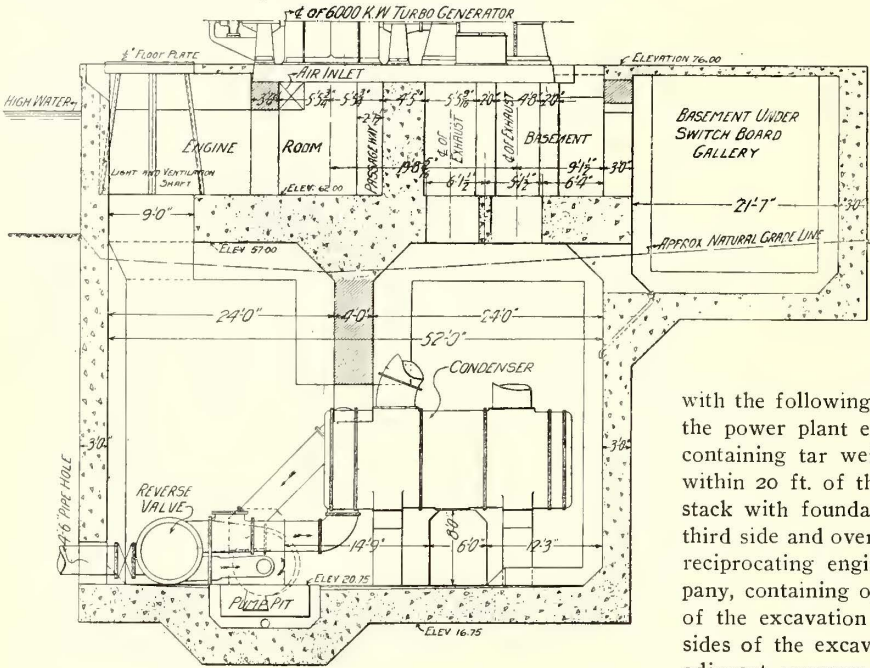
vided near the elevator house, so that all coal may be weighed before it is dumped into the bunkers. A vertical section through the entire plant from the coal-receiving end to the turbine building, including a profile of the circulating-water conduits, shows the general arrangement of the engine room, switchboard gallery, vacuum pump bays and the condenser pits. In designing this plant it was, of course, necessary not only to provide for an ample supply of condensing water at all stages of the Ohio River, but also to build water-tight basement walls to a height safely above the high-water level. Referred to the established datum, which is 3 ft.

below low-water level, the highest water level is 71 ft., and the turbine-room floor is at an elevation of 76 ft. The floor of the basement, which extends under the entire turbine room, is at an elevation of 20.75 ft. The basement structure between the engine-room floor and the basement floor has a depth of 55.25 ft., and of necessity had to be built to withstand water pressure for its full height.

The superstructure is built of brick and steel according to the plans of modern fireproof construction. The turbine room proper is 53 ft. wide and 71 ft. long in the clear. Its entire floor area is served by a 30-ton Case crane, with runways sup-

ported on the steel building columns at an elevation of 25 ft. thick and the floor is 4 ft. thick. Each condenser pit is 36 ft. 3 in. high from floor to ceiling. A typical longitudinal section of one of these basement subdivisions, which shows the turbine base and condenser in place, is presented.

The concrete floor which covers the condenser pits is 5 ft. thick, heavily reinforced with Kahn bars, as shown in an accompanying illustration. This extreme thickness and the heavy reinforcement were necessary because the floor over each of the three condenser sections of the subbasement serves to support the columns which carry the turbo-generators directly above it. Two vertical exhaust connections from the double-flow turbines pass directly downward through the two floors to the top of the condenser in the pit immediately below.



Cincinnati Turbine Station—Longitudinal Section of a Basement Subdivision, Showing Turbine Base and Condensers in Place

ported on the steel building columns at an elevation of 25 ft. above the floor. The crane is built with a wide bridge to provide for long drums on which there is sufficient cable for a lift of 80 ft., thus making it possible for the crane to handle the condenser equipment in the pits 55 ft. below the turbine-room floor. The roof trusses of the turbine room are 33 ft. above the floor. The roof is of reinforced concrete. A skylight 22 ft. wide extends the full length of the turbine room roof.

Facing the turbine room and opening onto it is a series of four balcony bays, one above the other. The lower bay, which is at the turbine room floor level, contains the large dry-vacuum pumps; the next two bays above contain the high-tension busbars and switchboard apparatus, and the upper bay encloses the lightning arresters and outgoing high-tension leads, a vacuum header and a supply tank for gland water. Ventilation of the engine room is had through large louvres in one side of the upper bay.

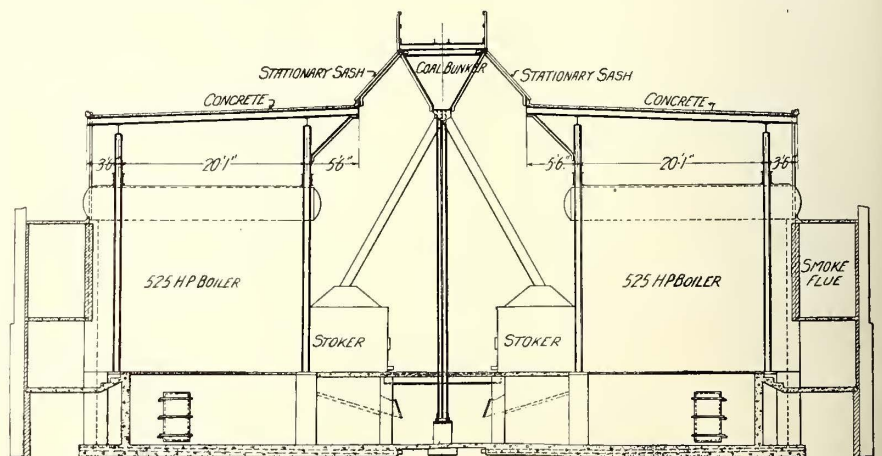
FOUNDATION WORK

The turbine room substructure is a massive concrete box subdivided by a heavy floor which forms an upper and lower basement. The upper basement is used as a valve room and for ventilating chambers. The lower basement is subdivided into three sections, each 52 ft. long by 21 ft. wide, and occupied by the condenser equipment of one 6000-kw turbo-generator, which stands directly above it on the machine room floor. The

with the following obstacles: Within 20 ft. of the river side of the power plant excavation is a steel tank 75 ft. in diameter, containing tar weighing 8000 tons. On the opposite side, and within 20 ft. of the brink of the excavation, is a 200-ft. brick stack with foundations extending 25 ft. below grade. On the third side and overhanging the excavation is one wall of the old reciprocating engine station of the Cincinnati Traction Company, containing operating machinery. Thus the chief problem of the excavation work was that of satisfactorily bracing the sides of the excavation against the lateral thrusts of the three adjacent pressure-producing structures.

After consideration of the many methods of excavating, it was decided to open the entire basement area, 70 ft. x 85 ft., and take out approximately half of the material, or about 6000 cu. yd., by working downward within the area of an inverted pyramid. Thus the natural slope served to withhold the side thrust while one-third of the material was being removed. After this had been taken out it was necessary to brace the entire excavation as the work proceeded. The bracing was done

by starting at the top of the excavation and placing a series of timber frames built of 12 x 12-in. sticks, having crossing frames in the same plane so as to maintain rectangular openings 10 ft. square in each frame. For the first half of the depth excavated these frames were spaced every 5 ft., and for the remaining half, where the great pressure from the adjacent structures developed, it was necessary to introduce these heavy frames over the entire area of the excavation at a vertical spacing of 2½ ft.



Cincinnati Turbine Station—Section Across One Bay of Two Boiler Houses

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The excavation was carried down to bedrock and a 5-ft. depth of this rock was taken out, the final level being approximately 55 ft. below natural grade and 70 ft. below the high-water level of the river. During the progress of the work, and after the concrete walls had been brought up to grade, the Ohio River reached the flood stage, and although neither leakage nor any perceptible damage developed, the entire excavation was filled with water to counterbalance the thrust from the outside. The water afterward was pumped out without difficulty.

A total amount of steel reinforcing material of 250 tons, consisting of twisted bars in the walls and Kahn bars in the floors and other spans, was used in reinforcing the 6000 cu yd. of concrete deposited in the substructure of this plant. The entire work of excavation and placing the concrete was completed in a period of five months by the Falkenau Electrical Construction Company, Chicago.

TURBINES

The present plant is designed for three generating units, two of which are now installed. These units are Westinghouse double-flow, 1500 r.p.m. turbines and 6000-kw, 6600-volt, 3-phase, 25-cycle generators. Each turbine has an independent 14-in. steam connection from the main header which extends between the two boiler plants. Two exhaust connections from each unit lead directly downward through suitable openings in the basement floor to the condenser in the subbasement. The back-pressure valves and the free exhaust connections are located in the engine room basement. The free exhaust lines are 36 in. in diameter, and lead to a common pipe carried up one corner of the switchboard gallery section and terminating above the roof. The back-pressure valves are of the Chapman type 48 in. in diameter, two for each turbine, and are motor-operated.

The turbines are spaced 24 ft. between centers, and the centers of the end turbines are 10 ft. 6 in. from the end walls of the building. Each turbine carries a 50-kw, 125-volt exciter on an extension of its main shaft. The speed of the turbines is remotely controlled from the switchboard.

The turbine generators are cooled with air taken directly from the engine room through openings in the top half of the casings. Fresh air enters the engine room through a row of louvres 4 ft. high, extending across the building just under the room of the switchboard gallery. After it has passed through the generators the air is discharged through an opening in the floor into a chamber in the engine room basement. This room is connected with the outside of the building by a row of louvres, one under each window on the river side of the building.

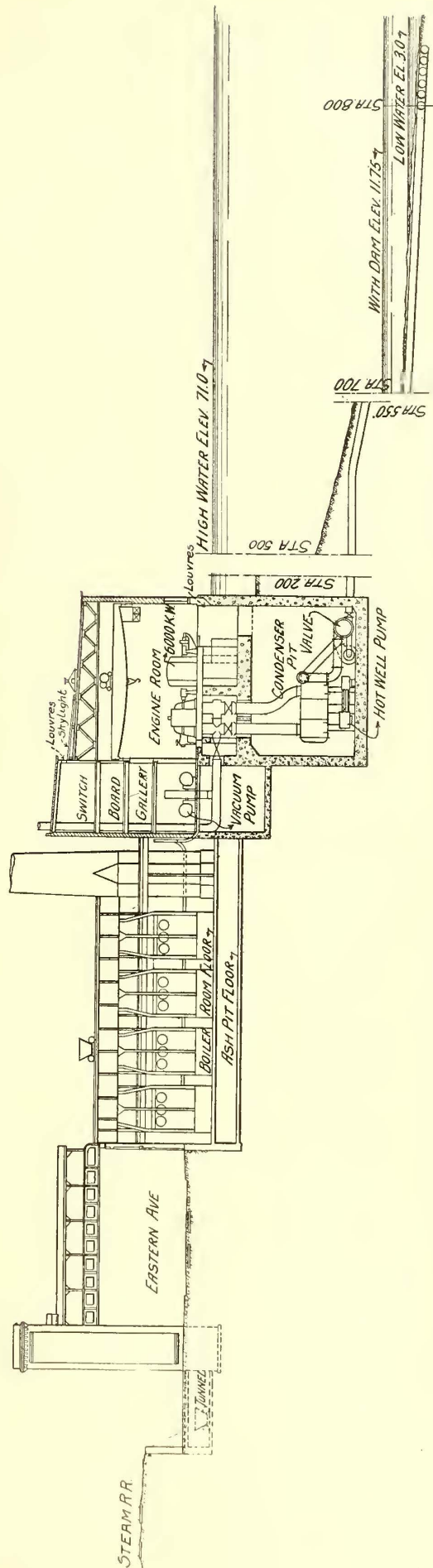
ELECTRICAL SWITCH GEAR

The electrical switching apparatus of the new Pendleton power plant is centralized in a Westinghouse remote-control benchboard with edgewise instruments. This board is located on the second balcony, from which point the operator has an unobstructed view of the machine room floor. All of the switches regularly used are motor-operated and have control buttons and pilot lamps on the bench board. Control buttons also are provided for the generator circuit-breakers, electrically operated field switch and electrically operated turbine governor. The board is in two sections, each complete for one generating unit.

High-tension busbar compartments also are installed on the second balcony. Generator buses, group buses and a ring bus are all interconnected with type C non-automatic electrically operated switches. Two feed lines are taken off each group bus and are controlled by type C electrically operated automatic circuit-breakers. All of the large oil switches and circuit-breakers may be isolated by opening knife disconnecting switches.

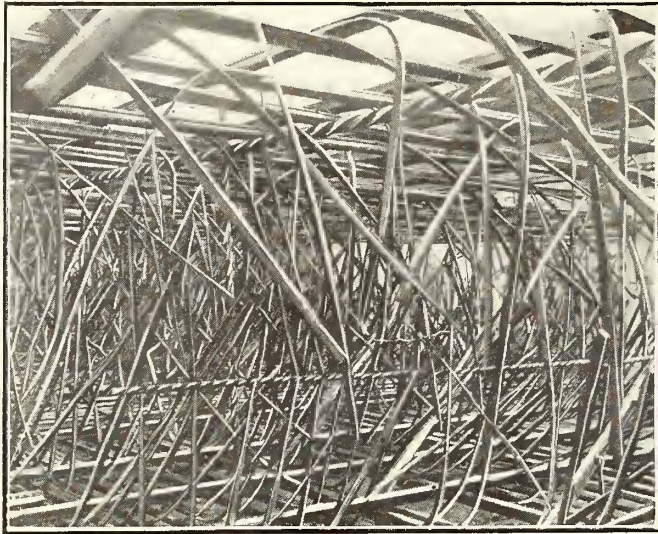
The switch cells stand on the first electrical balcony in two rows directly under the busbar structure, which is on the second balcony. This arrangement permits a simplified scheme of vertical connections between the buses and the switches. Each conductor is enclosed in a concrete septum.

The outgoing feeders pass upward through vertical bus



Cincinnati Turbine Station—Vertical Section, Showing General Arrangement of Plant, Also Circulating Water Conduits

structures and through the floor to the roof over the third electrical gallery, thence horizontally to outlets through the station wall. Three outgoing three-phase feeders are installed. A choke coil is inserted in each phase of the outgoing feeders, and each also is protected by a Westinghouse Type E electrolytic lightning arrester with a horn gap. A view of the lightning arrester installation, showing the method of mounting the



Cincinnati Turbine Station—Reinforcement for 5-Ft. Engine Room Basement Floor

horn gaps on a wooden framework, and the arrester jars as installed in individual trays on the pipe rack beneath, is presented.

CIRCULATING WATER SYSTEM

One of the most noteworthy features of this large turbine station is the method adopted for obtaining circulating water from the Ohio River. Because of the great expense for installing the usual type of intake well, screens, tunnels, etc., and providing for handling water varying in level practically 70 ft., there have been very few large generating stations built along the Ohio River. The method used at this plant is said to give good service, notwithstanding the fact that its cost is far below that for the installation of the more common form of intake.

Essentially the circulating water system for each unit is made up of two 36-in. pipes alternately used for intake and discharge, a reversing valve for changing the direction of flow, and an engine-driven circulating pump. The pipes leading to the river are 650 ft. long and extend nearly 200 ft. outward from the shore line at low-water level. Each has a horizontal right-angle bend at its extremity and an unscreened bell mouth. The six bell mouths point downstream, and are anchored in line by heavy wooden stringers and 12-in. piles driven into the bed of the river. The ends of the pipes are 5 ft. apart on centers, and following government regulations, no part of a pipe or its flanges is less than 2 ft. below the bed of the stream.

At the power station each pair of pipes enters one of the condenser pits close to the floor. Gate valves connect the two pipes in each condenser unit with a reversing valve. This valve is cylindrical in form, and is 6 ft. in diameter by 12 ft. long. Circulating-water connections are made on the river side of the valve, and pump and condenser connections on the other side. By shifting the position of the valve piston, the direction of flow of the water in the entire circulating system is changed. The valve piston is moved in about 55 seconds' time by a 12-in. hydraulic plunger. Cooling water is circulated by a 36-in. American Well Works centrifugal pump for each condenser. These pumps operate at 250 r.p.m. and are driven by tandem-compound Ball engines. Each pump has a capacity for handling 25,000 gal. of water per minute.

The success of this circulating-water scheme depends upon the performance of the reversing valve. With the intake and

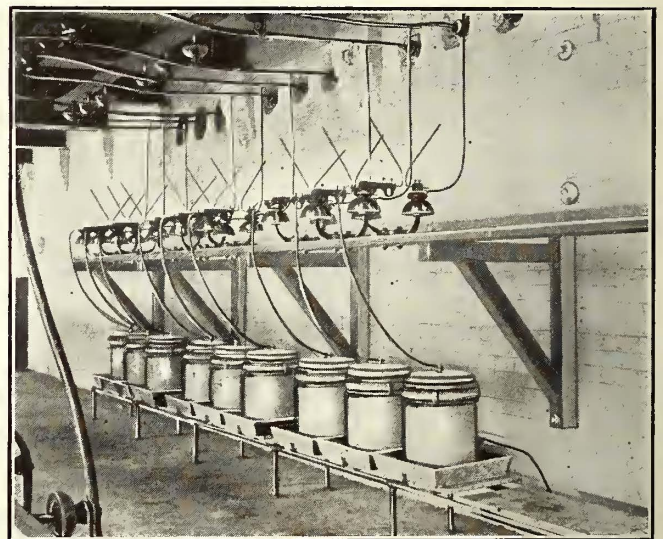
drift matter only by being pointed downstream, it is possible for foreign material to be drawn in with the water. The great discharge pipes open to the river and being protected from length of these pipes, however, provides against heavy bodies reaching the reversing valve, but smaller matter may reach the condenser tubes. When the condenser begins to clog and it is found impossible to maintain a uniformly high vacuum, the reversing valve is thrown over and the flow through the condenser and the circulating-water system is reversed. Thus the foreign material is forced back into the river and fresh water is drawn in through the pipe formerly used for discharge. It is stated that when this system was first put into service it was necessary to reverse the flow two or three times a day, but now that the bed of the stream near the ends of the pipes has been cleared, a high vacuum can be maintained with a reversal of flow only once in two days. Normally the circulating pumps lift the water about 14 ft. In times of flood there is a head of nearly 45 ft. on the pumps.

CONDENSER EQUIPMENT

Each turbine unit has an independent condenser installation excepting dry-vacuum pumps, two of which serve the entire plant. The condensers are of the Wheeler surface type, with 25,000 sq. ft. of cooling surface made up of 4800 1-in. tubes. Each condenser rests on concrete pillars, which support it at a height of 8 ft. above the floor of one of the basement subdivisions. The exhaust steam connections are practically straight and vertical from the outlets under the turbine casings to the top of the condensers. Daylight is admitted to each of the condenser pits through a hatchway extending from the machine room floor down through the basement and through the basement floor, which forms the ceiling of the condenser rooms. Each of these hatchways is made of No. 12 plate reinforced with angles. All three of the condenser pits drain to a common sump, which is emptied by a 3-in. Lunkenheimer steam ejector. The hot-well pumps are located in the condenser pits close to the condenser foundations. These pumps are of the Boytts-Porter type, with cylinders 20 x 20 x 48 in.

VACUUM SYSTEM

The dry-vacuum pumps are installed under the switchboard gallery in a bay on the machine room floor. Each vacuum pump is made up of a 16 x 42-in. Hamilton-Corliss 50 r.p.m. engine, to which a crank, connecting rod and a Laidlaw-Dunn-Gordon

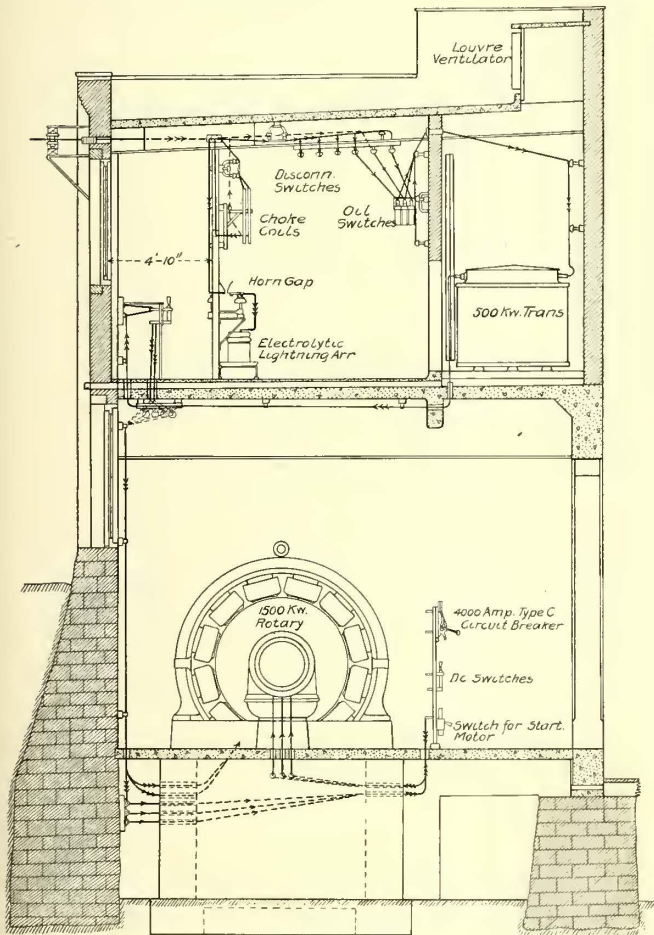


Cincinnati Turbine Station—Electrolytic Arresters on Out-Going Feeders

vacuum cylinder 36 x 60 in. have been added. The vacuum cylinders have semi-rotative valves operated similarly to the Corliss exhaust valves.

For removing the air from the intake line and elevating the water from the river to prime the centrifugal pumps, a connection is made from the circulating system to the valve chamber on each end of the vacuum pumps. When the piston has

reached the end of its stroke the rotative valve closes the opening on the suction side and establishes communication with the discharge side; then air is drawn into the cylinder from the circulating system. That is to say, after the pump has exhausted the air from the condenser it then exhausts the air from the circulating system, and does this without reducing the volumetric capacity of the pump for removing air from the condenser. The scheme of performing two services with the vacuum pump, however, does impose additional work on the steam side of the unit, because it is called upon to compress a greater quantity of air to atmospheric pressure. It is stated that when carrying 29.4 in. vacuum in the condenser the vacuum in the circulating system adjusts itself to the amount necessary to raise the water from the river to the circulating pump, depending upon the stage of the river.



Cincinnati Turbine Station—Transverse Section of Hunt Street Substation

The dry-vacuum pumps are protected against water charge by the use of a 14-in. vacuum header installed 115 ft. above low-water level and 40 ft. above the main floor. The vacuum header, from which the vacuum pump exhausts the air, is connected with the suction side of the large reversing valves which form an essential part of the circulating-water system. The vacuum header is drained by gravity to a water seal in the basement, 90 ft. below. This seal is made of a 10-in. pipe 18 ft. long, into which the 4-in. drain pipe has been inserted. The use of the vacuum header and connections with the circulating-water system not only permits the water to be lifted for priming the pumps, but is of principal importance in connection with the scheme for reversing the flow through the intake and discharge pipes, since it prevents the circulating pumps from losing water when reversing under load.

FEED WATER HEATERS

The feed water heaters are of the open type of 3000 hp each, and were made by the Pratt Iron Works.

NEW SUBSTATIONS

Two substations equipped with two 1500-kw rotary convert-

ers each, and one substation with one similar rotary, have recently been put into operation, receiving current from the new Pendleton power plant. As earlier stated, the substation equipment has been installed to replace d. c. generating machinery. A transverse section of the substation built at the site of the old Hunt Street power plant is presented. The equipment of this substation includes two 1500-kw Westinghouse three-phase rotary converters on the first floor and an installation of 500-kw, oil-insulated transformers in a fireproof room on the second floor, adjoining which are grouped the high-tension switching and lightning protection apparatus. The electrical equipment is all of the remote-control type, operated from a control desk similar in form to that of the Pendleton station.

Attention is called to the transformer arrangement and the method of ventilating the transformer vaults. A constant current of cooling air is delivered under the transformers by a row of 4-in. pipes laid in the concrete floor and extending outside the building. As the air about the transformers is heated it rises and passes out through louvre ventilators installed on the roof. The upward movement of the heated air draws fresh air in through the pipes, and this is discharged directly under the transformer cases. The 4-in. tubes laid in the floor are given a slight fall away from the transformer vaults, and so will quickly carry off any oil that might boil out of the transformers should they catch fire. This feature reduces the fire risk to a minimum.

CHANGE IN ROLLING STOCK STANDARDS AT RICHMOND, VA.

The Virginia Railway & Power Company now operates about 320 closed and open cars of various types, but it is now planning to make standard a semi-convertible car with maximum traction trucks and two 65-hp motors. These cars will be similar to the last pay-as-you-enter car of the Metropolitan Street Railway Company of New York, as described in the *ELECTRIC RAILWAY JOURNAL* for Dec. 5, 1908. With this end in view, the company has ordered 20 double-end cars from The J. G. Brill Company. The new cars will have 32-ft. bodies, 5-ft. 9-in. platforms, closed vestibules and the regulation exit and entrance doors. All of these cars will have the prepayment fixtures made under the license of the Pay-as-You-Enter Car Corporation. The question whether two-motor or four-motor equipment should be used in these cars was a very important one as it was feared that, owing to the narrow-grooved rail used in Richmond, sufficient traction could not be secured with two 65-hp motors. After making a number of tests for more than six weeks under the worst track conditions in Richmond in regular service operated in winter, it was found that two 65-hp commutating-type motors with single-motor, center-bearing trucks were fully capable of giving the desired service. The trucks are of The J. G. Brill Company 39-E type. It is the intention to make this type of two-motor equipment standard for city lines, while the equipments with four 50-hp motors will be transferred to the suburban and interurban service.

Aside from the 20 new double-end cars mentioned, the company has available 20 single-end, double-truck semi-convertible cars with Detroit platforms and 30 other cars which can readily be converted to pay-as-you-enter service. A long step toward the adoption of the pay-as-you-enter system has been made by enforcing a rule that the front platforms must be used only for exit. This order has already cut down fare losses and accidents to quite an appreciable extent. The company had little difficulty in bringing about this change in operation as it advertised its purpose for some time by taking considerable space in the newspapers, as well as in the cars. An unlooked for, but welcome, result of the new rule is that few people now ride on the front platform, and there is, therefore, much less interference with the motorman.

The Baku municipality, Russia, is said to have voted \$425,000 for the purchase of the local street railway system. It is the intention to electrify the system and build several extensions.

SEVENTH ANNUAL MEETING IOWA STREET & INTER-URBAN RAILWAY ASSOCIATION

The Seventh Annual Meeting of the Iowa Street & Interurban Railway Association was held at the West Hotel, Sioux City, Ia., April 21, 22 and 23. The Iowa Electrical Association held its annual meeting at the same time and the combined registration of members and supply men was about three hundred. At the closing session of the convention the following officers were elected to serve during the coming year: President, L. D. Mathes, Union Electric Company, Dubuque; vice-president, J. F. Porter, Tri-City Railway Company, Davenport; secretary, George W. Macartney, Des Moines City Railway. The next convention will be held at Davenport, Ia., in April, 1911.

On the morning of the first day both associations listened to an address on "Public Service Commissions," by J. U. Sammis, member Iowa State Senate, Le Mars, Iowa. The speaker discussed the public service commission law as now being considered by the Iowa State Legislature. It was held to be one of the most important issues of the time. The speaker gave his reasons for believing that a public utility law should be enacted and why it would prove of benefit to those interested in public service corporations. It was a good thing as a business proposition and still better when considered from the moral standpoint.

A public service commission would be of immense value because it would remove public utilities from the field of politics. One of the worst features of public utility work in Iowa, as well as other States, had been that, often of necessity, the railway and lighting companies had been forced to protect themselves by getting into politics. Mr. Sammis said that during the last eight years more than 800 laws had been passed in different States to regulate corporations. These laws might be grouped as follows: First, to establish commissions; second, to amend the first laws; third, to define freight and passenger rates; fourth, to regulate service; fifth, to regulate corporate affairs, and sixth, public safety measures. In five years 15 railway commissions had been appointed. These might be graded into three classes—those with the power to revise rates; those with the power to take the initiative, and, lastly, the commissions with less power.

Considering the proposed Iowa commission, Mr. Sammis held that it should be strongly established and that the law should so be framed that the commission might accomplish its aims and that its orders would be recognized. If the railways were to be controlled, the means for doing so should be firmly established and the control fairly executed.

An important question when considering public service commissions was: Should the rates be made by local councils or by non-partisan commissions? The final results of a good law would be improved service, publicity of corporate affairs and stability of investment; also, free service would be abolished, as well as rebating, and this should eliminate the feuds frequently occurring between citizens and managers of public service corporations. The public service commission law of Wisconsin had done a great deal of good in showing many small companies the detailed cost of their operations, as well as in eliminating rebating. It certainly was true that if rebating was not correct in principle for steam railway use, it should have no place in other public utility operations. The requirements for uniformity in accounting methods and the publication of statistics would do for the companies what a trust company does for its subsidiary organizations; it would put managers in competition with each other.

Mr. Sammis said that when a new law had taken the corporations out of politics, then an important step toward better conditions would have been made. The uniformity in accounting and the regulation of corporate affairs and services would make investments more valuable because then they would not be jeopardized so frequently by local limitations.

Among the objectors to such a new law were those who gained their livings by political work; objections from such should be judged on their merits. Others objected to the grant-

ing of perpetual franchises. Mr. Sammis held that a perpetual franchise would be of benefit to the people giving it, providing the corporations were under impartial regulation. Certainly such a franchise would make its securities more stable and protect the invested capital. Moreover, a franchise would not be perpetual unless the company did not comply with the orders of the regulating body, and so long as a company did obey, it should be protected. Some reasons for his approval of the indeterminate franchise were because the real purpose of a public utility was to serve the public. To do this most effectively the company should be a "public" monopoly as contrasted with a private monopoly.

Mr. Sammis reinforced his arguments with statements of the results accomplished by the Wisconsin and New York commissions, citing the many complaint cases—nearly 100 a month in Wisconsin—that were settled out of court. He held that in discussing the subject of commissions and the advisability of their establishment, the moral question of fair treatment of both parties was greater than any business one. He believed that a well-established, carefully chosen commission, made up of competent experts, would be best for the people of Iowa and the corporations. Believing this, he urged the public service companies to favor the proposed laws and assist in educating the people to the same idea.

FIRST SESSION, RAILWAY ASSOCIATION

P. P. Crafts, president of the association and manager of the Iowa & Illinois Railway Company, presided at all sessions. The report of the committee on operating rules was read by J. A. Du Bois, Cedar Rapids and Iowa City Railway. This was a report of progress, and on motion the committee was instructed to continue its work. A digest of the report is published elsewhere in this issue.

L. D. Mathes, secretary and treasurer of the association and general manager Union Electric Company, Dubuque, reported that the finances of the association were in good condition and distributed to the members bound volumes of a report of the last annual meeting. The report contains 113 pages.

President Crafts then presented his address to the association. An abstract follows:

PRESIDENT'S ADDRESS

"It is difficult to realize that a year has elapsed since this association met at Cedar Rapids, and enjoyed three days of profitable meetings and the hospitality lavishly bestowed by the various electric public utility companies and by their friends. In the meantime many history-making events have happened in the electric railway field.

"The forcing of the 3-cent fare upon the Cleveland traction lines is one of the most important events. Repeated exposition by the companies that the 3-cent fare cannot produce a reasonable return upon the investment, for reasons well known to the owners and operators of street railway properties, seemed to have no effect upon the majority of the Cleveland voters, and they apparently yielded to that sentiment that is all too common at the present time, namely, 'force the situation on the company; it will work out its salvation in some way.'

"The public demands constantly better service, better equipment and better track. These demands must not only be met by heavier expenditures, along the line of improvement, but the cost of all materials and supplies, and of all labor entering into the construction and maintenance of electric railways is constantly increasing, and at a greater ratio than the increase in railway earnings.

"The electric railways are bound in their unit of earnings by the terms of their franchises or by the ruling of State, or of Federal Commissions. Generally speaking, this unit is automatically reduced as traffic increases, either through further rulings of the bodies mentioned above or by concessions granted by the companies upon demand, and in a few cases voluntarily. On the other hand, general lines of business are not bound by anything as to the prices which shall be made, except by the leveling influence of competition, which in many cases is materially reduced by associations that divide territories and fix

prices, only too often to the maximum the market will bear, regardless of the cost to the agent, manufacturer, etc. Naturally, therefore, the electric railways must endeavor to maintain passenger fares and freight tariffs at as high a plane as possible rather than to decrease them.

"No doubt the campaign of education of the public that is now being conducted by the public utilities of the country will sooner or later have a beneficial effect and they will be permitted to conduct their business under less trying conditions than at present and enjoy better returns. Unless, however, this condition prevails within the near future, the confidence of investors, which has already been severely shaken, will be disturbed to such an extent that development of public utilities will be brought practically to a standstill, with a consequent loss to communities whose welfare depends greatly upon the growth of the utilities located therein. But those who own and operate properties should not cease for a moment their efforts to further educate the public regarding the conduct of their business and to do so in a frank and open manner.

"The prepayment type of car for street railways is gaining favor every day principally because it has caused an appreciable increase in the earnings of roads adopting it, and it has minimized step and platform accidents. The full field of usefulness of this type of car has not yet been fully determined, and no doubt as improvements are made and its first cost lessened it will be more generally adopted by the smaller roads. We are fortunate in having with us a representative of one type of prepayment car, who will enlighten us on a few of the points mentioned above.

"I desire to call your particular attention to the fact that most of the papers to be presented before this convention cover a line of subjects which in the past have not received the consideration which perhaps they have deserved.

"Very little attention has been given to the man who in case of personal injury to passengers or to the public has it in his power to work great good or serious damage to his client. I refer to the company surgeon. He must be a man having business and executive as well as surgical ability, quick to act, positive, and diplomatic. I commend your careful attention to the very able paper on that subject to be presented here.

"Great progress has been made in the past few years in the character of track and overhead construction, both in paved streets and on interurban rights-of-way. The standard is being constantly raised from year to year, and what was considered standard practice five or six years ago is now almost obsolete. City track construction is becoming more simplified by the use of T-rail properly installed, the placing of long, easy curves, high-grade special work, etc. Interurban construction is conforming more closely to accepted steam railway standards for high speed and heavy traffic, and the more extended use of catenary overhead construction shows great improvement in that direction. Joint papers on this subject will be presented by gentlemen thoroughly conversant with and well able to handle the subject in a manner which should be very interesting and instructive to the delegates.

"We are now facing a situation which is becoming more urgent every year, and which may be forced upon us at some time in the future, namely, that of providing for depreciation of our properties beyond normal maintenance. Two very knotty problems in connection with this matter are, what basis should be used, and what amounts should be allowed on the various portions of property and equipment in making up depreciation charges. So far there seems to be as many different opinions as there are electric railway properties in the country, but I trust that delegates to this convention may at least get started on some basis which will be accepted by all of the companies in this State. The paper on this subject will be presented by a gentleman whose experience in this line eminently fits him to start us in the right direction.

"Papers will be presented on the question of "Fares," both city and interurban, and a paper on the "Prepayment Car," which will be presented by gentlemen thoroughly well fitted to handle the subjects.

"Many of the members of this association are fully conversant with the work which has been, and is being done, by the American Street & Interurban Railway Association, and the benefits that are being derived by its members, by State associations directly and indirectly, and by the electric railway interests of the country in general. The scope of work of that association has enlarged tremendously in the past few years, and the association should be encouraged by having all electric railways of the country as active members and many of the officers and employees of said property as associate members. I take this opportunity to ask you to consider this matter carefully and to lend to the American Street & Interurban Railway Association all possible assistance by becoming active or associate members.

"Manufacturers and supply houses most certainly co-operate with this association more heartily as each year passes, as is evidenced by the number of their representatives at this convention and the number and class of the exhibits. I trust that you will accord to these representatives and their exhibits the full measure of attention which they so richly deserve.

"Where has this association held a convention before where we have received more courtesies, have been so well provided for, and have been given a better program of general and special entertainment than has been provided by the street railway and the lighting interests of Sioux City, aided by their friends. It will be impossible for us to show our appreciation except in a very feeble way, but I beg to assure our Sioux City friends that our appreciation is warm and deep.

"The officers of your association have not been called upon to handle so many matters in the past year as the year immediately preceding; they have, however, been accorded full support of the member companies, and I want to thank those gentlemen and the members of the various committees for their hearty support and efficient attention to the matters placed before them."

MEDICAL DEPARTMENT

A paper on the medical side of the claim department was read by Dr. A. J. McLaughlin, Sioux City. Dr. McLaughlin laid special emphasis on the value of the company surgeon, comparing him to the claim agent and lawyer. The steam railroads maintained well-organized surgical departments, and therefore their value must have been established. If a company has a surgeon regularly employed he can more than earn his pay in consultation with the heads of departments. He will be of inestimable value for consultation purposes, whether or not he is called upon actually to handle the injured claimant. Dr. McLaughlin said that as the electric railroads grew older and as business increased they would look more and more at the scientific handling of damage cases.

In introducing the discussion, Mr. Crafts spoke of the importance of the subject from the dollars and cents point of view.

Arthur W. Gross, general claim agent, Omaha & Council Bluffs Street Railway, said that his company did not maintain a medical department. He thought that the most important point brought out by the paper was the need for greater care in employing motormen and conductors. During the past two years he had directed the trial of more than 50 lawsuits and had not called on a medical expert for testimony. It had been said that the testimony of the medical men who represent a company has but little weight with the jury, although the jurors believe them to be honest. Based on this opinion, Mr. Gross had saved the company considerable money by eliminating expert medical witnesses. He felt that the attending physician usually would give a fair report. In 90 per cent of the accidents the company was not liable and therefore should not bear the medical expense. The Omaha trainmen had positive instructions to call the nearest physician in an emergency, and he would be kept on the case until the arrival of the police ambulance with its surgeon. By following this method the company did not get into difficulty with the doctors and the hospitals. In a liability case the company assumed the bill of the medical man and made a settlement with the patient. Considered from the non-humanitarian viewpoint, he did not feel that the company should be

put to any expense in non-liability cases, and so it merely provided first aid.

J. P. Walters, Tama & Toledo Railway, was connected with a small road which had injured but one passenger and but three or four employees. This company had been using the first available physician, and it included the physician's fees in the settlement. Mr. Walters realized the importance of having a medical department for the examination of employees and also held that in choosing an employee the home conditions of the applicant should be taken into account. Good home surroundings for the employees would have much to do with the prevention of accidents.

Mr. Crafts told of two instances which had firmly impressed him with the value of thorough medical examinations. One applicant made a good appearance and passed the mental examinations high, but the medical examiner found that the applicant had a weak heart. Another man appeared to have an excellent physique, but on examination it was found that he was very slow in perception. The Illinois & Iowa Company had a surgeon at each end of its line, but the employees were all examined at the main office.

F. J. Hanlon, Mason City & Clear Lake, said that his company employed a physician, and also an eye and ear specialist in examining men. The steam roads had concurred this to be good practice, and therefore he held it to be of more value for the electric roads, with their shorter headways. Mr. Hanlon's company furnished a surgeon for all accident cases, whether liable or not, and thus obtained the good will of the public. In very flagrant cases of negligence, after the first aid had been given, the claimant's friends, surgeon and hospital were notified that the company would not meet the bills for the medical attention. Mr. Hanlon's company called medical men representing the company for witnesses in trial cases.

F. McDonald, Waterloo, Cedar Falls & Northern, said that his company had adopted some methods similar to those used in Omaha. Preference was given to two or three physicians, but the trainmen were instructed to get the first doctor available in an emergency. When cases were being tried the company seldom called medical experts. In 15 years' experience Mr. McDonald had always found it possible to get a fair statement of the facts of an accident case from a physician or surgeon called by the claimant. In liability cases Mr. McDonald's company protected the physician's bill, and in all cases the bill was protected if the company had called the physician. Referring to the medical examination of trainmen, Mr. McDonald said that very careful examinations were made by the superintendent, using charts and color tests for eyesight and the usual watch tests for hearing.

TRACK CONSTRUCTION

Wm. A. Heindle, Tri-City Railway Company, read a paper on city railway track, which was published in last week's issue. In discussing this paper several members spoke of the satisfactory results obtained from track substructures which included rock ballast and a concrete foundation for brick pavement. When questioned, Mr. Heindle expressed the opinion that it hardly ever was necessary to bond rails up to their full capacity, except near power stations, where the joints should be double bonded. In the Tri-Cities the 70-lb. rails had been bonded with 300,000 circ. mil bonds. Mr. Heindle did not favor any particular device for testing bonds, unless it were the Herrick test car, which he did not think available for service in Iowa. Regarding the comparative cost of cast welded and other joints, Mr. Heindle had installed in Washington about 3,000 cast welded joints at a cost of \$3.40 each. The cost for Continuous joints complete on the same rail was \$4.10, of which amount 50 cents was for bonding.

Mr. Mathes described track construction in Dubuque, which had not lasted anywhere nearly as long as had been expected at the time of its installation. The 6-in. 72-lb. rails had been laid over a 6-in. concrete base and regular angle-bar joints were used. After this track had become rough the joints were renewed by using Continuous joint plates, which were installed with bonding complete for \$4 apiece. Mr. Mathes had had a

bid of \$5 from a firm which proposed to cast weld the joints and so he asked for the relative merits of the two kinds of joints when considered from the mechanical and electrical standpoint. Mr. Heindle replied that he was now tearing up cast welded track and at many of the joints the rails were cupped and some rails could be drawn from the iron joint, showing no welding contact.

Mr. McDonald described his experience with track laid on a bridge. This track comprised 72-lb. standard section rails, first laid with angle bar joints. When it has been in service 2½ years the joints needed renewing and Continuous joints were adopted. These, shortly after installation, had brought the rail ends up to surface, so that now the track was in as good shape, if not better, than when first installed. In paved streets the Waterloo, Cedar Falls & Northern used 75-lb. rails, carried on concrete stringers 18 in. deep. This rail gave ample space for brick pavement. In an emergency the company had reinforced some joints with 2-ft. sections of 60-lb. rails, inverted and placed directly under the angle bar joints. When concreted in, this base support gave excellent results. A good track foundation had also been made by laying a mixture of stone, sand and cement, tamped under the ties without water.

Mr. McDonald was convinced that hard center special work was best for steam intersections. He had installed such crossings at intersections where 3-rail construction with plates under the full length of the steam rails would last but six months.

Mr. Crafts told of the experience of his road with built-up special work. In five years the built-up special work at several intersections of his road had worn so that it needed renewing while other parts of the road were still in good condition.

Mr. Mathes told of the good results his company had had from the use of four electrically operated switches manufactured in Louisville, Ky. The maintenance of these had not been high and their use had saved a great many car-hours on the trunk lines, where cars operated on 2-minute headway. He also had obtained good results from a switch point spring lock, which could be applied to any switch and would lock the point in either position and return the point to that position after a car had trailed through the switch.

F. J. Hanlon, Mason City & Clear Lake Railway, then read a paper on track and overhead construction for interurban railways. This paper is published elsewhere in this issue. Mr. Crafts introduced the discussion by calling particular attention to the following subjects brought out in the paper: (1) Blind vs. through sidings; (2) Choice of ties; (3) Weight of rail; (4) Preserving poles from butt rot.

Mr. McDonald favored the use of 70-lb. rather than 60-lb. rail, because the heavier steel could be kept in alignment with less maintenance work and by the use of fewer ties. He also favored a dump 16 ft. wide, with poles set 9 ft. from the track center. On the Waterloo road side bracket construction with poles having a rake of 6 in. has stayed in position for nine years.

Mr. Crafts favored the use of catenary construction and grooved wire. His company was now facing the proposition of renewing trolley ears which were less than six years old.

H. W. Garner, Oskaloosa Traction & Light Company, described 3 miles of catenary construction which had given excellent service after the slack accumulated during the first winter had been taken out. The task of readjusting the sag was rather difficult because the hangers were clamped to the messenger cable, and each needed loosening before the cable could be pulled up. Then they had to be tightened afterward.

Mr. Du Bois said that the Cedar Rapids & Iowa City Railway obtained satisfactory service from grooved wire. Regarding sidings he favored the practice of requiring all trains to head in and back out of stub sidings, although it was advisable to have long through sidings to assist the movement of freight trains.

Mr. McDonald said that the practice on the Waterloo, Cedar Falls & Northern was to use cedar ties on tangents, white oak ties on sharp curves, and mixed oak and cedar ties on long radius curves. He favored the use of tie plates, if they were of heavy material. Regarding the advisability of installing loading tracks, with a view to encouraging freight, Mr. McDonald

noted that the usual cost for a siding was about \$700, and he questioned the too frequent installation of sidings by interurban roads. In one instance, at a county poor farm, he had installed a siding on condition that the county pay for the original installation and be reimbursed according to the earnings from freight originating there.

Mr. Hanlon had noted in Mason City that a cement company which moved about 80 cars in and out each day had been obliged to build its own steam railway siding. This was the general practice of the steam roads, and Mr. Hanlon thought that where sidings were installed as an accommodation to shippers the road should not be required to carry the cost. Regarding the use of light rail, Mr. Hanlon noted that several steam roads in Iowa were operating heavy trains over 60-lb. rail, and that the service was rather good, if care was taken of the joints.

CITY FARES

A paper on why fares should not be lowered, written from the standpoint of the city railway, was read by L. D. Mathes, general manager, Union Electric Company, Dubuque. It was published in this paper last week.

E. L. Kirk, Sioux City Service Company, called attention to the need for aggressive educational work on the part of the roads, with a view to preventing agitation for the lowering of fares. As excellent material for such educational work he cited the papers read before the midwinter association meetings, referring particularly to the paper by W. J. Clark, which was published in the *ELECTRIC RAILWAY JOURNAL* for Feb. 12, 1910, page 279.

E. M. Walker, Citizens Railway & Light Company, Muscatine, described the fare situation on his property. At the time the franchise was granted the promoters accepted a low rate of fare in their desire to get permission to build the road. The rates were, 3 cents for workmen's tickets during the morning and evening rush hours, six tickets for a quarter all day; children's fares, 3 cents, and the company was obliged to carry all city officials free. The average rate of fare per passenger was a very little more than 4 cents, and the maximum ride was 4 miles. In accounting for the free rides of the city officials the company made a book charge of 3 cents each, handling the charge similarly to that for taxes. The free riding by city officials averaged from 50 to 60 passengers per day on a road normally operating from 8 to 10 cars.

R. A. Leussler, Omaha & Council Bluffs Street Railway Company, stated that low fares had been requested in the cities served by his company, and for that reason the management had been obliged to study the question thoroughly. There were many logical reasons for resisting the demand; also, the demand did not come from the people, who usually desired better service rather than fractional fares. Such demands usually originated with politicians or "yellow" newspapers, and later the people were drawn into the controversy because the merits of the case had been wrongly presented by the agitators. Not only were publicity and educational methods needed generally, but sometimes among a road's own stockholders. The extensive educational campaign carried on last year by the Omaha road had done much good, but the results were, of course, difficult to gage.

Mr. Hanlon called attention to a company which by franchise had the right to collect a full 5-cent fare, but had given six rides for a quarter in order to stimulate traffic. This plan had not succeeded, and rates of 24 rides for \$1, and 120 rides for \$5, successively, had been put into effect. In all but the last instance the plan had been unsuccessful because the people whom the company desired to reach did not buy the tickets. Even the sale of 120 tickets for \$5 had not fully met expectations, so the company was considering other plans. Mr. Hanlon did not believe it advisable for any road to attempt to stimulate traffic to the extent of cutting down the rate of fare.

INTERURBAN RATES

A paper on "Why Interurban Fares Should Not Be Lowered" was read by H. W. Garner, general manager, Oskaloosa Traction & Light Company. It is published in abstract on another page in this number.

Mr. Hanlon saw no reason why interurban railway fares should be any lower than those on steam roads. His road charged higher fares than a competitive steam line, and the passengers were willing to pay for the superior service. Passenger rates in Iowa had been established with a maximum of 2 cents per mile. This should be fully used by interurban companies, but the present freight rates were too low, and the interurban lines should be willing to join in any movement leading toward their equitable increase. One road had attempted to handle sugar beets in large quantities at the scheduled tariffs of Iowa, and had met with positive loss.

The Iowa & Illinois Railway, Mr. Crafts said, was particularly interested in the fare question. When service was started five years ago, the one-way rates were based on 2 cents per mile, and 5-cent increases. Round-trip rates were about 1¾ cents per mile, and special park rates were at about 1½ cents per mile. Mr. Crafts felt that the interurban railways were entitled to a rate of fare equal to that received by the steam roads.

DEPRECIATION

The paper on depreciation, by H. E. Weeks, secretary and treasurer, Tri-City Railway, Davenport, Iowa, which is published elsewhere in this issue, was then presented. Mr. Luessler agreed with the author that depreciation due to obsolescence should be charged to capital account. He also held that the cost of developing a property should be capitalized, but he favored showing depreciation as a part of operating expenses. Mr. Weeks stated that those companies whose depreciation reserve was only a book account would not want to show it in expenses. He classed depreciation with taxes, and believed in treating them similarly because the size of each was outside the control of the management.

Mr. Luessler said that whatever percentages had been so far adopted in practice, depreciation reserves were yet too small, and that the more thoroughly the question was studied the more alarming became the need for careful handling of the depreciation question. His company set aside 10 per cent of its gross receipts, which seemed a large amount, but was not so in effect. The determination of the proper percentage was entirely an estimate, and so lump sums were set aside, according to the business done. The present deduction amounted to \$240,000 a year. In addition to this depreciation fund the company accumulates the usual reserves, among which was one for painting the bridge over the Missouri River. This painting was done every five years, and required about \$7,000.

Mr. Crafts spoke of the inaccuracies of published reports of the financial returns of companies, which emanated from various sources. One newspaper had published the annual report of his company for four years, and taken no note of fixed charges in its comment on the earnings of the road. At the fifth publication a student of financial matters had written the article, which showed the condition of the company to be contrary to that set forth by the earlier reports. Because of the ill effect of such reports broadly published, Mr. Crafts held that as a matter of policy it would be advisable to show depreciation as an operating account.

Mr. Walker stated that the Muscatine company set aside 10 per cent of its combined railway, water and lighting receipts to meet depreciation. Mr. Hanlon also called attention to the incomplete reports which were distributed. None of these reports, as published in the newspapers, showed taxes and other deductions made from the revenue, and, therefore, a false impression of the profitableness of the business had been spread.

C. D. Cass, Waterloo, Cedar Falls & Northern Railway Company, noted that some bond houses now required that a certain per cent of the gross earnings, varying in amount, be set aside each year for depreciation. The requirements permitted this fund to be used for additions to property, at the discretion of the directors. Mr. Cass thought that a depreciation fund on a new and growing road, which must extend its lines, would work a hardship on the property unless the fund could be reinvested in the property. It was his experience that the bond houses desired to have the depreciation fund sufficient in amount so as practically to retire the bonds at their expira-

tion. This fund would be in addition to a regular sinking fund.

When questioned, Mr. Weeks replied that he had not found the Interstate Commerce Commission to be exacting in its rulings regarding the handling of depreciation accounts and funds. Regarding taxes, he had questioned a great many roads, and came to the conclusion that they should appear as a deduction from income.

Mr. Mathes criticized the setting up of theoretical funds not available for immediate purposes of renewal. Other operating items were settled monthly, and unless the money were available for making renewals, the monthly statement frequently would be overbalanced. The best plan, in his mind, was to make a deduction according to a certain percentage of the gross income and pay the money into a separate account, just as a company would pay for its coal; then, when replacements were needed, they could be made without overbalancing the monthly financial condition. Mr. Mathes did not think that any hard and fast rule for determining the proper amount of this depreciation charge could be applied to all properties; it was rather a local question. He also stated that the Dubuque company had accumulated a book fund of more than \$100,000 and that when the company needed new money for extensions or improvements this surplus could be used, but meanwhile checks could not be drawn against it, and it was necessary, when buying a new car or truck, to get the cash from regular earnings. If the fund had been independently maintained, renewals could be made much more regularly. Mr. Mathes thought that the depreciation situation had not been fairly and squarely handled by the majority of the companies throughout the country. There was too much bookkeeping, and too little real business practice in the various solutions of the local problem. His company was classed with the others. A general discussion on the ways and means for handling the details of depreciation accounts followed.

PREPAYMENT CARS

Mr. Crafts introduced A. J. Varrellman, New York City, representative of the Pay-As-You-Enter Car Corporation, who read a paper on the "Prepayment Car and Its Advantages." This paper is published on another page in this issue. Mr. Crafts stated that the paper was intended to encourage the general principle of fare prepayment, and not the adoption of any particular type of car.

An interesting discussion followed the reading of the paper, and included the opinions of various members, and observations on how small companies could improve service by the use of prepayment cars. Many objections raised to such cars before they had been installed were found to be easily met when the cars were put into service. Among these was the objection that it was difficult to arrange for flagging crossings. This criticism had been overthrown in a number of different cities, and hardly two of the companies used the same solution. Prepayment cars also were used on roads having the zone system of collecting fares; the prepayment feature being used while leaving a terminal city, and the car being operated according to the old method as the zone sections were passed.

An executive session was held on the last day of the convention, and at this session the plans proposed for the next year of association work were considered. Following the executive session resolutions of thanks and appreciation for the entertainment of members and guests provided by the Sioux City railway and lighting companies, and by the manufacturers and their representatives, were passed unanimously.

The program of entertainments included: An electrical show at the Auditorium; complimentary smoker given by the supplymen; a theater party given by the Sioux City railway and lighting companies, and a rejuvenation of the Sons of Jove.

It is reported that an electric railway, to have a gage of 3 ft. 6 in., will shortly be built between Agua de Maiz and Los Dios Caminos, Venezuela, by J. A. Mosquera, A. Michaud and A. Avelado.

INTERURBAN RULES*

In analyzing the standard code of interurban rules adopted by the American Street and Interurban Railway Transportation and Traffic Association at the 1909 convention, the principal fault which has been found is the unnecessary encumbering of this book by useless and unimportant rules. The operation of the average interurban railway is not and should not be much different from the operation of an average steam railroad. The committee has proceeded with this idea in mind, taking the American Railway Association's standard code of rules as a guide, with the object of making it as easy as possible to interchange train service employees with steam railroads. The committee believes that the years of constant experience behind the standard code of rules of the American Railway Association should not be too lightly considered. The principal object of any book of rules is safety in operation, and it would hardly be possible for new seekers in the field of railway operation to obtain in a short time the experience necessary to devise and promulgate a set of rules such as is standard in steam railroad practice in this country. Therefore, the committee has adhered as strictly to the American Railway Association's standard code of rules as the conditions of interurban operation permit.

The following are the principal changes recommended:

First.—Discard all of the general rules of the interurban code and substitute the general rules of the American Railway Association standard code, which are more brief and salient. The committee considered the value of the general rules that it discarded, but believes that a great many of these rules are not applicable and that those companies desiring to use any or all of these general rules should use them in the form of special instructions. The interurban code general rules are very long and tedious, and set forth a great many things which the committee considered were in a measure an insult to the average intelligence of trainmen.

Second.—Under definitions in the interurban code, the committee has changed the heading of Rule 51 from "Scheduled Train" to "Regular Train," and the definition following has been made to read: "A train authorized by a time-table schedule. It may consist of sections." This definition and heading conforms to the American Railway Association code. The committee considered that a scheduled train might not be a regular train with reference to daily or weekly regularity, and decided, therefore, that the American Railway Association definition conveyed a much clearer meaning to the average trainman's mind than "scheduled train."

Third.—Rule 53 changed to conform with the American Railway Association code, making the definition of an extra train: "A train not authorized by a time-table schedule. It may be designated as extra for any extra train except for work extra; work extra for work train extra."

Fourth.—Rule 54, which is a definition of "Superior Train," changed to the old American Railway Association code definition instead, reading as follows: "Superior Train: A train having precedence over another train. A train may be made superior to another train by right, class or direction. Direction is superior as between trains of the same class." There was a great deal of discussion among the members of the committee with reference to this rule. It was finally concluded to recommend the adoption of this rule as quoted above and to insert in the book of rules a note calling the attention of small roads to the fact that "superiority by direction" is hardly applicable to short runs on small lines, recommending that the managers should in every instance before promulgating a standard code consider carefully the local conditions before adopting the "superiority by direction" clause of this rule. The committee believes, however, that on the average interurban run of 20 miles or more with frequent turn-outs, it is a mistake to overlook the value of superiority by direction.

*Abstract of report of committee presented at the annual meeting of the Iowa Street and Interurban Railway Association, Sioux City, Ia., April 21-23, 1910.

Fifth.—The committee recommends eliminating Rule 65 defining a meeting point, as it assumes that any man of ordinary intelligence, while possibly not being able to express himself, would know what a meeting point was.

Sixth.—Eliminate Rule 66, defining a passing point; Rule 71, defining a block and automatic block system; Rule 72, defining a home signal; Rule 73, defining a distance signal; Rule 74, defining an advance signal; Rule 75, defining a dwarf signal, and Rule 76, defining a pot signal.

Seventh.—Under "Standard Time" substitute the American Railway Association standard rules, and eliminate Rules 78, 79 and 80 from the interurban code. However, instead of using the American Railway Association wording for Rule 80, make this rule read as follows: "Watches of conductors, motormen, enginemen, brakemen and ———, must be compared before starting on initial trip for the day with a clock designated as a standard clock. The time when watches are compared must be registered on a prescribed form."

Eighth.—Discard Rules 81 and 82 of the interurban code.

Ninth.—Substitute the following for Rule 83 for the interurban: "All employees whose duties are in any manner affected by the time table must have a current copy in their possession while on duty."

Tenth.—Discard Rules 84 and 85 and substitute Rule 4 of the American Railway Association standard code of 1906.

Eleventh.—Discard Rules 88 and 89 and substitute a new rule reading as follows: "Indication of meeting and passing stations. Scheduled meeting or passing stations are indicated by figures in full-face type. The number or numbers of trains they are to meet or pass are shown in small type. Both the arriving and leaving times of a train are shown in full-face type when both are meeting or passing times, or when one or more 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-face type.

Twelfth.—Discard Rule 90 of the interurban code and substitute Rule 6 of the American Railway Association.

Thirteenth.—Discard Rule 91 of the interurban code, which is merely a repetition of other information contained in the book.

Fourteenth.—Under "Visible Signals," Rule 95, subhead "b," omit the word "perfect" preceding "control," as the committee assumes that if a motorman is proceeding under control it means the same as perfect control.

Fifteenth.—Revise Rule 97 of the interurban code to conform with the American Railway Association's standard "Hand, Flag and Lamp Signals," and in addition, the committee recommends placing the miniature cuts illustrating the hand, lamp and flag signals on the same page with the definitions, or immediately opposite the definitions, so that there can be no confusion with reference to the meaning of the rule.

Sixteenth.—Under "Audible Signals" substitute the American Railway Association standard "Whistle Signals."

Seventeenth.—Discard Rule 100 of the interurban code, since anyone of ordinary intelligence would know what a succession of short blasts of a whistle meant.

Eighteenth.—Under "Communicating signals from Conductor to Motorman" make subhead "d" read as follows: "Four. When train is running, stop at once," and discard subheads "e" and "f" as unnecessary.

Nineteenth.—Make Rule 104, subhead "c," read as follows: "Three. Desirous of backing train. To be given only when train is standing, to be answered by conductor from rear platform, as per Rule 103 "c," after which whistle signal prescribed by Rule 99 "h" must be sounded before train is backed."

Twentieth.—Discard interurban code Rules 105 and 106.

Twenty-first.—Substitute the American Railway Association's Rule 17 with reference to headlights, instead of Rule 107 in the interurban code.

Twenty-second.—Substitute the following in place of Rule 110: "The following signals will be displayed, one on each side

of the rear of every train, as markers to indicate the rear of the train: By day, green flags; by night, red lights to the rear, except when train takes a siding to permit a following train to pass and is clear of the main track, then green instead of red lights must be displayed to the rear."

Twenty-third.—Substitute Rule 20 of the American Railway Association in place of Rules 111 and 112.

The committee regrets that it was unable to complete its study of the rules and give recommendations on all of the rules in the standard code at this year's meeting. The committee suggests that it be continued for another year so that it can complete its work.

The report was signed by C. D. Cass, general manager, Waterloo, Cedar Falls & Northern Railway, chairman; J. A. DuBois, chief dispatcher, Cedar Rapids & Iowa City Railway & Light Company; C. P. Wilson, general manager, Rockford & Interurban Railway.

WHY INTERURBAN RAILWAY FARES SHOULD NOT BE LOWERED*

BY H. W. GARNER, GENERAL MANAGER OSKALOOSA TRACTION & LIGHT COMPANY

The meaning of the term "interurban railway" is to-day altogether different than early in electric railway history. When interurban railways were first conceived they partook of the nature of the present "suburban railways," connecting two or three small towns only a few miles apart with some large center of population. They were generally constructed along the highways, the expense of purchasing rights of way being considered as too great for the future benefit to be derived from it. The interurban railway of to-day is as well constructed and as well operated as the steam railroad, the only difference is that it employs electricity instead of steam locomotives for motive power, and gives in almost all cases a much better service, particularly for passenger traffic.

The old type of interurban line usually was built to compete with the suburban service of some steam railroad, and it was considered necessary to offer an inducement in the way of a reduced fare to attract passengers from the steam railroad. At that time the interurban railway, being lightly built, could be constructed and maintained very cheaply. The conditions now are very different. Interurban railways are now built to a great extent into new fields where development is necessary to bring the property up to its earning power, and the company, in many cases, has to operate heavy equipment in trains at high speed, handle baggage and transport express and freight. The cost of maintenance is much greater than formerly, due partly to the heavier construction and partly to the higher individual cost of the various items of supply required, which in many cases have risen in price 25 to 185 per cent. The conditions under which the interurban must obtain and hold its traffic are also becoming more and more exacting. National, State and municipal supervision is becoming more exacting, and taxation keeps pace with the other items.

There is now no reason in connection with the service rendered why the modern interurban railway, if properly operated, should make its fare less than that charged by the steam railroads in the same territory, because it generally gives better service and should, therefore, obtain and hold its share of the traffic. If its fares are lower than those of the steam railroads, they should be increased to meet these conditions and so that a reasonable return may be had on the investment and sufficient margin be provided to meet further and more exacting conditions which will arise from time to time. Of course, local conditions must govern to a certain extent, but service gets the traffic, other conditions being equal. The standard of the interurban must be constantly upward and the returns must be commensurate with the service rendered.

*Abstract of paper read at annual meeting of Iowa Street and Interurban Railway Association, Sioux City, Ia., April 21-23, 1910.

DEPRECIATION*

BY H. E. WEEKS, SECRETARY AND TREASURER, TRI-CITY RAILWAY

In taking up the subject of depreciation, let us look up the definition of the word. Webster gives it as "The falling of values; reduction of worth." It is apparent at once that it will be necessary to make an arbitrary ruling, applicable to the business in which we are engaged, setting forth just what the term shall cover. Much discussion has taken place in the past as to where maintenance ends and depreciation begins; inasmuch as there is no such state as inertia, as in this world either growth takes place or disintegration ensues, it follows that disintegration is taking place and that maintenance is only a partial replacement, as depreciation begins before maintenance is necessary whether the property is operated or not. Accounting authorities have defined "maintenance" as embracing ordinary wear and tear or upkeep, using the word upkeep in the sense that it is commonly accepted, including, only to a limited extent, expenditures for replacements or renewals of any except minor elements. The replacement of major elements being extra, or ultra, wear and tear would be defined as depreciation. A good illustration is found in track work. The upkeep or ordinary wear and tear would not provide for the wearing out of the rail and the replacement of the rail would be a proper charge to depreciation, that is, as much of the cost of the rail as would be necessary to offset the original cost. Depreciation caused by obsolescence or supercessional depreciation raises the question as to whether it is proper to charge depreciation due to obsolescence to capital account or against earnings, as obsolescence is usually due to economic reasons. If the net profit from operation was increased on account of the change, it would seem that renewals due to supercession on account of obsolescence are a proper charge to capital account.

In the testimony of Edward R. Gore in behalf of the city of Milwaukee in the Milwaukee fare case, he stated that "if the company found that it could operate more cheaply by using another type of equipment, then the loss resulting from the abandonment of the old equipment should not go against the earnings of the company to the detriment of the public or as a justification of a higher charge to the public."

The cost of progress should be capitalized. The advent of the Brennan monorail and gyroscope car may again revolutionize the business and make the question a very vital one. The steam turbine has made a great change in power house economy and the gas engine may make further changes necessary in the near future.

Experience with power generating machinery doubtless brings vividly to the minds of many of those present, the fact that the ordinary wear and tear that takes place can hardly be counted as a percentage of the replacement of electrical equipment. A machine becomes obsolete in some cases before maintenance is necessary, and yet the Public Service Commission of New York State includes all obsolescence and inadequacy under depreciation and require that it be included in the expenses.

The growth of the street and interurban railway business has been fraught with kaleidoscopic changes: First, the horse-car, running on two straps of iron supported by wood stringers, later running on rails; then the cable and electric, making it necessary to transform the horse-car construction; the electric roads have been rehabilitated several times, and all of the expenditures were capitalized upon the theory that the increase in earnings would provide for the returns on capitalization. Although the experience of the past has proven this theory to be correct, in most cases, it cannot be kept up indefinitely. The general practice of European countries is to recognize depreciation in their systems of accounting. In some instances, the laws in regard to charging obsolescence out of earnings have been so stringent as to retard development very materially which it seems should be a warning that it is necessary to educate the public to the fact that it is necessary to encourage progress in the art. The financial exploitation of public service

properties and the failure to provide properly for maintenance and depreciation are responsible to a large extent for the present attitude of the public. The ambition of every manager has been to operate on 50 per cent—in some instances managers have even boasted of 40 per cent—of their gross earnings. The public naturally argues when statements showing operation on 50 per cent basis come into their hands that out of every 5-cent fare 2½ cents is profit; the natural sequence is an agitation for reduction of fare. The time has come when it is necessary to acquaint the public with the actual conditions that confront the industry. If proper maintenance and depreciation are charged up, no company need fear to advertise its net earnings as a reason that fares should be increased. The Cleveland situation is an illustration of conditions that can be brought about by politicians on account of conditions that have been prevalent in the industry.

It is unnecessary for me to elaborate on the conditions that have brought about the increased cost of operation such as increased cost of labor and material. However, the situation is such that an increase in fares in some sections must be made. The justification for such an increase can only be established by showing a proper charge for depreciation. The form of report required by the United States Bureau of Internal Revenue provides that the deduction authorized for depreciation "shall include all expense items under the various heads acknowledged as liabilities by the corporation making the return and entered as such on its books from Jan. 1 to Dec. 31 of the year for which the return is made." As this form must be filled in by every public service corporation in the United States, the question of setting up depreciation becomes a pertinent one, for if no depreciation is set up no claim can be made including depreciation in the cost of operation in case of rate regulation or to limit the return on capital.

The Bureau seems to treat depreciation under two heads, complete depreciation or abandonment on account of inadequacy or age and incomplete depreciation due to wear and tear and obsolescence. Complete depreciation is provided for separately on the report under deductions from gross income. This depreciation includes only such items as have not been charged out under the depreciation account on the maintenance accounts and is defined as follows:

"Losses.—The deduction for losses must be in respect of losses actually sustained during the year and not compensated by insurance or otherwise. It must be based upon the difference between the cost value and salvage value of the property or assets, including in the latter value such amount, if any, as has in current or previous years been set aside and deducted from gross income by way of depreciation as defined in the following section and not been paid out in making good such depreciation."

As you will notice, this ruling makes it necessary to charge obsolescence against earnings. The ruling on the other deduction for depreciation is as follows:

"Depreciation.—The deduction for depreciation should be the estimated amount of the loss, accrued during the year to which the return relates, in the value of the property in respect of which such deduction is claimed that arises from exhaustion, wear and tear, or obsolescence, out of the uses to which the property is put, and which loss has not been made good by payments for ordinary maintenance and repairs deducted under the heading of expenses of maintenance and operation or in the ascertainment of gross income. This estimate should be formed upon the assumed life of the property, its cost value, and its use. Expenses paid in any one year in making exhaustion, wear and tear, or obsolescence, in respect of which any deduction for depreciation is claimed must not be included in the deduction for expense of maintenance and operation of the property or in the ascertainment of gross income, but must be made out of accumulative allowances deducted for depreciation in current and previous years."

The Interstate Commerce Commission does not require a depreciation charge except in States where the State law required a charge for depreciation. Electric roads are required

* Abstract of paper read before annual meeting of the Iowa Street & Interurban Railway Association, Sioux City, Ia., April 21 to 23, 1910.

to keep two accounts—"depreciation of ways and structures" and "depreciation of equipment." Steam roads are only required to keep the charge for "depreciation of equipment." Steam road practice in taking care of this item might well be followed by some of the larger companies. A car trust, as it is called, is usually formed and the equipment bought by the trust and sold to the operating company, payments being made in annual installments covering the estimated life of the property, the payments including the estimated depreciation. The Interstate Commerce Commission reports of the amount charged to maintenance and depreciation by steam railroads show that an average of over 25 per cent of gross receipts has been set aside each year for the last 10 years. Inasmuch as depreciation is a much larger factor in steam road operation than in electric, and franchise expirations do not have to be accounted for, the comparison of the two is not of much value except as concerns interurban business, in which detailed comparison of similar feature can be made with profit.

The Public Service Commissions of both New York and Wisconsin require depreciation to be set up. The New York commission's requirements shows the effects of the radical political agitation against public service corporations in that State.

What method of setting up depreciation should be used is a question. A depreciation reserve may be established and the proceeds deposited in cash or invested in securities, although the objection is sometimes raised that the money may be diverted for use for other purposes. A good method is to show on statement the actual capital invested with deduction for what has been set up for depreciation, showing the net sum in a separate column.

The charge for depreciation may be made in several ways: A fixed percentage on gross earnings may be taken. This method is usual in Milwaukee, where 10 per cent is set up; also in Chicago, where the franchise provides for 8 per cent in addition to 6 per cent for repair or maintenance. This amount does not seem to be sufficient. In Cleveland about 5 cents per car-mile is applied to maintenance and depreciation account. This method is also in use in several other cities.

Power station depreciation may be figured on the basis of kw-hour output of plant. Although most of the commissions require that depreciation be shown on the basis of 1/12 of the annual charge in the expense account monthly, it seems that as it is an arbitrary charge, and the other figures shown are actual, there is considerable argument in favor of showing it on the monthly statement not as an expense but as a deduction from income, thus separating the actual from the arbitrary figures. In arriving at the figure that is to be used in setting up depreciation each head of department should be required to furnish the detail necessary, as actual experience is valuable and generalizing is sure to result in inaccuracy. Each item should receive consideration. Appreciation of real estate is certainly a correct deduction in making up the total figure, although this is not allowed by some commissioners. Provision should be made for writing off loss on physical property which has been sold at a loss on account of the expiration of a limited term franchise.

The fund required to meet the requirements for estimated obsolescence and other depreciation, based on experience, varies from 10 per cent to 25 per cent; this will not include maintenance and renewals. In considering the subject of depreciation the scrap value of the different items entering into the account should be allowed in figuring the amount to be written off.

The properties with which the writer is connected use the following figures for length of life of property:

YEARS		YEARS	
Ties	7	Boilers	15
Rails	20	Generators	15
Poles	7	Pumps	15
Trolley wire	14	Condensers	15
Feeder	20	Transformers	7
Car bodies	15	Paving	10 to 15
Car equipment	10	Shop equipment	15
Buildings	50		

The boards of directors of many corporations in facing this question squarely will find that if they set aside the proper amount for depreciation they will be paying dividends out of capital. The fact is the same, however, whether the books show it or not and should be used as an argument for increasing fare.

On April 25, 1909, at Des Moines, this association passed the following resolution:

"Resolved, That the Iowa Street & Interurban Railway Association recognized the correctness of the principle of providing out of earnings an adequate annual appropriation for a depreciation reserve; said depreciation reserve account to be separate and distinct from any maintenance account. The fund so appropriated to be used solely for the purpose of paying for renewals of equipment worn out in service or superseded by advances in the art.

"Your committee deems it wise that all member companies shall make public their financial statements at least once a year for the following reasons:

"First—To correct the erroneous idea on the part of the public that the business is productive of excessive profits.

"Second—A true exposition of the net returns to security holders will to a large extent still the clamor for short-term franchises and reductions in fares and rates.

"Third—The public is disposed to be fair-minded, and if they have access to our reports and realize the close margin of profit in the electric railway business much of the effectiveness of the doctrines of the demagogues will be lost."

The happenings of the two years that have elapsed have demonstrated the wisdom of the action.

INTERURBAN TRACK AND OVERHEAD CONSTRUCTION*

BY T. J. HANLON, VICE-PRESIDENT AND GENERAL MANAGER, MASON CITY & CLEAR LAKE RAILWAY

The reports of the interurban railways in Iowa show that during 1908 15½ per cent of their operating expenses were charged to track maintenance. Hence their roadways should be built so as to require a minimum amount of work to keep it in proper operating condition. Every interurban railway now handles freight in standard cars, while I do not contend that we should attempt to hold our grades to the same standards as a trunk line, yet it is very desirable in construction to pay close attention to the idea of a maximum grade and keep within it. Every curve should be made as long as conditions will permit. The right-of-way should be 100 ft. wide, assuming that in this day no interurban railway will be built upon the highway, and should be well fenced, leaving the passengers to board the cars at regular road crossings, or preferably at every other crossing, thus assuring a 2-mile run in the country without the necessity for a stop.

Where trains hauling 75-ton freight cars are operated and where the ballast is from 6 in. to 8 in. under the ties on tangent, the subgrade should be about 14 ft. wide, this will allow for a small shoulder at the end of the ties, but good track can be maintained on a 12-ft. subgrade. The most common error in construction is to make the subgrade too narrow, as the track will sooner or later have to be ballasted, and it will be much more expensive to use the gravel to widen the slope to grade with dirt at the time of building.

Good drainage is a more important aid in maintaining track. For this reason there should always be a crown of from 3 in. to 6 in. in the center of the roadbed and great care should be used to see that there is proper ditching all along the track. In well-known soft spots it is well to lay a tile a few inches under the subgrade in the center of the track as the water will rapidly seep through the ballast and leave the bank very soft. Proper culverts should be placed wherever the natural flow of water indicates their necessity, after a careful estimate of the amount of water they will be required to carry.

Cedar is the best available tie for interurban track construction.

* Paper read at annual meeting of Iowa Street & Interurban Railway Association, Sioux City, Ia., April 21-23.

tion. It is cheaper than oak and longer lived, even where tie plates are not used. The most common reason for the removal of cedar ties is the wear of the rail into the tie rather than decay. It is often possible to take a cedar tie out and turn it over, and so get good service out of it for a number of years. Cedar does not hold the spike nearly as well as oak. For this reason on very short curves it might be well to use oak or alternate cedar and oak, but the objection does not obtain on tangents, as the weight of the car tends to prevent spreading of the rails.

Ties should be cut from live timber in the winter so they will be free from sap and should be allowed to season properly in the open air for at least 6 months, and a year is better. The bark should be removed to allow the sapwood in the tie to dry out and the bark should never be put in the track, as it will rot first and deteriorate the rest of the tie and as it interferes with weed cutting and injures the ballast.

Hewn ties are preferable to sawed. They are less liable to decay, because sawing the tie leaves the ends of many fibers exposed, and it is impossible to tamp the ballast under a sawed tie as well, as the elliptical bearing service of the hewn tie gives better results.

A standard 8-ft., or even longer, tie is the only kind that should be used and the thickness should be as nearly uniform as possible. About 6½ in. is best, with 6 in. as the minimum and 7 in. as the maximum. A thick tie makes the work of tamping hard and liable to be neglected, while a thin tie does not have the requisite strength and is usually split by the spike. A 7-in. tie is approximately 59 per cent stronger than a 6-in. tie.

Rock is the best ballast, but its cost is often prohibitive. Next to rock comes good coarse gravel and after that cinders, which I consider better than sand.

The question of a proper rail section is an important one and is decided oftener by guess than any other way. I believe that a 60-lb. section is sufficient for any interurban road in this territory and that a heavier rail is money wasted. The excess material that will have to be scrapped in time, and maintenance cannot be reduced sufficiently to warrant the added investment. Any degree of stiffness desired in the rail may be secured by placing a few extra ties under the rail, at a fraction of the cost of a heavier section. We follow too much the practice of the steam roads which have reasons for their use of immense engines and heavy counter-balanced driving wheels.

The question of station facilities in the way of side tracks depends upon the prospective amount of business to be secured, but it is good economy to be extremely watchful and only lay such tracks as there is reason to believe will be used within a short time. An interurban railway should avoid as far as possible all blind sidings, which make switching expensive and difficult and act as time killers for freight trains. As a usual arrangement at the average small station, the stock yards and elevators can be located on the delivery track without trouble. This avoids the necessity of cutting the main line, which is bad practice when done unnecessarily.

As regards overhead construction, I will describe 5 miles of new overhead work we are putting in this spring. If the money was available I presume all of us would prefer catenary construction, but the average interurban line in this State will have to worry along without it. At least, we shall.

We are using 40-ft., 7-in. top poles set 5 ft. in the ground, with a 6-in. rake, with a two-pin cross-arm 12-in. from the top of the pole and a fourpin arm 18 in. below. For the present, we shall carry a three-phase 13,000-volt line on the bottom arm and later intend to string in the other lines and then carry a three-phase line on each side of the pole. We shall place a 10-ft. trolley wire bracket 23 ft. from the ground and immediately under this bracket place another four-pin cross-arm on the inner side of which we shall carry our 600-volt direct-current feeders and on the outside our telephone lines. We are using a steel pin with wood top for our insulators, as being cheaper than a pin requiring cement and easier to line properly.

In setting the poles we use a sewer pipe with a bell up, placed

over the butts of the poles and about 6 in. larger than the diameter of the pole, filling it with a mixture of gas house tar to prevent butt rot and to keep the grass from growing up close to the pole and damaging the pole by fire when the right-of-way is burned in the fall. It is very difficult to keep the fire away from the poles and it is a well-known fact that the greatest damage is done right at the ground line, and we feel that we are protecting the pole from two dangers at its weakest point.

THE PREPAYMENT CAR AND ITS ADVANTAGES*

BY A. J. VARRELLMAN.

The all important problems of devising some means whereby platform step accidents could be eliminated, and of instituting a "positive system" of collecting fares from each passenger riding without increasing the labors of the conductor, occupied the serious attention and deep study of those engaged in street railway work for many years. When the pay-as-you-enter car was introduced into the street railway world, these problems were practically solved.

The Montreal Street Railway, under the direction of William G. Ross, managing director, and Duncan McDonald, general manager, after many years of investigation and experiment, put the first pay-as-you-enter car into operation in Montreal in 1904 on the St. Catherine Street line. This car was arranged for single end operation and did not differ materially from the general make-up of the cars previously in service, with the exception that the rear platform had been lengthened to 7 ft. to give better accommodation to smokers, who were permitted to remain and ride on the rear platform, behind a railing which designated a place provided for them. The Montreal Street Railway started with one car at the time, but kept putting them on one by one until at the end of the first year they had reached a total of 25. After a year's operation, these 20 cars proved so successful that the Montreal Street Railway began the work of changing over the greater part of its equipment, with the result that to date 400 pay-as-you-enter cars are operated over the Montreal lines.

While we are indebted to the Montreal Street Railway Co. for originating and developing this type of car, a great deal of credit is due the officials of the Chicago City Railway Company, who were the first to inaugurate the pay-as-you-enter system in the United States. On Sept. 27, 1907, the Chicago Railway Company inaugurated the pay-as-you-enter system with 150 cars, and although the officials of the company were somewhat apprehensive as to the results and gave a great deal of time and energy in instructing the public prior to putting the cars into service, the innovation was accepted by both the public and the press in a most satisfactory manner. At the present time, there are being operated in Chicago by the different railway companies 1420 cars, and before the end of the present year, there will be 2184 cars of the pay-as-you-enter type in operation in that city. The complete equipment of an entire line with pay-as-you-enter cars, as in Chicago, presented an untried proposition. The management of the Chicago City Railway, however, carefully planned for the inauguration of the services, and as the design of the cars was fundamentally correct in every particular, the cars secured at once an improvement in operating conditions and the favor of the public. The business districts of Chicago exhibit an unparalleled density of traffic of all kinds, and the electric cars have to handle a large number of passengers at every corner in the business district and contend with a large number of vehicles. The problem was also serious because of the necessity of collecting a fare from every passenger when a large number boards and leaves the cars at every stop. It was the ability to meet all these requirements in a satisfactory manner which made the pay-as-you-enter car such a success in Chicago.

The principal claims of the pay-as-you-enter car are four in

* Abstract of paper read at annual meeting of Iowa Street & Interurban Railway Association, Sioux City, April 21-23.

number: (1) reduction in accidents; (2) increase in receipts; (3) improved service; (4) greater convenience and comfort to the passengers.

That the pay-as-you-enter car has accomplished what has been claimed for it is best evidenced by the extent to which the system has been adopted in a comparatively short time since its introduction in Chicago.

In Montreal, in the year preceding the introduction of the pay-as-you-enter cars, there were 700 platform step accidents, while in the following year only two slight platform step accidents were reported in connection with these cars. In Chicago, on the Chicago City Railway, in the period from Feb. 1, 1908, to July 31, 1908, inclusive, accidents other than fatal with the pay-as-you-enter car showed a decrease of 16.2 per cent, as compared with the same period in the preceding year with almost the entire elimination of that class of accidents sustained in leaving the front platform. Other roads have not made public definite figures on the reduction of accidents since pay-as-you-enter cars were used, but all report a decided decrease.

Figures showing the increase in receipts following the introduction of the cars have been hard to obtain, both because a majority of roads have apparently been inclined to give as little publicity as possible to such matters, and also because it has been difficult to determine the percentage of increase which is due to natural growth, or other conditions. It appears to be generally conceded that the increase in receipts due to the new type of equipment has been from 10 per cent to 15 per cent, and in one instance it is stated to have been 18 per cent. In Montreal, a careful record was kept of the returns from

tures in the general mechanical construction of the car. The long platform has been in common use on various street railways in this country long before cars of this type were designed. The pay-as-you-enter car should be credited with attaining an equal distribution of the passenger load. On the old style of cars, it is a common thing particularly in rush hours to see the passengers crowded on the rear platform and in the rear part of the car, leaving the front part practically empty. As standing on the rear platform is practically prohibited on these cars, passengers will move inside and will also move to the front, the front door being accessible to them as an exit. That the pay-as-you-enter car was a much needed device is proved by the way the car is generally sought after and adopted in this country, as in the very short period of 2½ years it has been adopted and put into operation by over 50 railway companies in the United States and the number of cars in operation total close to 6000.

DISSECTING THE NICKEL IN NEW YORK STATE

E. F. Peck, general manager Schenectady Railway Company, has recently compiled the operating statistics of the 10 largest electric railway companies in the Second District, New York State, and of all the railway companies in the district, to determine the percentage distribution of the receipts. These figures are presented in the table below.

To assist in popularizing this information the Street Railway Association of the State of New York has sent an analysis of these figures under the title "Dissecting Nickels" to a large number of the daily papers in the State. This analysis shows

TABLE SHOWING DIVISION OF REVENUE ON THE TEN LARGEST ELECTRIC RAILWAYS AND ON ALL THE ELECTRIC RAILWAYS IN THE SECOND DISTRICT, NEW YORK STATE, FOR THE YEAR ENDED JUNE 30, 1908.

	Ten largest companies.			Seventy-four companies.		
	Total.	Per cent of operating revenues.	Distribution of five-cent fares, cents	Total.	Per cent of operating revenues.	Distribution of five-cent fares, cents
General expenses, including insurance, etc.....	\$934,988	.0619	0.309	\$1,551,335	.0732	0.366
Cost of power.....	1,677,716	.1112	0.556	2,608,705	.1231	0.615
Conductors and motormen.....	3,217,439	.2132	1.066	4,351,391	.2053	1.027
Other transportation and traffic expenses.....	1,112,718	.0737	0.369	1,558,187	.0735	0.367
Maintenance of way and structures.....	1,187,445	.0787	0.393	1,754,505	.0828	0.414
Maintenance of equipment.....	941,991	.0624	0.312	1,422,599	.0671	0.336
Damages and legal expenses.....	734,844	.0487	0.244	884,625	.0417	0.209
Rentals.....	140,239	.0093	0.046	214,567	.0101	0.050
Taxes.....	763,290	.0506	0.253	1,046,913	.0494	0.247
Interest.....	2,633,101	.1745	0.873	4,270,515	.2015	1.008
Surplus.....	1,747,528	.1158	0.579	1,531,144	.0723	0.361
Street Railway Operating Revenue.....	\$15,091,299	1.0000	5.000	\$21,194,486	1.0000	5.000
Operating expenses.....	\$13,343,771	.8842	4.421	\$19,663,342	.9277	4.639

pay-as-you-enter cars, in comparison with cars of a similar size running on the same routes and same hours. The result showed an increase in earnings per car of 10 per cent.

The improvement in service, due to the "pay-as-you-enter cars, has ranged from 5 to 10 minutes decrease in the running time required from terminal to terminal, according to the length of the line. On the Niagara-Grace and Niagara-O'Neal lines in Buffalo, approximately 6 miles long, the average decrease in running time was close to 6 minutes. On the Cottage Grove line of the Chicago City Railway, the decrease was shown to be between 5 and 10 minutes.

The greater convenience and comfort of passengers is a factor of which there is necessarily no tangible proof. It is reflected, however, by the approval with which the pay-as-you-enter car has been received in every city in which it has been introduced. There have been instances in which slight opposition has developed when this type of car was started, but it soon disappeared when it became apparent that the new cars were able to give better service, that it was unnecessary for the conductors to pass continually through the car, that overloading could be restricted, that exit and entrance to the cars could be made without conflicting with other passengers in any way, and that it was unnecessary to fight a way through a crowd of smokers who are constantly blocking the rear platform of the old style of car. The popular approval of the car has been a material factor in the extent to which it has been adopted.

The pay-as-you-enter car has not introduced any new fea-

tures in the general mechanical construction of the car. The long platform has been in common use on various street railways in this country long before cars of this type were designed. The pay-as-you-enter car should be credited with attaining an equal distribution of the passenger load. On the old style of cars, it is a common thing particularly in rush hours to see the passengers crowded on the rear platform and in the rear part of the car, leaving the front part practically empty. As standing on the rear platform is practically prohibited on these cars, passengers will move inside and will also move to the front, the front door being accessible to them as an exit. That the pay-as-you-enter car was a much needed device is proved by the way the car is generally sought after and adopted in this country, as in the very short period of 2½ years it has been adopted and put into operation by over 50 railway companies in the United States and the number of cars in operation total close to 6000.

LIGHTNESS OF CARS

M. V. Ayres, electrical engineer of the Boston & Worcester Street Railway Company, calls attention to an error in his article on page 704 of the issue of this paper for April 16. It occurs in the summation of the figures in the first column of the table of operating expenses near the bottom of the page. Mr. Ayres says that "the figures under the heading 'Denver Estimate' is given as 24 cents, whereas it adds up to 26.6 cents. These figures were copied from my Denver paper and I find that the addition was made correctly in the original paper, but apparently I made an error in copying from that, as I find that my copy of the manuscript I sent you appears as you printed it."

At the annual Easter egg-hunt of the Nashville Railway & Light Company at Glendale Park on April 3, 1910, there were two golden eggs with a \$5 prize attached. One was offered by the Mayor and the other by the company. A silver egg carried a prize of \$3 and other eggs were full of candy.

PORTABLE SUBSTATION AT NORFOLK, VA.

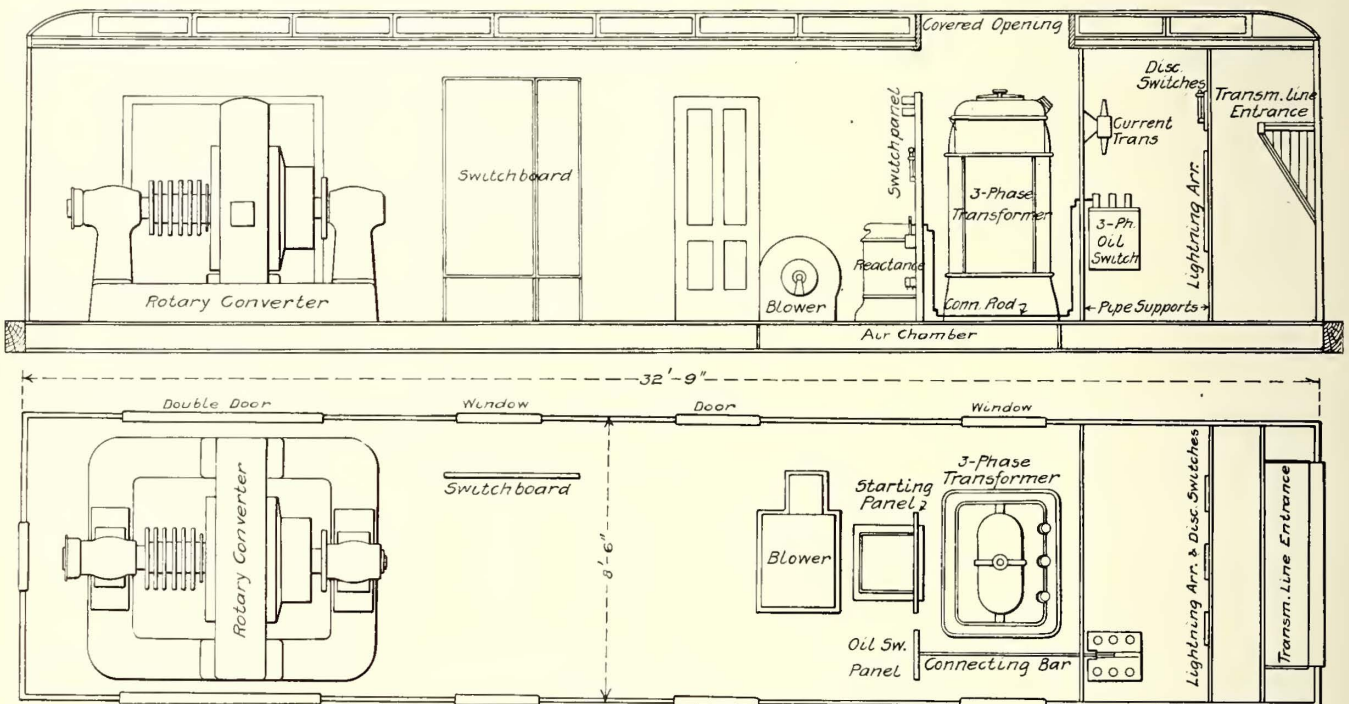
It is generally admitted that a portable substation is of the greatest utility on any system where there are radical changes in the load centers, such as on lines serving baseball parks, excursion grounds, and the like. However, the usefulness of the portable substation generally is limited to the summer months so that economy is a prime factor in its construction and maintenance. Among the railways which have settled this problem satisfactorily is the Norfolk & Portsmouth Traction Company, Norfolk, Va., whose simple portable substation is shown in the accompanying half-tone views and drawings. The car body was built in the power station by the company's carpenters at a total labor and material cost of only \$800. The M. C. B. trucks on which the body is mounted were secured from a neighboring steam railroad in exchange for an old feed pump which the company valued at \$150. Ordinarily, the car body does not rest directly on the trucks, but is raised on four jacks.

The car is 32 ft. 9 in. over all and 8 ft. 6 in. wide. By using

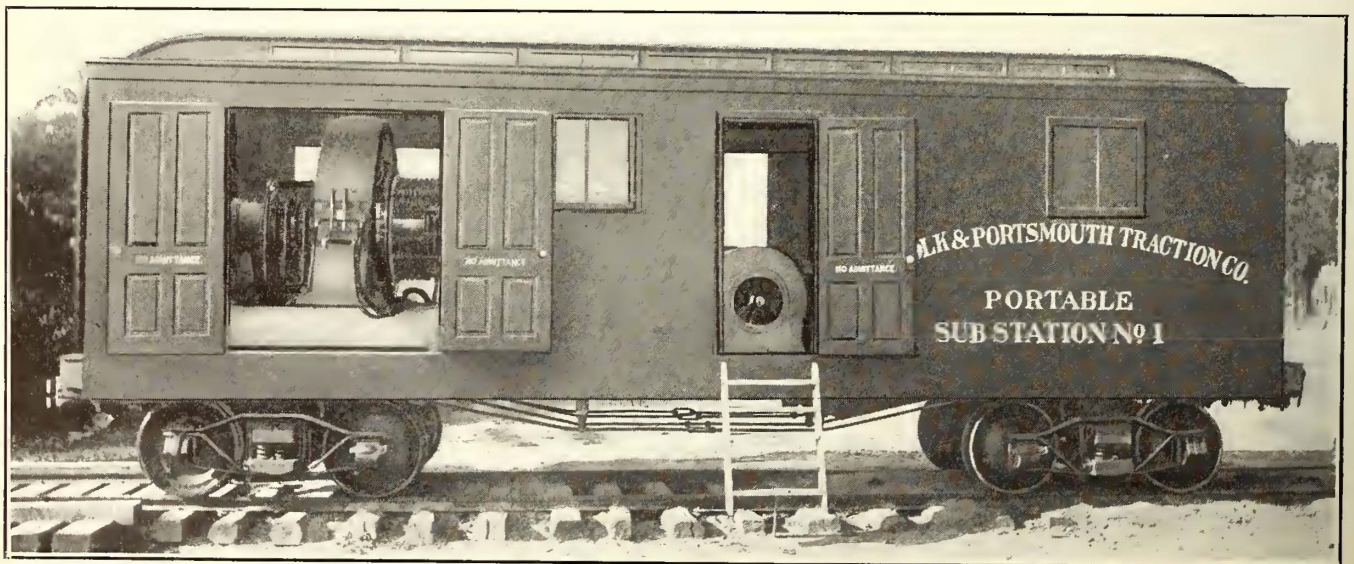
plain swinging instead of sliding doors, the width of the car as well as the cost of installation were minimized. There is just enough room for the comfortable housing of one 500-kw



Norfolk Portable Substation—High-Tension End



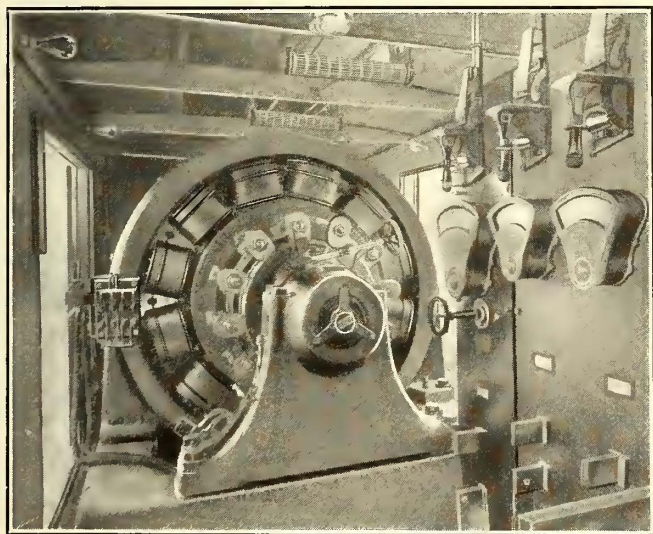
Norfolk Portable Substation—Elevation and Plan



Norfolk Portable Substation—View of Rotary Converter and Blower

rotary converter, switchboard, blower equipment and high-tension apparatus. The switchboard includes switches, circuit-breakers, Thomson astatic ammeters for three circuits and a Weston voltmeter mounted on a swinging bracket. The 550-kw, three-phase, 11,000-volt transformer K-4, hand-operated oil-switches, and the lightning arresters, are of the General Electric Company's manufacture. The transformer is cooled through an air-duct connection under the car floor by means of a Buffalo Forge Company's blower which is driven by a 3-hp induction motor.

Last summer this car was used at White City on the Atlantic Terminal line between Tanner's Creek and the Virginian Railway piers. This park has recently been turned into a negro resort and it is probable that the substation will be transported to some other point in the coming season. As located last summer, the station was at a place $7\frac{1}{2}$ miles from the power house, 6 miles from the Ocean View substation and 6 miles from the Cove Street substation. A 500,000 circ. mil feeder



Norfolk Portable Substation—Rotary Converter and Switchboard

from the power station to Ocean View looped around Ocean View to the portable, from the portable to Cove Street and back to the main power plant. By means of the loop it was possible to take 250 kw each from the Cove Street and Ocean View substations, giving a maximum of 1000 kw at any desirable point in the loop. During the months of inactivity, the rotary is kept under a rubber cover and several incandescent lamps are kept burning all the time to avoid dampness.

HEARINGS BY PENNSYLVANIA COMMISSION

A hearing was held before the Railroad Commission of Pennsylvania at Harrisburg on April 14, 1910, to consider the complaint of the officers of the West Chester Improvement Association against the increase in fare put into effect by the Philadelphia & West Chester Traction Company in October, 1909, when it established six 5-cent fare zones between Sixty-third Street and Market Street, Philadelphia, and West Chester, instead of five.

A. M. Taylor, president of the company, stated that the company was compelled to change the fare zones and increase fares between certain points, in order that the stockholders might have a reasonable return upon their investment. The fares charged previously were not remunerative. In a circular letter issued at the time the increase went into effect and printed in the *ELECTRIC RAILWAY JOURNAL* of Oct. 16, 1909, page 888, reasons were given for raising the fares. Between 1899 and 1909 the company earned only a small dividend on the capital stock, and there was no understanding when the road was built that the fares were to remain at the original figures.

After explaining that in making the changes the company had attempted to make no discriminations between its patrons he said in defense of the general proposition that the cost of maintenance and operation between Philadelphia and West Chester had materially increased since the line was built. Whereas the average wages paid to motormen and conductors in 1899 were $12\frac{1}{2}$ cents per hour, they were 22.127 cents in 1909, an increase of more than 77 per cent. Cars that cost \$4657 in 1899 now cost \$11,111. Further, the roadbed had been rock-ballasted, a new power plant built at a cost of \$114,585, and other betterments effected. He also said that the company had paid the following dividends: Four per cent in 1905, 4 per cent in 1906, $2\frac{1}{2}$ per cent in 1907, $2\frac{1}{2}$ per cent in 1908 and $2\frac{3}{4}$ per cent in 1909, making an average annual dividend of $2\frac{3}{4}$ per cent. The cost of upkeep and operation was such that in order to guarantee to the stockholders an annual dividend of 5 or 6 per cent, it was necessary to increase the fares on the lines that were not paying.

The gross earnings of the company to Nov. 30, 1909, were \$203,816.84 and operating expenses \$109,857.27, leaving net earnings of \$93,959.57, to which were added earnings from other sources, making the gross income \$97,709.57, from which \$9,992.53 was deducted for fixed charges. During the year ending Nov. 30, 1909, passenger earnings for the main line were \$156,969, as compared with \$157,606 in 1908, \$154,704 in 1907 and \$147,022 in 1906.

The fare zones before Sept. 27, 1909, were as follows: Sixty-third Street Station, Philadelphia, to Eagle Hotel; Eagle Hotel to Newtown Square; Newtown Square to Pan Handle; Pan Handle to Milltown. The fare zones between Milltown and West Chester had not been changed, but the intervening territory had been divided into four instead of three zones, leaving Newtown Square in the center of the zone between Broomall and Florida Park. The distance between Broomall and Newtown Square was 2.16 miles, and travel between Broomall and Newtown Square was very light. The line from Philadelphia to West Chester was $19\frac{3}{4}$ miles, from Philadelphia to Ardmore, 6 miles; from Philadelphia to Collingdale, $5\frac{1}{2}$ miles.

Following the hearing, the commission requested Mr. Taylor to furnish the commission with a statement showing the receipts from passengers on the Collingdale and Ardmore divisions and the earnings per car-mile on each of these divisions on the basis of a 30-minute schedule, as compared with receipts and earnings per car-mile on the West Chester division.

Argument was also heard on the petition of residents in Harrisburg, chiefly railroad men employed at Enola, for an all-night service on the more important lines of the Central Pennsylvania Traction Company in Harrisburg. The company was represented by its counsel, Wolfe & Bailey, and produced records to show that there was no general demand for cars after 12:30 a. m. or 12:50 a. m.; the time service is now discontinued. F. B. Musser, president of the company, said that at least five cars would have to be run at night at a cost of about \$5 per car. There had been no general demand for night cars. The receipts on all lines on average nights fall below the cost of operation about midnight. The last cars generally were well filled because many men remain at clubs or hotels until time for the last car. The most economical way in which night cars could be operated would be to buy power from the Valley Traction Company, which is guaranteed against loss in operating night cars by the Pennsylvania Railroad. In January, 1910, the receipts of the Valley Transit Company had exceeded the operating expenses on its night cars by \$4.

The Pittsburgh Railways had entered a general denial of charges made by the McKeesport Board of Trade that the condition of its cars was unsanitary.

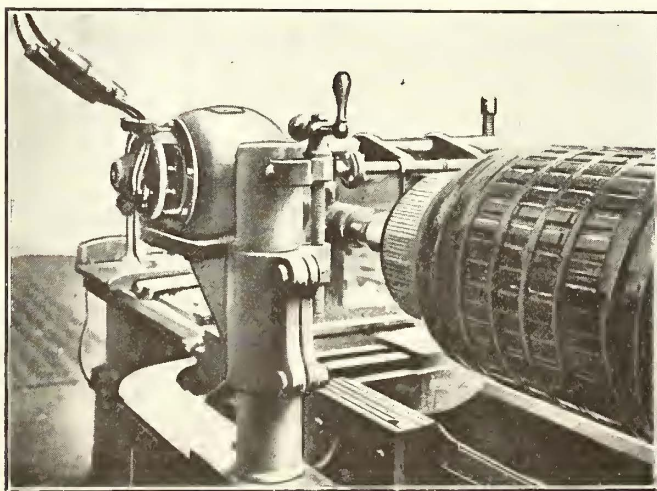
H. C. Eddy, secretary of the District Electric Railway Commission, Washington, D. C., was a guest of the Takoma Park Citizens' Association recently and at the request of the president of the association delivered an illustrated lecture entitled "Electric Railway Development."

NEW SHOP SCHEMES OF THE INDIANA UNION TRACTION CO.

An illustrated description of the shop of the Indiana Union Traction Company at North Anderson, Ind., appeared in the *STREET RAILWAY JOURNAL* for April 4, 1908, page 538. Since that article was presented this paper has published accounts of new maintenance methods inaugurated in the shops by R. C. Taylor, superintendent of motive power of the company. The present article deals with several new shop schemes recently put into effect at these shops.

COMMUTATOR SLOTTER

One of the illustrations shows a form of commutator slotter which does excellent service without impairing the capacity of the lathe on which it is mounted except while the grooving work is actually under way. The lathe upon which this slotting device is mounted was built with a taper attachment. As this was not required for armature work, it was utilized as a very satisfactory support for the slotting device. The mica is cut away by two small saws spaced apart the width of one commutator bar. These saws are mounted on a spindle directly driven at 1750 r.p.m. by a $\frac{1}{4}$ -hp Crocker-Wheeler motor. This motor and an arm which supports the bearings carrying the saw spindle are bolted to a split bracket clamped about a cylindrical post that stands on the part of the lathe carriage originally provided



Combination Slotting Device

for the taper attachment. The bracket arm may be moved up and down the post by a large square thread screw. In this way a nice adjustment for the depth of cut of the saws can easily be made.

The forward and backward movement of the saws through the slots is effected by moving the lathe carriage automatically or by hand. Adjustment for commutation of various diameters is easily made. The saws, moving with the lathe carriage, travel directly in line with the center of the armature shaft, so the only adjustment required for commutators of various sizes is a change in the height of the saws. This is easily made by turning a small handle attached to the screw which controls the movement of the bracket up and down the main post. Standard spacing pieces are provided for insertion between the saws so that they may be adjusted for different widths of commutator bars.

As the lathe to which this slotting mechanism is attached is also used for finishing commutators, little extra labor is required in preparing for slotting. When not in use the slotting saws are simply pushed back out of the way, and the lathe is then free for any other work. The apparent advantages of this type of slotting mechanism are that the armature need not be moved from the commutator lathe after it has been turned, and that there is no interference with the use of the lathe for other work except while the actual cutting away of the mica is being done.

ELEVATED HEADLIGHT

For experimental purposes, one high-speed interurban car is being equipped with a luminous arc headlight mounted in a dormer projection built as a part of the front hood. A circular glass window in the front of the dormer protects the lamp from drafts. The inside of the lamp space is open to the motorman's compartment, so that the lamp may be lifted in and out easily or may be adjusted by the crew while the car is running. This method of mounting the headlight high above the track is expected to give a more effective distribution of the light and to reduce the maintenance cost. It was suggested for trial by H. A. Nicholl, general manager of the Indiana Union Traction Company.

DESTINATION AND TRAIN NUMBER SIGNS

One of the illustrations shows the front end of a limited interurban car equipped with new types of signs for indicating the train number and the destination. The indication is effected by illuminating cloth signs carrying white letters or figures on black background. Two types of signs are used, one for destination names and the other for train numbers. The destination sign is carried inside the right-hand cab window close to the bottom of the sash. The train-number sign is carried at the bottom of the center window. The curtain mechanism and the lamps for these signs are enclosed in riveted tin boxes with doors arranged so that the interior fittings are accessible and so that the motorman can read the signs from his position at the controller.

The destination sign box is built to fit between the two window posts. A pair of hinges at one end provide for swinging the whole box back from the car window to facilitate cleaning the glass. There is no glass in the front of this sign box.

Three 16-cp lamps are permanently mounted on the bottom of the sign box. The curtain on which the names of the cities are printed is made of white sun-fast holland. The curtain is about 10 ft. long and is carried on two rollers, only one of which is equipped with springs. The roller without springs is operated by a shaft with a crank outside the sign box. The positive movement of the curtain roller in unison with the turning of the crank is effected by the use of a pair of 45-deg.



Destination and Train Number Signs

helical gears. The adjusting crank connects with the gear shaft by means of an eccentric pin so arranged that when the crank handle is turned flat against the box any movement of the curtain is prevented. All the parts of this destination sign, including the gears, were made from the raw materials in this shop at a cost of about \$6 per sign.

The train-number box has three separate curtains, each showing all the digits and the letter X, to indicate "extras." The enclosing box is of the same general type as that for the destination sign, only smaller. The curtains within are illuminated by two 16-cp lamps. Each of the small curtains is carried on two rollers without springs. The brass rods which carry these rollers extend through and above the top of the box, and are provided with long and short knobs, so arranged that each curtain can be adjusted independently.

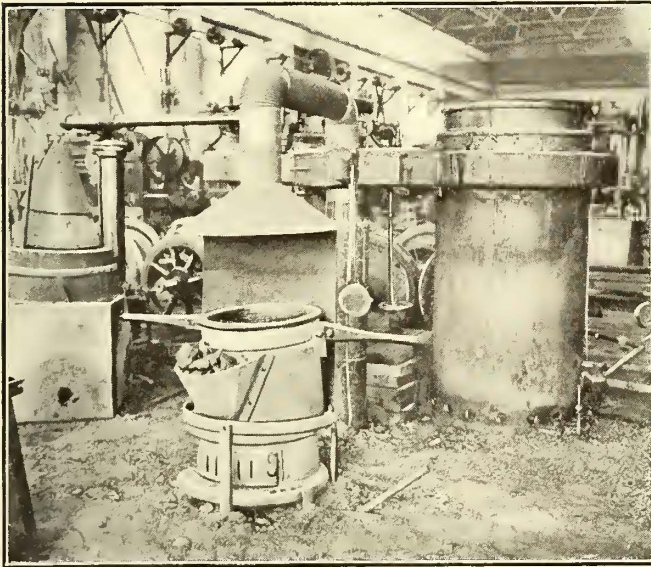
The destination and the train-number signs carry a total of five lamps on an independent circuit within control of the motorman. A small peephole is provided in the top of the train-number box for observing the numerals readily. The motormen find that it is useful in times of low voltage to have the lamp circuit in these boxes close at hand. The condition of power can be observed without the use of the general illumination of the car body and without having a bright, unconfined lamp in the cab.

The Indiana Union Traction Company indicates to intending passengers whether a train is a local or a limited by placing a

neatly lettered sheet-steel sign in the right-hand cab window. Signs for the two kinds of trains are printed in different colors. The limited sign has a blue background with gold letters and the local sign has a black background with silver letters.

EASEL FOR CURTAIN PAINTING

The sign painter at the Anderson shop has rigged up an easel which has been found very convenient during the painting of the curtains for the car destination signs. An illustration of this easel with a curtain on it is shown. The curtains used in the destination sign boxes are 21¾ in. wide, 10 ft. long and carry the names of 18 towns in letters 4½ in. high, spaced according to the length of the name. The easel on which these curtains are painted is so arranged that duplicate curtains can be made without the use of a stencil or any lining.



Home-Made Babbitt Melting Stove

When a curtain is to be painted the top of the cloth is tacked to a strip of wood which rides on the front of the two main legs of the easel. The curtain is supported by a weight carried on a string which is passed over the top of the easel. The end roll of cloth is carried in two supports made of spring steel bent into hook shape and fastened to the lower cross brace of the easel. Just above this cross brace is a sheet of glass about 30 x 24 in., against which the cloth to be painted lies. This glass forms a backing for the cloth and holds it in smooth shape while the paint is being applied.

If a curtain is to be duplicated one of the type desired is partly unrolled and so placed that that portion of the lettering to be copied lies flat against the front of the glass. The rolls of the cloth are supported behind the glass in suitable hooks. The blank cloth then is hung in front of the glass directly over the pattern curtain. As the curtain material is translucent the letters on the first curtain plainly show through the blank cloth and may easily be copied without the use of stencils.

BABBITT STOVE

An accompanying illustration shows a babbitt stove which has been rigged up on the shop floor close to the coil insulating plant. The stove was constructed almost entirely of second-hand material. The fire box consists of an old coal stove, the top half of which has been cut off. A feeding magazine has been attached to the side of the fire box so that when the ashes are shaken through the grate fresh coal falls into the fire pot. A ladle in which the babbitt is melted is supported in the top of the cut-off stove. Compressed air for forcing the fire is led under the grates of this stove. The exhaust fumes from the fire box and the ladle are collected in a hood and drawn in to the suction chamber provided near by for the vacuum impregnating plant. This melting outfit is used only for babbitting work. A very complete brass foundry in a separate building is a much-used part of the North Anderson shop group.

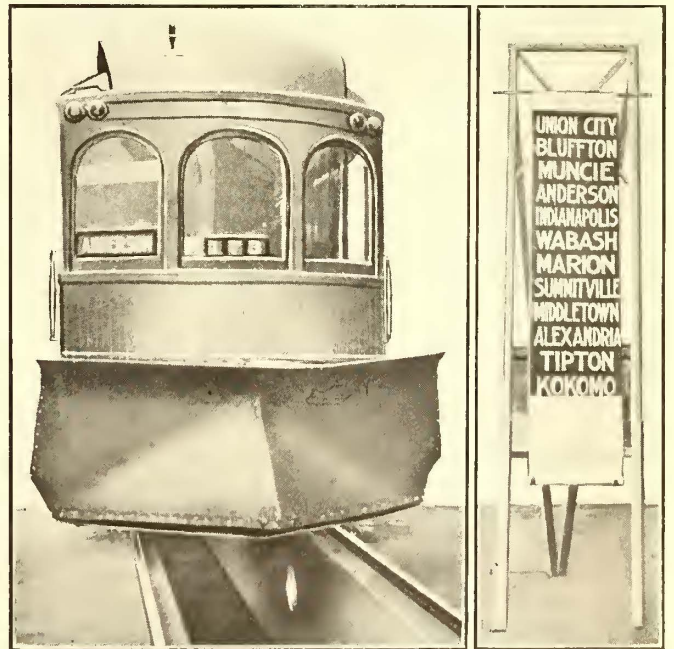
COIL INSULATION

One of the illustrations shows the coil-impregnating plant installed in the main shop. This plant was supplied by the J. P. Devine Company. Since this apparatus was put into use not an impregnated field coil has been lost. In connection with the standard type of impregnating apparatus Mr. Taylor has arranged a gasoline coil burner around the base of the tank. The gasoline supply is received from a sunken reservoir outside the shop building and is distributed under pressure for this use and for heating tires. The impregnating plant is directly under the main shop crane. Standard Varnish Company compounds are used for insulating the coils.

The following particulars regarding the method of operating this vacuum drying and impregnating plant may be of interest. One of the main points which is kept in view is that of maintaining a uniform temperature in both of the tanks while the compound is in a liquid state. The temperature is maintained between 310 and 320 deg. Fahr. When starting up with a supply of cold compound about 15 hours' time is required at the above temperatures to liquefy the compound.

In checking the temperature of the tank containing the compound a section of iron pipe with one end plugged is used to permit the insertion of the thermometer well below the surface of the insulating material. The temperature of the vacuum chamber is found by inserting the thermometer in an oil pipe provided in the cover. It is stated that the temperature of the vacuum chamber as thus found is about 40 deg. below that on the inside of the tank when the cover is in place, so an adjustment of 40 deg. is made. In connection with the use of gasoline for heating, it is found necessary to watch the temperatures of the tanks carefully when the gasoline supply tank outside the building has been filled. For a period of about an hour after this has been done the fresh gasoline seems to make a much hotter fire than at other times.

Coils which are wound with double cotton-covered wire are insulated as follows: The sets of coils are first put in the



Car Front, Showing Position of Illuminated Signs

Easel for Painting Sign Curtains

vacuum chamber and allowed to be heated to a temperature of 320 deg. in about four hours' time; then the vacuum pump is started and the coils kept under vacuum for three hours. Next the vacuum line is closed and the large gate valve between the vacuum tank and the supply tank is opened, allowing the hot compound to run into the vacuum chamber and submerge the coils about 6 in. Next the gate valve is closed and an air pressure of 60 lb. is turned on for three hours. After this

treatment the air pressure is reduced to 15 lb., the gate valve opened and the compound forced back into the liquid supply tank. The coils are then allowed to drain for about half an hour, when they are taken out and the layer of cheap cotton cloth which first had been put on as stripping is removed. This cloth takes away with it the excess compound and leaves the coils with a smooth surface on which the finishing insulation is placed.

COMBINATION PASSENGER, SMOKER AND BAGGAGE CAR, HANOVER, PA.

The accompanying illustration shows a fine combination car which has just been completed in the shops of the Hanover (Pa.) & McSherrystown Street Railway Company for use on its Littlestown division. It was designed exactly to suit the operation conditions for this line. This car is 27 ft. 6 in. over the corner posts, 37 ft. 6 in. over the vestibule and 7 ft. 6 in. wide. The side sills are old 6-in. girder rails reinforced by a light T-rail. The bolster is composed of two 4-in. girder rails with an intermediate oak filler. The end sills and center cross-sills are also light T-rails joined to the side sills by angles. The platform knees are 4-in. girder rails joined to the bolster and resting upon the end sills. The balance of the inner framing is white oak.

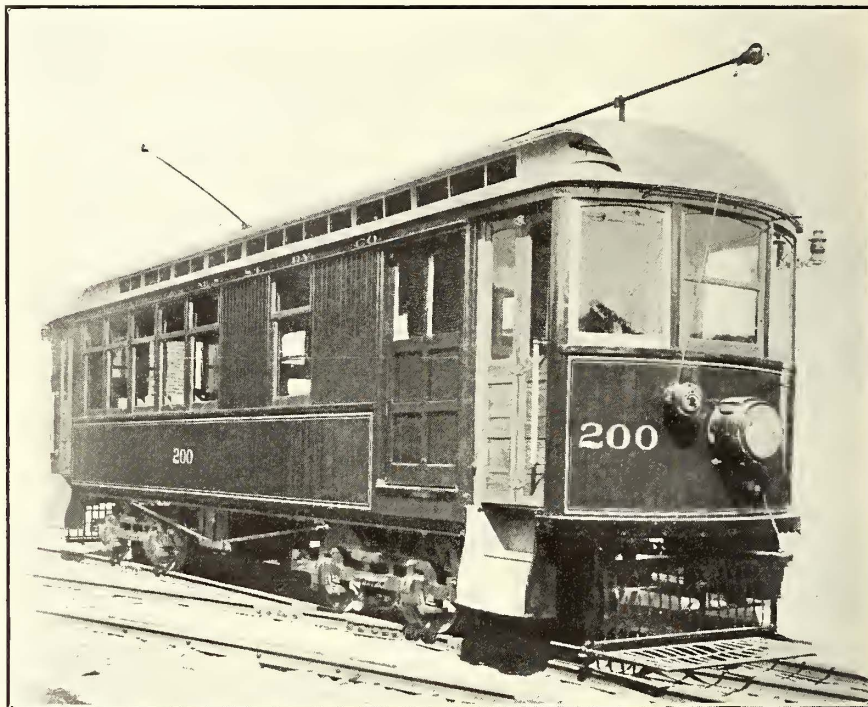
The passenger compartment is 16 ft. long and contains six Brill Winner rattan cross seats and four end seats, giving a total seating capacity of 20. The interior finish is white ash with a small amount of cherry moulding with bird's-eye maple headlinings. The windows raise up and are equipped with Edwards No. 13½ O. D. sash fixtures. In order to gain room the inside sheeting was placed between the posts with the moulding over the joints. The register in the passenger compartment is of the Sterling-Meaker type and is arranged for center rod operation.

The baggage and smoking compartment is 11 ft. 6 in. long, and contains one window on each side, and two sliding baggage doors. The equipment of this compartment is somewhat of a novelty, as it contains two rattan cross seats and one rattan end seat providing comfortable seating facilities for a reasonable number of smokers. In addition to these rattan seats two folding slat seats are provided to seat eight. These slat seats are hinged against the front bulkhead, and fold out of the way in case baggage is handled. This compartment contains a Cooper hot-water heater next to the center bulkhead. The ceiling finish is natural oak varnished down to the plate. The window frames are also oak; the balance of this compartment is painted a light drab. The roof is of the full steam coach type and carries two U. S. No. 11 trolley bases.

This car is mounted on double trucks, which were also built by the company in the manner hereinafter described. Two 16-ft. closed-car bodies, which were withdrawn from service, had been mounted upon two Brill No. 21-E single trucks of 6-ft. 6-in. wheelbase and equipped with GE 81, 30-hp motors. The motors had been purchased only about a year ago to replace Westinghouse No. 3 motors which had been scrapped. The side frames of the trucks as well as the wheels and journal boxes were in excellent condition and it was decided to use these parts to build two double trucks for the combination car. The two side frames and four journal boxes of the No. 21-E single truck were used for each truck. These were cut down from a wheelbase of 6 ft. 6 in. to 4 ft. 6 in. and sp'iced together by shaping off half of the metal of each end for a 12-in. length and bolting together. The top frame is an angle

3 in. x 4 in. x ½ in. resting upon the top of the pedestals of the old frames and bolted in place. This top frame is secured to the bottom spliced frame by two 2-in. x 2-in. angles on the inside to which the transoms are also bolted, the whole forming a light gusset and tying the two together to make a truss construction. Additional gussets are provided to join the transoms to the top angle frame and these in connection with the rigid end frames make a very stiff truck. The transoms are 4-in. x 6-in. angles cut away and resting upon the angles of the top side frame and bolted rigidly to the same. The bolster construction is of the swing type.

The bolster proper is 6-in. x 9-in. white oak, plated on each side with 6-in. x ¼-in. steel with through rivets and provided with removable chafing plates. The spring plank is made of two pieces of 10-in. channel, forming the spring supports which are tied together by two 3-in. x ⅝-in. steel plates riveted to the channels. The swing links are heavy steel swinging on 1¼-in. steel bolts screwed into the transom and 1¼-in. pins passing through the channels and the side pieces of the swing plank. The bolts carrying the upper end of the swing links are further



Combination Passenger, Smoker and Baggage Car

supported on the outside ends by angles bolted to the top of the transoms and pinned fast. The center bearing is a Symington ball-bearing secured to the bolster by through bolts. The springs used under the bolster are the eight coil springs (four on each side) from the old No. 21-E single truck, but provision was made in case these were too weak to add two of the old semi-elliptic springs from the single truck.

The No. 21-E side frames were cut off 20 in. from the outside of the center of the pedestal jaws and angles were bolted to the ends to which the 1¼-in. x 3-in. end frames are bolted and the motor suspensions were mounted on the same. The old wheels, axles and journal boxes of the No. 21-E trucks were used. The wheels were cast iron 30 in. in diameter, but the clearance on the trucks was designed for 34-in. steel wheels with a 3-in. tread. The side swing of the bolsters is cushioned by an ingenious arrangement as follows: The top side frame is drilled to allow a 1¼-in. bolt to project through close to the bolster. A collar was shrunk upon this bolt on the outside, against which a coil spring bears. In turn this coil spring is supported by angles and plates bolted to the frames. This, of course, acts as an effective cushion for the side swing. All important bolts used in this truck were turned to size and fit in reamed holes with Columbia lock nuts.

The brake system is a composite of the Brill No. 27-G and Baldwin trucks, taking the best points of each. It consists of 1-in. x 4½-in. brake beams with live and dead levers for center pull with safety carriers under the beams, hung from the transom. The old No. 21-E trucks were equipped with Christie interchangeable brake shoe heads and these were used on the new rigging, the links being hung from the upper part of the transom. These heads could not have suited the conditions better.

The four motors used were those from the single trucks. The cost to produce these trucks was but a fraction of the cost of new trucks. The braking equipment of this car includes Christensen AA-1 air brakes and the Sterling-Meaker "Giant" hand brakes.

Both the trucks and the car were completely designed by Robert E. Manley, general manager of the company, and built entirely in the shops of the company, under his supervision and that of Leroy Stokes, master mechanic. This car has now been in use for some time, making about 200 miles a day. It has exceeded all the expectations of the designer. The trucks are particularly easy riding and rigid under brake action.

COMPARATIVE COST OF 600-VOLT AND 1200-VOLT D. C. INTERURBAN RAILWAYS*

To obtain an idea of the advantages which may be expected on interurban railways with the use of 1200 volts as contrasted with 600 volts, let us consider four concrete applications to different conditions as presented in the following table:

	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
Kw-hour a day at cars.....	\$33,500	\$32,400	\$8,640	\$8,400	\$5,670	\$5,470	\$3,240	\$3,060
Converter load factor.....	0.31	0.13	0.44	0.19	0.58	0.28	0.45	0.25
Efficiency (average):								
Substation	0.836	0.69	0.87	0.76	0.89	0.823	0.873	0.803
Secondary distribution.....	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Transmission	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Step-up transformers.....	0.98	0.98	0.97	0.97	0.97	0.97	0.97	0.97
Combined	0.722	0.595	0.745	0.632	0.761	0.705	0.748	0.688
Kw-hour a day purchased.....	46,500	54,500	11,600	13,300	7,450	7,750	4,330	4,440
Cost per year at one cent per kw-hour.....	\$169,000	\$199,000	\$42,400	\$48,600	\$27,200	\$28,200	\$15,800	\$16,200

It will be seen that the roads vary from the heavy railroad conditions of "A," through heavy interurban "B," light inter-

DESCRIPTION OF LINES	A	B	C	D
	Length of road, miles, all single track.....	100	100	100
Time between trains each direction, minutes.	60	60	60	60
Cars per train.....	3	1	1	1
Seating capacity per car.....	65	60	50	40
Distance between stops, miles.....	5	2	1	0.5
Schedule speed, m.p.h.....	45	35	25	15
Maximum speeds, m.p.h.....	60	48	38	28
Car-miles a day.....	9,000	3,000	3,000	3,000

urban "C" and very light traffic "D." In fact, the rolling stock of "D" will be no heavier than many city cars. Based upon the requirements, the following data may be considered reasonable for the cars.

GENERAL DATA ON CARS	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
Number	60	60	15	15	17	17	20	20
Cost each.....	\$15,000	\$13,000	\$11,000	\$10,000	\$8,000	\$7,000	\$5,000	\$4,500
Weight, tons....	46.5	45	36	35	27	26	18	17
Amp, starting...	900	1,650	140	260	100	185	60	110
Amp, running...	100	187	47	87	33	62	20	37
Kw-hr, per train-mile	11.16	10.8	2.88	2.80	1.89	1.82	1.08	1.02
Car-miles a day per car.....	150	150	200	200	176	176	150	150

The power consumption, which is "at the train" is slightly more for the 1200-volt cars because of their heavier equipments. In the following estimate of car maintenance costs, 10

per cent greater maintenance is allowed for the 1200-volt equipment. As a matter of fact, no noticeable increase has been observed up to the present time. Thus on the Pittsburgh, Harmony, Butler and Newcastle Railway, where the service is very severe on account of many grades and curves,

COST OF CAR MAINTENANCE IN CENTS PER CAR-MILE	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
Mechanical...	1.25	1.25	1.00	1.00	.90	.90	.75	.75
Electrical99	.90	.77	.70	.60	.55	.55	.50
Total.....	2.24	2.15	1.77	1.70	1.50	1.45	1.30	1.25
Yearly cost..	\$73,500	\$70,500	\$19,400	\$18,600	\$16,400	\$17,000	\$14,300	\$13,700

many of the original motor brushes are still in service after 150,000 car-miles and the commutator wear is hardly perceptible. The sizes of synchronous converter units for the substations are based on an assumed maximum momentary demand of two cars starting simultaneously, except in the case of "A" where the size is based on the demand of one train

	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
Substations..	6	14	4	9	3	6	3	5
Momentary demand, kw.	1,440	1,320	336	312	280	222	192	154
Units	2	2	2	2	2	2	2	2
Size of each unit, kw..	1,000	1,000	300	300	200	200	150	150
Cost of station, each.	\$60,000	\$56,000	\$26,400	\$24,000	\$20,200	\$18,400	\$17,100	\$15,600

starting and one train running. In all cases, a margin is allowed for occasional extra service.

The number of substations depends upon the maximum economical spacing, considered in conjunction with the cost of feeder copper and the allowable line drop with the assumed conditions of load. The addition of another substation to the number given in the data will not save its equivalent in cost of feeder copper.

The investment in feeder copper equivalent to each substation would be: "A"-1200 volts, \$110,000 and "A"-600 volts, \$106,000; "B"-1200 volts, \$58,300 and "B"-600 volts, \$55,000; "C"-1200 volts, \$38,800 and "C"-600 volts, \$46,400; "D"-1200 volts, \$43,400 and "D"-600 volts, \$41,400. The actual amount should be somewhat greater than these values, for with the addition of a substation there is a reduction in load factor on each substation.

The primary distribution will be the same for either system except that the total length of the 600-volt transmission line will be slightly longer on account of the greater distance between the terminal stations. A flat price of \$3,500 per mile of transmission line is taken for "A" and \$1,000 per mile for system "B," "C" and "D." It is assumed that power is de-

FEEDER COPPER—COST PER MILE INSTALLED	No. 0	No. 00	No. 000	No. 0000	300,000	1,000,000
	Size.....	\$500	\$600	\$700	\$800	\$1,000

For track bonding \$450 per mile has been taken for A and \$400 per mile for B, C and D.

livered to the power house step-up transformers at 1 cent per kw-hour. The secondary distribution efficiency of approximately 90 per cent is based on using enough copper to keep the maximum drop within 250 volts on the 600-volt lines and 500

*Abstract of a paper on "The 1200-Volt Railroad," by Charles E. Eveleth (General Electric Company), read before the Philadelphia Section of the American Institute of Electrical Engineers, Jan. 10, 1910.

volts on the 1200-volt lines. A table on the previous page gives data on feeder copper costs and power consumption.

The table below, entitled "Comparison of Systems," parallels the 600-volt and 1200-volt railways on the bases of first cost, fixed charges, operation and maintenance, annual cost and revenue. The net saving, figured at 1½ cents to 2 cents per car-mile, will permit a very material increase in dividends. It is clear that the relative value of the higher voltage increases as the demand for power increases, and that below a certain size of equipment there would be practically no justification for adopting the higher voltage.

In conclusion it appears that a conservative estimate of the economy obtained by a 1200-volt system as compared with the 600-volt system with regard to the electrification material, is approximately as follows: First cost, 10 to 20 per cent; fixed charges, 10 to 18 per cent; and operation and maintenance, 10 to 15 per cent. In specific cases the saving has been found materially greater than indicated, notably where the length of road is such that no substations are required for the 1200-volt system while substations are required for the 600-volt system. In some instances the savings in the electrification material have been as great as 25 or 30 per cent.

DISCUSSION

W. S. Murray, electrical engineer, New York, New Haven & Hartford Railroad, regretted that Mr. Eveleth had not introduced the single-phase system for comparison with the others.

ing into sharp contrast the obnoxious arrangement of the combined alternating and direct current equipment.

One of the points in Mr. Eveleth's paper that had particularly interested him was the gradual betterment in first cost and operating expenses by the use of a 1200-volt system in preference to the 600-volt, as it passed from the conditions imposed by city requirements to light interurban traffic, and finally to those conditions required in heavy interurban traffic. This suggested to him the system that came into play after the 1200-volt system had done its best. It was fair to assume that 1200 volts on the d. c. motor would not be exceeded. Thus, with the motors in series it would be possible to establish a 2400-volt line. This might widen the field of application of the 1200-volt system for interurban work, but its competition under trunk line conditions, such as obtain on the New Haven road, disappeared when compared with single-phase current at 11,000 volts overhead. It was not impossible even to conceive of 22,000-volt a. c. transcontinental lines for the future. In connection with the single-phase system, he wished to say that he thoroughly believed its principal application was relegated to just one thing, trunk line traffic. Except for isolated branch or interurban lines that come within the zone of power supply from a trunk line system, it was not applicable to interurban or city lines.

L. B. Stillwell, consulting engineer, New York, said that within the limits of the problem which Mr. Eveleth considered,

COMPARISONS OF SYSTEMS

	A		B		C		D	
	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.	1200 volt.	600 volt.
<i>I.—First Cost:</i>								
Track, roadway, etc.....	\$2,500,000	\$2,500,000	\$1,800,000	\$1,800,000	\$1,800,000	\$1,800,000	\$1,800,000	\$1,800,000
<i>Electrification material:</i>								
Car equipments.....	960,000	840,000	172,500	150,000	136,000	119,000	100,000	90,000
Substations.....	360,000	784,000	106,000	216,000	61,000	110,000	51,000	78,000
Distribution.....	988,000	1,285,000	337,000	364,000	340,000	381,000	330,000	338,000
Total.....	\$4,808,000	\$5,409,000	\$2,415,500	\$2,530,000	\$2,337,000	\$2,410,000	\$2,281,000	\$2,303,000
In favor of 1200 volts.....		601,000		114,500		73,000		26,000
<i>II.—Fixed Charges:</i>								
Track, roadway, etc., 7 per cent.....	175,000	175,000	126,000	126,000	126,000	126,000	126,000	126,000
Electrification material.....	259,000	315,000	73,000	83,000	62,000	69,000	56,500	58,500
Total.....	434,000	490,000	209,000	209,000	188,000	195,000	182,500	184,500
In favor of 1200 volts.....		56,000		10,000		7,000		2,000
<i>III.—Operation and Maintenance:</i>								
Miscellaneous.....	421,000	421,000	123,000	123,000	87,000	87,000	65,000	65,000
Electrical.....	282,000	329,000	82,000	97,000	61,000	68,000	47,000	31,000
Total.....	703,000	750,000	205,000	220,000	148,000	155,000	112,000	116,000
In favor of 1200 volts.....		47,000		15,000		7,000		4,000
<i>IV.—Annual Cost II + III.....</i>								
	\$1,137,000	1,240,000	414,000	429,000	336,000	350,000	294,500	300,500
In favor of 1200 volts.....		103,000		2,500		14,000		6,000
<i>V.—Revenue:</i>								
Additional receipts per car-mile necessary to pay additional cost of operation, etc., for 600 volts.....		3.1c.		2.28c.		1.28c.		0.55c.

NOTE.—3,285,000 car-miles per year for A; 1,095,000 car-miles per year for B, C and D.

He thought very highly of Mr. Eveleth's paper but he believed that it was slightly more academic than would be the case if he had had actual field data from which to make compilations. Thus the calculations were based on theoretical assumptions of trains taking current in the vicinity of substations. Upon the basis of this assumption many of the financial considerations of the paper were involved, and one could see in an instant that this was the crux of the whole situation. If he had attempted to write the paper, he should have made the same assumption. While it seemed perfectly reasonable to make these assumptions, this emphasized the fact that there was a lack of data on actual 1200-volt practice. Electricity could certainly wear a great many different suits of clothes. He thought the 1200-volt system had come to stay, and that it was applicable to certain classes of interurban service. The best reasons for its existence of the 1200-volt system were the excellent opportunity it afforded for the reduction or elimination of substations in rural territory, and the facility with which motors operating on lines of this voltage could be made to accommodate themselves to equally efficient operation on 600-volt city lines, bring-

the advantages of the 1200-volt system were manifest. It was an obvious and fair deduction that the possibilities and limitations of voltages still higher must be carefully considered. A comparison of the 1200-volt d. c. system with a 10,000-volt single-phase or three-phase a. c. system, as applied to the operation of heavy passenger and freight trains as operated by the steam railroads of the country, would show advantages for the latter analagous to those which the 1200-volt system possessed when compared with the 600-volt system in the classes of service which Mr. Eveleth had considered.

In concluding the discussion, Mr. Eveleth said that while a higher d. c. voltage up to 2000 volts was possible, 1200 volts had been selected because with the motors wound for 600 volts, the car may be operated at the same speed on either 600- or 1200-volt trolleys by connecting the motors all in parallel for 600-volt operation and two in series and two groups in parallel on a 1200-volt section. By exactly doubling the voltage advantage was taken of the economy of higher voltage with minimum complication of equipment. One road was now successfully running with motors wound directly for 1200 volts

on each commutator. The choice of individual motor voltage was one of the questions which must be considered in any particular case, as they may be wound for either 600 or 1200 volts.

The choice of a system for heavy traction was quite a different problem from the choice for interurban service. Just as one tool fitted one class of work, and another tool fitted another so there seemed to be at the present time no one system best for all classes of service. He would regret very much to be considered an advocate of any one system. He hoped to see the single-phase system make good ultimately because it had been the most promising from its inception on account of the apparent advantages in distribution, simplicity and cost.

THE WAY COMMITTEE MEETS IN HARRISBURG

A meeting of the committee on way matters of the American Street & Interurban Railway Engineering Association was held in Harrisburg, Pa., on April 25. The following committee members were present: E. O. Ackerman, chairman, engineer maintenance of way, Columbus Railway & Light Company, Columbus, Ohio; Martin Schreiber, engineer maintenance of way, Public Service Railway Company, Newark, N. J.; C. L. Crabbs, engineer of way and structures, Brooklyn Rapid Transit Company, Brooklyn, New York; J. M. Larned, engineer, maintenance of way, Pittsburgh Railways Company, Pittsburgh, Pa. The work allotted to this committee is a continuation of the work of last year, particularly with reference to questions of economical maintenance; specifications for open-hearth and manganese steel rails; influence of gage of curves on movement of cars through them; clearance between street surface, or any other obstruction, and the rolling equipment; rail corrugation; standardization of girder rails; and standard layout for special track work.

In outlining the work the committee has made the following assignments: Mr. Schreiber, economical maintenance; Mr. Larned, specifications for open-hearth and manganese steel rails; George Weston, assistant general engineer, Board of Supervising Engineers, Chicago Traction, Chicago, Ill., rail joints; M. J. French, engineer maintenance of way, Utica & Mohawk Valley Railway Company, Utica, N. Y., influence of gage curves, etc.; Mr. Crabbs, rail corrugation; Mr. Ackerman, standard girder rail. The subject of standard layout for special track work is to be included in Mr. Schreiber's report on economical maintenance. Each member of the committee will give primary treatment to the subject assigned to him and then all the other members will contribute to the treatment of the same subject by gathering pertinent data and information and mailing the same to the member who has that subject in hand. The data thus separately assembled are to be formulated into one report by the committee as a whole.

After the meeting the members were entertained at lunch at the works of the Pennsylvania Steel Company, Steelton, Pa. After lunch the committee visited the Steelton Works and obtained valuable information relative to the work carried on there.

TRANSPORTATION AND TRAFFIC MEETING IN CHICAGO

A meeting of the executive committee of the American & Interurban Railway Transportation & Traffic Association was held in the Auditorium Annex, Chicago, Ill., on Tuesday, April 26. The association members present were: Robert I. Todd, vice-president and general manager of the Terre Haute, Indianapolis & Eastern Traction Company; G. W. Parker, general express agent, Detroit United Railway; J. N. Shannahan, vice-president and general manager, Washington, Baltimore & Annapolis Railway; J. W. Brown, superintendent of transportation, West Penn Railways; H. C. Donecker, secretary and treasurer of the association. The other attendants at this meeting were: C. D. Emmons, general manager of the Fort Wayne & Wabash Valley Traction Company, who is chairman of the

committee on interurban rules; P. P. Crafts, general manager of the Iowa & Illinois Railway, chairman of the committee on express and freight traffic; G. O. Nagle, general manager of the Wheeling Traction Company, chairman of the committee on the training of transportation employees; F. W. Coen, general manager and purchasing agent, Lake Shore Electric Railway, chairman of the committee on passenger traffic; H. W. Fuller, general manager, Washington Railway & Electric Company, member of committee on subjects. Progress reports were submitted by the representatives mentioned. Written reports were also received from the following absent chairmen: N. W. Bolen, superintendent of transportation, Public Service Railway, New Jersey, committee on construction of schedules and time tables; R. E. Danforth, general manager, Public Service Railway, New Jersey, committee on city rules; M. R. Boylan, general auditor, Public Service Railway, committee on transfers and transfer information.

It was decided that all committees will send out data sheets. The rules committees will develop desirable changes and point out the extent to which the rules have been adopted. The passenger traffic committee will develop the experience of interurban railways which have increased the rates of fare. The committee on freight and express traffic will develop the conditions where the carrying of freight is profitable and also a standard form of expense report. The next committee meetings are scheduled as follows: Interurban rules, May 8, at Fort Wayne, Ind.; express and freight, May 2, at Cleveland, Ohio; training of employees in Buffalo, on date not set; executive committee to meet early in July. The convention program of the Transportation & Traffic Association will follow the same arrangement and days as last year except for the addition of three papers and a report from the committee on the construction of schedules and time tables.

INQUIRY BY PUBLIC SERVICE COMMISSION CONCERNING DEPRECIATION ACCOUNTS

The New York Public Service Commission, Second District, has issued circular letters of inquiry to the street railroad and the electrical corporations subject to its jurisdiction which have not established operating expense accounts to cover depreciation and other amortization. The letters to street railroad corporations state in part:

"The uniform system of accounts for street railroad corporations prescribed by this commission, effective Jan. 1, 1909, contains three operating expense accounts to cover the matter of depreciation of operating property and other amortization of such property and capital. One of these is called depreciation of way and structures, another is depreciation of equipment, and the third is entitled general amortization.

"Charges to the two accounts, depreciation of way and structures and depreciation of equipment, are by the order of this commission covering the uniform system of accounts required to be made by each corporation to which the order applies according to 'a rule determined by the accounting corporation,' and it was further required that 'such rule and a sworn statement of the facts and expert opinions and estimates on which it is based shall be filed with the Public Service Commission on or before July 1, 1909.' The above-named corporation has not yet complied with this requirement. You are therefore required to file with this commission before April 15, 1910, answers to the following questions:

"1. Have you set up on your books the three accounts above named?

"2. If you have not set up such accounts, or any of them, why have you not done so?

"3. What rule are you observing in charges to the account depreciation of way and structures?

"4. What rule are you observing in charges to the account depreciation of equipment?

"5. Why have you not filed a copy of such rule and other matters with this commission as required by the order referred to?

"6. When do you expect to obey the order of the commission in this particular?"

"Also, on or before April 15 show in detail, giving dates, amounts, and all other particulars, the several entries which the corporation has made on its books of record in the accounts depreciation of way and structures, depreciation of equipment, and general amortization.

"Reply to this communication, giving specific answer to each of the foregoing questions, should be received before the date named. Your attention is respectfully called to that part of section 46 of the Public Service Commission's law reading as follows: 'The commission may require of all such corporations specific answers to questions upon which the commission may need information.'"

LARGE NEW STEEL CARS FOR OAKLAND ELECTRIC LINES SOUTHERN PACIFIC COMPANY

A contract has been let for the construction and equipment of 125 large steel passenger cars to operate over the 1200-volt suburban lines of the Southern Pacific Company, now being electrically equipped at Oakland, Cal. These cars are noteworthy because of their large seating capacity, 116 passengers, their all-steel construction with turtle-back roofs and their low weight per passenger seat, 896.6 lb. The American Car & Foundry Company will build these cars and the order includes 40 motor coaches, 25 combination coach and baggage motor cars and 60 trailers.

The frame and body design of all cars is the same. The controlling dimensions are as follows:

Length over end sills.....	58 ft.	6 $\frac{3}{8}$ in.
Length over platforms coupled.....	72 ft.	4 $\frac{1}{2}$ in.
Center from bolster to end sill.....	6 ft.	9 in.
Wheel base of car	52 ft.	$\frac{1}{2}$ in.
Wheel base of truck.....	7 ft.	
Width over sills	10 ft.	4 in.
Width overall at eaves	10 ft.	5 $\frac{7}{8}$ in.
Height top of rail to bottom of sills.....	3 ft.	8 $\frac{3}{4}$ in.
Height top of rail to top of platform.....	4 ft.	4 $\frac{3}{16}$ in.
Height top of rail to top of roof.....	13 ft.	$\frac{1}{2}$ in.
Approximate light weight of motor coach complete	104,000 lb.	
Weight of trucks, each complete.....	13,728 lb.	

The designs for the new cars were prepared by the engineers of the Southern Pacific and Union Pacific Associated Lines.

BODY AND UNDERFRAME CONSTRUCTION

The main members of the underframe of these cars are two $\frac{7}{8}$ -in. channel-section center sills extending from end to end of the car and similar side and end sills. The body bolsters are cast steel. The underframing within the body is covered with a floor of Flexolith laid $\frac{3}{8}$ in. deep on galvanized Keystone flooring. The platform framing is floored over with a $\frac{1}{2}$ -in. open-hearth steel plate supported by a $3 \times 3 \times \frac{3}{4}$ -in. angles. The wearing surface of the platforms is Mason safety carborundum tread. The platforms have spring buffer attachments providing for passage from one car to another through end doors 40 in. wide. Janney long-stem couplers are used.

The body is made up of steel plates and pressed-steel posts supporting a turtle-back sheet-steel roof of the same type as that used on the Union Pacific and Southern Pacific steel coaches. This roof is reinforced with 1/16-in. pressed-steel carlins.

The motor coaches each have two platforms with step openings 4 ft. 4 in. wide divided by a pipe stanchion extending from the platform floor to the middle of the lower step. Each step opening during running is protected by a steel grill gate, mechanically operated. The interior of the motor coach is not subdivided, except that a toilet room about 3 ft. 6 in. square, is partitioned off at one corner of each car. Folding cabs for enclosing the control equipment and motorman are provided at both ends of the motor coaches and permanent cabs are provided in the baggage end of the combination coaches.

All of the interior finish of the car body is steel and the sides below the windows are only as thick as the steel plate used to cover the framing. In this way an extreme interior width is obtained. Because of the extreme width of these cars, 10 ft. 4 in. at the sills, and the thinness of the sides, it is possible to greatly increase the seating capacity using seats which accommodate three passengers on one side of the aisle and two-passenger seats on the other. The window end of each seat is carried on a pressed-steel bracket riveted to the car siding. Each of the seats has a back 20 in. high and pressed-steel framing of the Hale & Kilburn "walkover" type. Each motor and trailer car has 24 two-passenger seats, 20 three-passenger seats and 4 two-passenger bulkhead seats. On the side of the aisle which has the three-passenger seats the seat nearest the door is of the two-passenger size so that there may be ample clearance for passenger movement. The combination cars have 18 two-passenger seats, 16 three-passenger seats and 2 two-passenger bulkhead seats. The three-passenger seats have cushions 53 in. long with arm rests and are 57 $\frac{5}{32}$ in. long over all. The two-passenger seats have 33-in. cushions and are 36 $\frac{29}{32}$ in. long over all. Ventilation of the car body will be effected by the use of 10-in. Globe ventilators above register openings in the car roof.

EXHIBITS AT SIOUX CITY

The following are brief statements of the exhibits made in connection with the annual convention of the Iowa Street & Interurban Railway Association at Sioux City, Ia., April 21-23:

American Car Company, trucks, car seats, fare boxes and noiseless brake hangers.

Ohio Brass Company, overhead material, track bonds, car-signal system, air sanders and Tomlinson couplers.

American Steel & Wire Company, cables and wires, track bonds and bonding, tools and right-of-way fence.

Central Electric Company, high-voltage insulators, span drop-outs, D. & W. car fuses and cut-outs, Okonite wires and cables, Monson and Okonite tapes, Deltabeston wire.

W. R. Garton Company, Bayonet trolley base, Earll trolley retrievers and catchers, Shaw lightning arresters, "M. V. G." arrester with "hydro" ground, "Bradshaw's" car skid, Frank Ridlon Company's field and armature coils and commutators, Electric Railway Equipment Company's overhead supplies, Universal safety treads, Waterbury Company's wires and cables and Heany fireproof wires.

Taylor Electric Truck Company, short wheelbase truck for city service.

General Electric Company, general supplies and apparatus for railway and lighting use.

Interstate Supply Company, Sioux City, Ia., products of the Wagner Electric Manufacturing Company and W. N. Matthews & Brother.

Westinghouse Electric & Manufacturing Company, overhead material, including several types of wood and composition strain insulators and railway and lighting supplies.

Western Electric Company, electric railway materials and machinery, including telephones.

Hensley Trolley Company, wheels, harps and sleet cutters.

Indianapolis Brass Company, overhead materials.

Milwaukee Vacuum Machinery Company, car-cleaning apparatus.

Atlas Railway Supply Company, rail joints, chairs and track fittings.

Rail Joint Company, rail joints, including Weber and continuous types and the "F. & S." continuous joint for frog and switch heels.

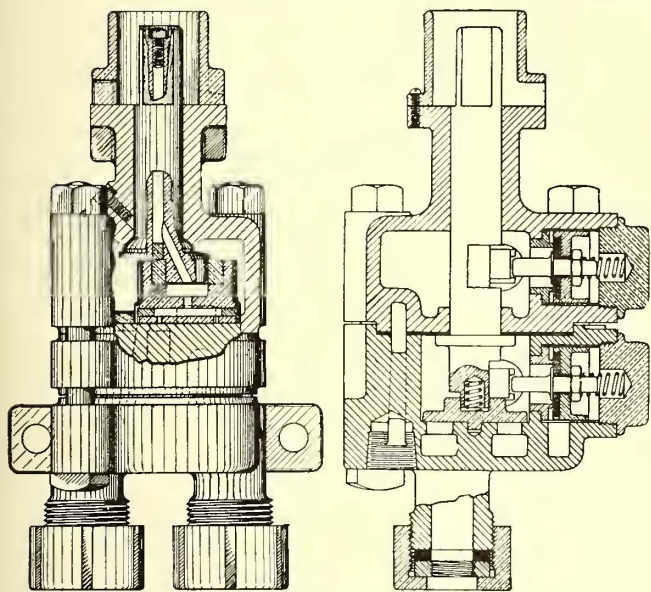
Monarch Electric Company, Monarch wire, Bryan Marsh lamps and general electrical supplies.

The British Columbia Electric Railway, Victoria, B. C., is planning to create a summer resort at Cordova Bay, 6 miles from Victoria, where it has purchased 40 acres of land for amusement purposes.

MOTORMAN'S BRAKE VALVES

The accompanying cuts are sections of two recent types of motorman's brake valve made by the National Brake & Electric Company, Milwaukee, Wis. One of these is the 1/2-in. "SV" slide valve and the other the 1/2-in. "PV" piston valve, which has no ground joints.

The 1/2-in. "SV" valve is a slide valve with ports on the lower face that register with corresponding ports in the valve seat. The valve seat is of cast iron and has three port openings which connect with the reservoir, brake cylinder and atmosphere. Repairs can be easily made as the valve seat, being de-



Sections of Type 1/2-in. "SV" and Type 1/2-in. "PV" Motorman's Brake Valves

tachable and provided with removable guides for slide valves, can be refaced on a lathe instead of a shaper. A detachable handle, which tops the valve stem or eccentric spindle, causes this part to revolve, thus manipulating the slide valve and cross-head, the latter having a large wearing surface to compensate for wear between the slide valve and lower portion of the stem. The valve must be in lap position and all ports of the valve seat blanked before the operating handle can be inserted or removed. A shield on the valve bonnet protects the valve stem when the handle is taken off and thus the mechanism is practically locked so that passengers cannot tamper with it.

Considerable trouble has been experienced in lubricating air valves even when they are provided with an oil reservoir. This has been due both to moisture deposits and the action of the air which, when passing through the valve bonnet, invariably comes in contact with the reservoir and whips out the oil. These defects have been remedied by extending the cross-head to cover the oil reservoir completely and by conducting oil direct to the latter through the cross-head by means of an opening leading from the top of the valve stem. The air cannot lift the cross-head from the oil reservoir as the cross-head never extends beyond the side of the valve, the air also being deflected by plates which are cast directly over its path. Oil cannot escape, but is brought in immediate contact with all the wearing parts of the slide-valve seat, perfect lubrication being thereby assured. The oil supply is renewed by removing the screw in the upper part of the valve stem. The slide valve adjusts itself to the proper seat without attention. A spring latch in the operating handle engages projections on the valve bonnet so that by the sense of feeling alone an operator soon gages the successive positions of the valve.

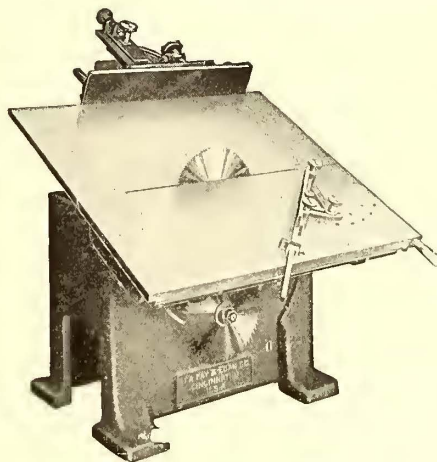
Car-house men have had trouble in repairing valves where the air tightness depends on ground joints. The types 1/2-in. "PV" valve is designed to overcome this, as it is made without ground joints. The valve bonnet is free from air pressure ex-

cept when the brake cylinder is charged, thus eliminating the leaks around the valve stem, bonnet or seat, which frequently occur in the slide or rotary valves. The admission and release valves have an inexpensive seat of composition material which effectually prevents the escape of air and is so arranged that should this part become displaced or slightly worn, it is an easy matter to adjust the same quickly or replace it with an entirely new seat. The valve can be completely disassembled without disconnecting or draining the main reservoir, although this does not apply when it is desired to remove the admission valve. The only lubrication required is effected by removing the screw in the valve stem.

The sectional view shows the valve with the handle removed, at which position the admission and release valves are seated, while the graduating valve closes the ports leading to the brake cylinder and release valves. The valve stem is so milled that when the operating handle is moved to the right of center, the lever of the admission valve is pushed outward, thus forcing the valve from its seat; likewise, a movement of the handle from left to center displaces the release valve. The admission and release valves are interchangeable and have a seat of composition material that renders them impervious to moisture and oil. The graduating valve is a flat disk with face and seat accurately machined, the upper part of the valve being milled to engage the lower portion of the valve stem, thus transmitting movements of the valve stem to the graduating valve.

DOUBLE CIRCULAR SAW

The accompanying cut shows a novel combined ripping and cross-cutting machine designed especially for pattern work in car shops by the J. A. Fay & Egan Company, Cincinnati, Ohio. Both saw arbors are carried on a revolving frame, and it is easy to take off or put on saws without disarranging the table. Two saws up to 16-in. diameter, one on each arbor, can be carried at the same time and the frame revolved, or if only one saw is used, it may be as large as 20 in. in diameter. The table is made in two sections, one moving section moving easily on frictionless rollers, and a stationary section having an extension



Double Circular Saw

so that material up to 20 in. in width may be ripped. The moving section of the table has sufficient motion to edge or cut-off material up to 35 in. and will open to permit the use of 2-in. grooving head. The whole table can be tilted by a hand-wheel to an angle of 45 deg. from the saw. A gage registers the angle to which the table is tilted.

The ripping fence may be set to take stock up to 20 in. wide and used on either the right or left section of the table. A micrometer adjustment is provided on this fence for use when certain adjustments are too fine to be made by hand. The miter cut-off fence is used on the sliding table and covers a range of 45 deg. back of the fence to 60 deg. in front. This fence is furnished with a stop-rod, to be used for stock of various lengths. The mechanism of the tool is completely enclosed.

News of Electric Railways

Transit Affairs in New York

The Public Service Commission has made public the form of contract proposed for the construction, equipment and operation of the tri-borough subways route, in so far as that route is offered to private capital to build, equip and operate. This contract is the forerunner of another covering the construction of the subway only and by funds derived from the sale of city bonds. As previously announced in the *ELECTRIC RAILWAY JOURNAL*, there will be a public hearing on May 9, 1910, on the form of contract made public, and a week later a hearing will be given on a form of contract, to be published in the meantime, providing for the construction of the tri-borough route with city funds and its equipment and operation by private capital. This second form of contract will cover the tri-borough route in sections, and will follow the general form of the contracts for the construction of the Fourth Avenue (Brooklyn) route, which have already been let.

It has been reported that the Hudson & Manhattan Railroad will apply to the Public Service Commission for permission to extend its subway south on Manhattan Island from Ninth Street and Sixth Avenue to the Cortlandt Street terminal.

An order signed by Judge Lacombe of the United States Circuit Court on July 15, 1909, was filed on April 23, 1910. It authorizes William H. Ladd, receiver of the New York City Railway, to sell to the receivers of the Metropolitan Street Railway 500 shares of the capital stock of the Bridge Operating Company and to transfer the agreement of the New York City Railway for the operation of cars over the Williamsburg Bridge for a consideration of \$150,000 in cash.

Justice Greenbaum, in the Supreme Court, in a decision rendered on April 21, 1910, said that the charter of a company is entirely distinct from its franchises to use the streets. While the Attorney-General must get the court's permission to sue to dissolve the charter of the Bleecker Street & Fulton Ferry Railroad, which has not been operated for some time, the Attorney-General may sue of his own volition to dissolve the right to occupy the streets. This right, the Attorney-General has, says the court, in case a railroad ceases to operate its cars.

The hearing before the Public Service Commission on the application of the Manhattan Bridge Three-Cent Line for a certificate of necessity and convenience for a franchise in the boroughs of Manhattan and Brooklyn has been closed. A review of some of the testimony introduced before the commission was published in an article in the *ELECTRIC RAILWAY JOURNAL* of April 16, 1910, page 705.

Detroit United Railway Files Bill of Particulars in Arbitration

On April 28, 1910, the Detroit United Railway filed with the board of arbitration which is to consider the appraisals of the property of the company the following communication, in which the reproduction value of the property on March 1, 1909, is placed at \$24,676,181.75:

"In response to your request for a statement in the nature of a bill of particulars relative to the value of the Detroit United Railway properties, we state:

"First—It is our understanding that it is the purpose of the court to ascertain the value of the property which may be written into a proposed contract between the railway and the city, which value should be that of a going concern or operating railway, and should include all values, tangible or intangible, which in any way enter into a correct valuation.

"Second—The Barcroft appraisal to which you direct our attention does not disclose any method of ascertaining such value.

"Third—The reproduction value of the property on March 1, 1909, as we claim it to be, is \$24,676,181.75.

"The foregoing does not include any reduction for de-

preciation, but does include the track and appurtenant property extending to the Log Cabin Park and other tracks and property devoted to city service, the mileage of said outside tracks amounting in all to 24.41 miles. It also includes the items mentioned hereafter in paragraph 5 as having been omitted from the Barcroft appraisal, but which are not yet separately tabulated so as to now be presented in this paper.

"As to depreciation, the company claims and will undertake to show that it maintains its entire system within the city at 82½ per cent of its reproduction value.

"Fourth—The Barcroft appraisal omits parts of the company's property, including real estate, paving, tracks, building and other items, and does not include all of the property of the railway used for city service.

"Fifth—The Barcroft appraisal omits to take into consideration such items as cost of separation of grades, street widenings, changes of track location, conversion of suburban tracks to city tracks, legal expenses, carrying charges during construction, brokerage, engineering, and in some cases contingencies. Neither does it take into consideration the matters of development cost and obsolescence, which are necessarily items which should be included in the capital account.

"Sixth—It omits the additions to the property of the railway since March 1, 1909, which is the date of the inventory and appraisal.

"Seventh—The Barcroft appraisal is, therefore, incorrect in stating the cost or reproduction value of the items going to make up the railway property, in that it does not include the entire property and items.

"Eighth—In some instances the depreciation fixed by the Barcroft appraisal is wholly arbitrary and without known rule or method. We instance in this respect the depreciation of tracks and rolling stock as stated in said appraisal."

Frederick T. Barcroft, who appraised the property for the committee of fifty, made public on April 22, 1910, a letter in which he gave his reasons for not appearing before the board of arbitration. Previously P. J. M. Hally, corporation counsel of the city, wrote an open letter to the arbitrators declining to be present on behalf of the city on the ground that the hearings were not official, although at the meeting of the Council on April 26, 1910, he was requested by that body to represent the city with full power to incur whatever expense he deemed necessary.

The board of arbitration has adjourned until May 9, 1910, to enable the committee of fifty to select an engineer in place of Mr. Barcroft. On April 26, 1910, the City Council approved the board of arbitration as now constituted.

Cleveland Traction Situation

G. M. Dahl, street railway commissioner of Cleveland, distributed the first of his "Street Car Talks" on the cars of the Cleveland Railway on the evening of April 21, 1910. Mr. Dahl intends to issue these leaflets whenever he has anything to say to the people who use the cars. In this first talk he discussed his recent orders forbidding passengers to smoke or stand on the rear platforms of cars. The purpose of the order was to facilitate the movement of cars by avoiding congestion that interferes with ready ingress and egress.

J. J. Stanley, president and general manager of the Cleveland Railway, has proposed that the schedules on the Superior, Woodland-Lorain, Cedar and Central lines be shortened through the day. Mr. Dahl says that service should be increased in the morning and in the evening when the travel is heavy. He contends that service during the day meets all demands. Mr. Stanley proposed to install the schedule in force when the Cleveland Electric Railway turned its lines over to the Municipal Traction Company. This would increase the car miles operated over the present schedules as follows: 1075 on the Woodland-Lorain line,

513 on the Superior line, 390 on the Payne line, 296 on the Cedar line and 236 on the Central line. Mr. Dahl says that it would require 12,656 extra fares to pay for the operation of cars on the increased schedules and he does not believe that the additional traffic would compensate for the change.

Mr. Dahl conferred with Mr. Stanley on April 22, 1910, about the purchase of additional cars. Mr. Stanley feels that the funds at the disposal of the company at this time should all be expended for improvements to the track, overhead work and power equipment.

Engineers in Mr. Dahl's office have placed the values of the portion of track on Lorain Avenue which the Cleveland Railway has proposed to purchase from the Cleveland, Southwestern & Columbus Railway at \$26,000 and Mr. Dahl has indicated that he is willing to approve a contract upon that basis. The price asked by the Cleveland, Southwestern & Columbus Railway was \$86,000. It is possible that arrangements may be made between the Cleveland, Southwestern & Columbus Railway and the Cleveland Railway for the joint use of the track.

Some time ago Mr. Dahl asked the Cleveland Railway to consider the proposition of a fare of 5 cents to Euclid Beach and reply in advance of the meeting of the Council on April 18. Mr. Stanley furnished figures showing that the present fare of 10 cents would aid materially in making 3-cent fare in the city a success. Councilman Laferty offered an ordinance to provide for the lower fare. Mr. Dahl said that the ordinance had been prepared and presented without his knowledge.

Mr. Dahl has ordered that all pay-as-you-enter cars be equipped with fare boxes. About 60 cars have not yet been equipped.

Meeting of the New England Street Railway Club.—The monthly meeting of the New England Street Railway Club was arranged to be held at the American House, Boston, Mass., on the evening of April 28, 1910. Henry E. Rhodes, past assistant engineer of the United States Navy, was to recount his experience in foreign countries as a naval engineer and as a member of a relief expedition to the polar region.

Decision in Geary Street, Park & Ocean Railroad Case.—In the suit brought by Horace G. Platt, president of the Geary Street, Park & Ocean Railroad, San Francisco, Cal., as a taxpayer, to enjoin the Board of Supervisors of San Francisco from proceeding with the issuance of bonds for the reconstruction of the railway as a municipal enterprise, the franchise having expired, Judge Ellison of the Supreme Court of Panama County has sustained the demurrer of the city, denied the application for an injunction and ordered judgment entered for the city.

Central Station Energy for Gary & Interurban Railway.—The Gary & Interurban Railway, which connects Gary and Hammond, Ind., has entered into a contract with the North Shore Electric Company, Chicago, Ill., to purchase 500 kw of electrical energy at 12,000 volts and 60 cycles, with the privilege of taking 1000 kw, delivered at the State line between Indiana and Illinois, at a point east of Bernice, Ill. The Gary & Interurban Railway will have a sub-station near Gary, and will take its entire supply of current from the central station company.

Plea for Lower Taxes in Indiana.—Representatives of most of the interurban electric railways in Indiana appeared before the State tax board of Indiana recently and pleaded for a lower assessment in order to meet the demand for improvements and renewals to their systems. Notwithstanding that the gross receipts of the companies for 1909 were greater than for any previous year, the cost of operation, of materials and of labor and the increase in taxes due in part to the 3-mile road law, reduced the net earnings appreciably. In most cases a reduction in the assessment was asked. All those represented contended that an increase would be unjust. The board will fix the assessments and will then grant another hearing.

Summer Courses at the University of Wisconsin.—The 10th annual session of the summer schools for engineers and artisans, under direction of the College of Engineering of the University of Wisconsin, Madison, Wis., will open on June 27 and continue for six weeks. Advanced courses are offered in direct and alternating currents, hydraulics, ma-

chine design, descriptive geometry, applied mechanics, shopwork, steam and gas engineering and surveying. Elementary courses are offered in applied electricity, engines and boilers, fuels and lubricants, mechanical drawing, machine design, materials of construction, shopwork and surveying. F. E. Turneure is dean of the College of Engineering.

Indianapolis, New Castle & Toledo Electric Railway.—Following a recent inspection of the Indianapolis, New Castle & Toledo Electric Railway, it was officially announced that the road would be placed in operation between June 15, 1910, and July 1, 1910. The road extends from Indianapolis to New Castle, a distance of about 40 miles, and passes enroute through Mt. Comfort, Mohawk, Wilkinson, Shirley and Kenwood. In 1907 the company was placed in the hands of the Union Trust Company, Indianapolis, Ind., as receiver, and from November, 1907, until September, 1909, very little construction work was done. The receiver was then ordered by the court to complete the line.

Paper Before Chicago Electric Club.—Under the title, "The Problem of Railroad Electrification—The Transmission of Power from the Power House and its Distribution to Moving Trains," Frederick Darlington, Pittsburg, electrical engineer with the Westinghouse Electric & Manufacturing Company, read an interesting paper before the Electric Club of Chicago on April 20, 1910. The main point of the speaker was that the transmission and distribution of electricity from the power house to heavy train units was the important problem in heavy railroading; further, that the use of high-voltage energy, specifically the single-phase system, reduced the cost of this transmission and distribution. Mr. Darlington's paper did not apply especially to railroad terminal electrifications, but rather to the whole problem of operating by electricity ordinary steam railroads.

Maryland Utility Commission.—When Governor Crowthers, of Maryland, announced the appointment of James M. Ambler, W. W. Abell and Judge James Alfred Pearce as members of the Public Utility Commission of Maryland, he said that none of the gentlemen had been consulted regarding his appointment, but that he felt they would all agree to serve unless some obstacle should present itself with which he was not acquainted. Judge Pearce has, however, declined the nomination. He gave his reasons for not accepting the nomination in a letter to the Governor, but has refused to discuss the matter for publication. Mr. Ambler has accepted the appointment. Mr. Abell is on his way to Baltimore from Japan. He has not been formally notified of his appointment. Philip D. Laird, Rockville, has since been named by the Governor for the place on the commission declined by Judge Pearce, and has accepted the appointment.

Association Notes.—The American Street & Interurban Railway Association has published a booklet entitled "Standardization," in which a brief description is given of the work of the association in the interest of standardization. The association has also distributed a series of standard employment, reference and physical examination blanks for transportation employees which were adopted by the Transportation and Traffic Association at the convention in Denver. The contents of this set is as follows: (a) Application for employment; (b) reference inquiry (sent to previous employer); (c) reference release (sent to previous employer); (d) reference inquiry (sent to individual named as reference); (e) record of examination of sight, color sense and hearing; (f) surgeon's certificate of examination; (g) instructions to surgeon. In addition the association is distributing an associate membership folder, in which are set forth the advantages derived by members of the association during the past year.

Suit to Annul Franchise in San Francisco.—Attorney-General Webb, of California, has filed a suit in the Superior Court asking that the franchise of the Sutter Street Railway for the outer tracks from Sutter Street to the ferry at the foot of Market Street, San Francisco, Cal., be forfeited, and that the Sutter Street Railway and the United Railroads be excluded from operating thereon. The complaint sets forth that on Nov. 14, 1870, the Sutter Street Railroad

Financial and Corporate

New York Stock and Money Market

April 26, 1910.

For a week the Wall Street stock market has been weak and irregular, with light trading. The serious storms in the West, the disturbance in the cotton market and the heavy exportations of gold have all contributed to this condition. The traction issues have stood the strain fully as well as any upon the list. The Interborough stocks continue to be active and the declines have not been serious.

The money market continues to be remarkably easy, in spite of the drain of gold to Europe. Quotations to-day were: Call, 2¾ to 3 per cent; 90 days, 3¼ to 4 per cent.

Other Markets

The heavy selling pressure directed against Rapid Transit and Union Traction continues to depress prices in the Philadelphia market. Since the strike the efforts to sustain prices have been relaxed, with the result that there has been little recovery from the low point.

In the Boston market, there continues to be active trading in the issues of the Massachusetts Electric Companies at prices that are nominally unchanged. Outside of this there is no trading of importance. A few shares of Boston Elevated have changed hands at former prices.

In Chicago there has been little trading in tractions. A few lots of Chicago Railways, Series 2 and 4, have been sold at prices slightly lower than those of a few weeks ago.

In Baltimore trading is inactive in the bonds of the United Railways at prices that have prevailed for months. There has also been some dealing in the stock at 12½ to 12⅞.

Quotations of various traction securities as compared with last week follow:

	April 19.	April 26.
American Railways Company.....	a45¼	a45¼
Aurora, Elgin & Chicago Railroad (common).....	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred).....	*94¾	*94¾
Boston Elevated Railway.....	a127	a120
Boston & Suburban Electric Companies.....	a16	a16
Boston & Suburban Electric Companies (preferred).....	75	73
Boston & Worcester Electric Companies (common).....	a10¾	a10½
Boston & Worcester Electric Companies (preferred).....	a47	a45
Brooklyn Rapid Transit Company.....	a80¾	a77¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s.....	86	83¾
Capital Traction Company, Washington.....	a132½	a132
Chicago City Railway.....	a190	a195
Chicago & Oak Park Elevated Railroad (common).....	*3½	*3½
Chicago & Oak Park Elevated Railroad (preferred).....	*7½	*7½
Chicago Railways, pteptg., ctf. 1.....	a100	a100
Chicago Railways, pteptg., ctf. 2.....	a30	a29
Chicago Railways, pteptg., ctf. 3.....	a13	a13
Chicago Railways, pteptg., ctf. 4s.....	*8	a7¼
Cleveland Railways.....	*91½	*91½
Consolidated Traction of New Jersey.....	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds.....	a104½	a104½
Detroit United Railway.....	61	*61
General Electric Company.....	151½	148¾
Georgia Railway & Electric Company (common).....	a109½	111
Georgia Railway & Electric Company (preferred).....	a86	a87
Interborough-Metropolitan Company (common).....	23¾	21¼
Interborough-Metropolitan Company (preferred).....	60¾	53¾
Interborough-Metropolitan Company (4½s).....	*81	80¾
Kansas City Railway & Light Company (common).....	a31	*31
Kansas City Railway & Light Company (preferred).....	*77¾	*77¾
Manhattan Railway.....	137	136
Massachusetts Electric Companies (common).....	a19	a18
Massachusetts Electric Companies (preferred).....	a88	a88
Metropolitan West Side, Chicago (common).....	a16	*16
Metropolitan West Side, Chicago (preferred).....	a53	*53
Metropolitan Street Railway.....	*15	*15
Milwaukee Electric Railway & Light (preferred).....	*110	*110
North American Company.....	*77½	72¾
Northwestern Elevated Railroad (common).....	a13	a17
Northwestern Elevated Railroad (preferred).....	60	a70
Philadelphia Company, Pittsburg (common).....	a50½	a50½
Philadelphia Company, Pittsburg (preferred).....	a44¾	a44½
Philadelphia Rapid Transit Company.....	a19¾	a19¾
Philadelphia Traction Company.....	a87	a86
Public Service Corporation, 5 per cent col. notes.....	a96¾	a96½
Public Service Corporation, ctf. s.....	a104½	a104½
Seattle Electric Company (common).....	a115	a115
Seattle Electric Company (preferred).....	103½	104½
South Side Elevated Railroad (Chicago).....	a53½	*53½
Third Avenue Railroad, New York.....	63¼	6½
Toledo Railways & Light Company.....	*10¼	*10¼
Twin City Rapid Transit, Minneapolis (common).....	114½	113
Union Traction Company, Philadelphia.....	a48¾	a48
United Rys. & Electric Company, Baltimore.....	a13¾	*12¾
United Rys. Inv. Co. (common).....	*37	37
United Rys. Inv. Co. (preferred).....	*67	65
Washington Ry. & Electric Company (common).....	a38½	a39
Washington Ry. Electric Company (preferred).....	a91¾	a92
West End Street Railway, Boston (common).....	a90	a88
West End Street Railway, Boston (preferred).....	a102	a102
Westinghouse Elec. & Mfg. Company.....	66	62½
Westinghouse Elec. & Mfg. Company (1st pref.).....	*125	*125

a Asked.

* Last Sale.

acquired a franchise along Market Street, to Sutter, and out Sutter to Central Avenue, and that this franchise was assigned to the Sutter Street Railway, which in turn assigned to the United Railroads all its franchise except that part of Market Street from the city front to Sutter Street. After the last assignment it is alleged the Sutter Street Railway stopped operating cars on Sutter Street, but continued to operate cars from the city front along Market Street to Sutter Street. This service has been maintained, so it is charged, by the United Railroads under the name of the Sutter Street Railway to prevent any other road from using lower Market Street. The desire of the city is to secure the use of the section of the street now occupied by the Sutter Street Railway for the municipal street railway, which the city contemplates building.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The joint committee on street railways and railroads spent two days recently going over the electric railways in the Berkshire district which the New York, New Haven & Hartford Railroad desires to acquire. The bill exempting transit bonds of Boston from the provisions of the law relative to Boston loans has been passed by the Senate to be enacted. The committee on street railways has presented an adverse report on the bills reducing the hours of labor of street railway employees, and the committee has drawn up a bill authorizing the Shelburne Falls & Colerain Street Railway to fund its floating debt and refund its funded debt. The House has passed to be enacted the bill permitting street railways to purchase the property of foreign companies. The effort made to secure a reconsideration of the bill to bestow the right to grant freight and express certificates to street railways upon municipal authorities has been defeated. The House has amended the bill for half fares on street and elevated railways for pupils of normal schools and business colleges by excluding students at business colleges from its provisions.

New York.—On April 21, 1910, the Assembly passed the two bills introduced by Assemblymen Lee and Shortt, designed to carry out the provisions of the constitutional amendment approved by the people last fall, eliminating bonds upon subways and docks, which are self-supporting, from the constitutional debt limit computation of New York City. An attempt to agree upon a compromise bill will be made when these two bills are received by the Senate cities committee. Senator Cobb has introduced the consolidated railroad law which Governor Hughes vetoed last year because it contained section 38 of the old railroad law, which guaranteed to per cent dividends to railroad corporations before passenger or freight rates could be reduced. The bill this year does not contain this section. The special committee which investigated the operations of telegraph and telephone companies last fall and recommended that these corporations be placed under the jurisdiction of the Public Service Commission of the Second District drafted a bill carrying out this recommendation. This bill was introduced in the Legislature and the committee gave hearings on it on April 20 and April 21. Assemblyman Dana has introduced a bill to amend the law of 1903 providing for the regulation of terminals and approaches of the New York Central & Hudson River Railroad in New York City. It adds to the territory in which lands and easements may be granted to the company by the Board of Estimate and Apportionment certain described territory west of Park Avenue between Forty-eighth Street and Fifty-second Street.

Ohio.—Governor Harmon has issued a statement in which he says that he favors the enactment of a public utilities bill and the establishment of a utilities commission. The restrictions regarding stock ownership should apply largely to competing companies and the rule regarding a depreciation account should not be too oppressive. It is said that an effort will be made to include a depreciation provision in the present bill before the Senate acts upon it, and that an amendment will be proposed that will require joint use of tracks, wires and other appliances of competing companies under certain circumstances. The Senate has concurred in the House amendments giving interurban railroads the right to condemn land in municipalities for union depot purposes.

Athens Railway & Electric Company, Athens, Ga.—The Athens Railway & Electric Company has been incorporated with a capital stock of \$1,050,000, of which \$750,000 is common and \$300,000 5 per cent preferred, to consolidate the Athens Electric Railway and the James White power plant, which is on the Oconee River, 10 miles from Athens. An issue of \$2,000,000 of 5 per cent first and refunding gold-sinking fund 40-year bonds has been authorized by the stockholders, \$400,000 to be held as against underlying bonds and \$425,000 to be used for the acquisition of properties, the remainder for the future needs of the company. The total power equipment of the company will be 7000-hp hydroelectric and 3000 hp from a steam turbine plant.

Brooklyn (N. Y.) Rapid Transit Company.—The \$125,000 of first mortgage 6 per cent bonds of the Greenpoint & Lorimer Street Railroad maturing on May 1, 1910, will be paid on or after that date at the office of the Long Island Loan & Trust Company, Brooklyn, N. Y.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—The Charleston Consolidated Railway & Lighting Company was incorporated at Columbia, S. C., on April 19, 1910, with a nominal capital stock of \$2,000,000, of which \$1,500,000 is to be common stock and \$500,000 6 per cent preferred stock, by Julian Mitchell, P. H. Gadsden and F. H. Horlbeck, Charleston. The Charleston Consolidated Railway & Lighting Company will lease the property of the Charleston Consolidated Railway, Gas & Electric Company for 99 years, guaranteeing dividends on the stock of the company. The Consolidated Railway, Gas & Electric Company will issue \$500,000 of 6 per cent preferred stock, which it will sell at par to the new company, using the proceeds to provide for extensions and betterments. It is announced that there will be no changes in the personnel of the Charleston Consolidated Railway, Gas & Electric Company.

Everett & Tacoma Railway, Tacoma, Wash.—The Everett & Tacoma Railway has filed a mortgage to the Chicago Title & Trust Company, Chicago, Ill., as trustee to secure an authorized issue of \$5,000,000 of 30-year 5 per cent gold bonds to provide for the construction of its proposed electric railway between Everett and Tacoma.

Havana (Cuba) Electric Railway.—The Havana Electric Railway has declared an extra dividend of 1½ per cent on its common stock, payable on May 14, 1910.

Interstate Railways, Philadelphia, Pa.—The directors of the Interstate Railways have decided not to pay before May 1, 1910, the interest defaulted on Feb. 1, 1910, on the 4 per cent bonds as the company has not sufficient funds. The three months of grace from Feb. 1, 1910, expire on April 30, 1910, and after that the company is liable to foreclosure under the mortgage if 25 per cent of the bondholders demand such action. There are now on deposit with the Real Estate Trust Company, Philadelphia, Pa., \$6,705,000 of the bonds of the company and several hundred thousand dollars are assured to be favorable to the plan for the reorganization of the company proposed by George H. Earle, president of the Real Estate Trust Company. It is not thought possible that the \$2,700,000 of bonds necessary to be pledged to bring about foreclosure could be concentrated in opposition to the Earle plan, which has for its end a reorganization of the company without foreclosure if possible.

Lehigh Valley Transit Company, Allentown, Pa.—A meeting of the stockholders of the Lehigh Valley Transit Company will be held on May 19, 1910, to authorize the creation of a \$10,000,000 refunding and improvement mortgage. The issue of \$6,000,000 of these bonds will also be authorized to retire \$2,500,000 of consolidated 4 per cent bonds and \$900,000 of 6 per cent debenture notes. The balance of the bonds will be used for extensions and improvements under proper restrictions.

Lexington (Ky.) Railway.—The Lexington Railway has amended its articles of incorporation so as to increase its funded debt to \$2,500,000.

Lewisburg, Milton & Watsontown Passenger Railway, Milton, Pa.—The Lewisburg, Milton & Watsontown Passenger Railway has been purchased from the Railways Company General, New York, N. Y., by J. F. Whittaker and D. R. Diehl, Harrisburg, Pa. The company has been reorganized and the following officers have been elected:

John F. Whittaker, Harrisburg, Pa., president; L. G. Brown, York, Pa., vice-president; D. L. Diehl, Greencastle, Pa., secretary and treasurer; W. B. Rankin, Harrisburg, Pa., assistant secretary and treasurer; Richard Barrett, Milton, Pa., superintendent; Chas. S. Johann, Philadelphia, Pa., chief engineer. The directors of the company are: J. F. Whittaker, L. G. Brown, C. S. Johann, D. L. Diehl, Claud Simpler, Philadelphia, Pa. The old mortgage has been replaced by a new one for \$300,000.

Ocean Shore Railway, San Francisco, Cal.—J. Howard Smith, who is interested in the Ocean Shore Railway, has served notice on F. S. Stratton, receiver of the company, that an application will be made to the United States Circuit Court to direct Mr. Stratton to bring suit against the stockholders to recover \$2,300,000 to liquidate the debts of the company and place it on a substantial basis. Mr. Smith contends that if this amount is raised from the stockholders the company will be able to carry out its projected work and possibly within a reasonable time be on a paying basis. V. G. Bogue, A. W. Foster and W. H. Hener, who constitute the board of engineers appointed by Judge Van Fleet, of the United States District Court, to investigate the physical condition of the Ocean Shore Railway, as noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 5, 1910, have filed their conclusions with the court. The members of the board estimate that the cost of operating the road under present conditions should not exceed the annual revenue, not taking into consideration the expenses of the receivership. They place the annual earnings of the company when the property is fully completed at \$503,000 and estimate that the cost of operation and maintenance would be \$337,275, leaving net earnings of \$166,225. The cost of completing the road is estimated at \$3,190,029. Of this amount \$1,351,115 would be needed for the road bed, \$1,227,441 for terminal facilities, \$132,320 for ballasting and \$479,153 for equipment. If receiver's certificates should be issued to cover these expenditures the interest charges on them at 5 per cent would be \$159,501, \$6,824 less than the estimated net earnings of the company. The total cost of that part of the road now constructed is given as \$7,459,414, or about \$109,000 a mile. A detailed statement gives the deficit as \$269,415. The engineers reviewed the prospect of the road and concluded their report as follows: "In view of these conditions we believe the traffic possibilities are excellent, and that when the road is finished its passenger and freight traffic will grow rapidly, and that the railway itself, as a property, will rapidly increase in value. We have been mindful, however, in preparing our estimate of the annual revenue, that development must follow completion of the railway before the property can produce large and profitable returns."

Philadelphia (Pa.) Rapid Transit Company.—The stockholders of the Philadelphia Rapid Transit Company will vote on June 20, 1910, on the question of authorizing an increase in the indebtedness of the company from \$5,000,000 to \$10,000,000. As announced in the *ELECTRIC RAILWAY JOURNAL* of April 16, 1910, page 719, the company has applied to the City Council of Philadelphia for permission to make a loan of \$2,500,000. It is stated that it is not the intention to increase the amount of the loan which the Council has been asked to authorize, but merely to obtain permission from the stockholders for a larger amount to provide for contingencies.

San Francisco, Oakland & San José Consolidated Railway, Oakland, Cal.—E. A. Heron, president of the San Francisco, Oakland & San José Consolidated Railway, said recently: "No project is being considered by which Eastern or any other capital is to purchase the holdings of F. M. Smith in the San Francisco, Oakland & San José Consolidated Railway. There is, of course, an effort to invade our territory, but there is no proposition of sale under consideration."

Susquehanna Railway, Light & Power Company, Lancaster, Pa.—The Susquehanna Railway, Light & Power Company has taken over the property of the Wilkesbarre Gas & Electric Light Company and the Wilkesbarre Heat, Light & Motor Company.

Tampa (Fla.) Electric Company.—A semi-annual dividend of 4 per cent has been declared on the stock of the Tampa Electric Company, payable on May 16, 1910, to holders of

record on May 2, 1910. This compares with 3½ per cent paid semi-annually during 1909 and 1908 and 7 per cent in 1907. Prior to 1907 10 per cent in dividends was paid for several years.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company has purchased a majority of the \$5,000,000 of stock of the Indianapolis Traction & Terminal Company, and to finance the purchase it has sold a block of bonds to Drexel & Company, Philadelphia, Pa., and Lee, Higginson & Company and Estabrook & Company, Boston, Mass. The exchange is said to have been made on the basis of 80 shares of preferred stock and 80 shares of common stock of the Terre Haute, Indianapolis & Eastern Traction Company for each 100 shares of stock of the Indianapolis Traction & Terminal Company.

Third Avenue Railway, New York, N. Y.—The Third Avenue Railway was incorporated at Albany on April 21, 1910, with a capital stock of \$16,590,000, as the successor to the Third Avenue Railroad, the property of which was purchased under foreclosure on March 1, 1910, in the interest of the bondholders. The directors of the new company are: James N. Wallace, Adrian Iselin, Harry Bronner, James Timpson, Frederick H. Shipman, W. Emlen Roosevelt, Albert W. Scholle, Joseph H. Seaman, Edward A. Maher, Franklin L. Babcock, Milton Ferguson, John W. Platten, New York, and George W. Davison, Brooklyn. The report of the Third Avenue Railroad for the seven months ended Jan. 31, 1910, shows total operating revenue of \$1,889,373, expenses of \$1,003,267 and net earnings of \$886,106. The traffic statistics show that during the seven months ended Jan. 31, 1910, 28,819,857 fare passengers were carried and that 4,235,553 passengers were carried on transfers.

United Railways Investment Company, San Francisco, Cal.—At the annual meeting of the United Railways Investment Company, to be held on May 6, 1910, there will be submitted for the consideration of the stockholders a resolution adopted by the directors, declaring it advisable to create a series of bonds, not to exceed \$6,000,000, to bear such date subsequent to May 31, 1910, as the directors may determine, drawing interest at a semi-annual rate of 3 per cent, payable in 20 years, and subject to redemption at the option of the company at 105. The bonds shall be convertible at par at the option of the holder into fully paid common stock at par, from and after a date to be fixed by the directors, not less than two years from the date of issue, or any date to maturity. A resolution will also be presented to confer power on the directors to utilize a portion of the authorized but unissued preferred stock of the company, at par, to pay or adjust the arrears of dividends on the outstanding preferred stock. On any shares of the preferred stock thus issued, dividends shall accrue only from and after April 1 or October 1 next ensuing from the date of issue. Another resolution will direct that the capital stock of the company, which is now \$50,000,000, be increased to \$56,000,000, the increase to be all of common stock, and that it be reserved in the treasury of the company, and issued on demand to holders of the above-mentioned bonds.

Western New York & Pennsylvania Traction Company, Olean, N. Y.—The Public Service Commission of the Second District of New York has authorized the Western New York & Pennsylvania Traction Company to increase its capital stock from \$2,000,000 to \$2,600,000. Of the present capital stock, all of which is outstanding, one-half is 5 per cent cumulative preferred stock. As constituted under the increase to \$2,600,000 the stock would consist of \$1,000,000 of common stock; \$600,000 of first preferred 6 per cent cumulative stock and \$1,000,000 of second preferred non-cumulative 5 per cent stock. The common stock is to be issued share for share in exchange for the existing common stock; the second preferred non-cumulative stock is to be issued in exchange, share for share, for the existing 5 per cent cumulative stock; not more than \$500,000 of the 6 per cent first preferred stock is to be issued in exchange for a like amount of first and refunding mortgage bonds dated Dec. 1, 1906; the remaining \$100,000 of first preferred stock to be issued in payment for extensions and improvements.

Traffic and Transportation

Accidents to Children

The United Railways & Electric Company, Baltimore, Md., included the following about accidents to children in a recent issue of *Trolley News*, which is addressed by the company to the public:

"Every reasoning man must realize that accidents are bound to happen as the price of modern civilization pays for rapid transit. We wish, however, to do all we can to lessen the number.

"Accidents to young and thoughtless children, who run suddenly on the track, are the most distressing of all.

"The best results in preventing such accidents can be obtained only by hearty co-operation on the part of fathers, mothers and teachers with our efforts, and we, therefore, make the following suggestions:

"(1) Teach the children to have a healthy fear of car tracks.

"(2) Teach them, also, never to pass behind a car or other vehicle which may obstruct their view of a wagon, automobile or car approaching in the opposite direction.

"(3) Whenever possible see that some older member of the family has a watchful eye on them.

"(4) As a sure preventive have the children play on streets where there are no car tracks. There are many such streets, and they furnish an infinitely safer playground.

"Our motormen are not heartless machines, but, for the most part, are married men with children of their own, and they all exert every effort to avoid accidents. What we ask of the Baltimore parents and teachers is co-operation."

Accidents in New York in March

The Public Service Commission of the First District of New York has issued the following comparative summary of accidents which occurred during March, 1908, March, 1909, and March, 1910, on the railways in the territory under its jurisdiction:

March.	1908.	1909.	1910.
Car collisions.....	146	82	81
Persons and vehicles struck by cars...	905	942	980
Boarding.....	574	574	765
Alighting.....	454	513	694
Contact electricity.....	27	20	28
Other accidents.....	2,246	1,794	1,957
Totals.....	4,352	3,925	4,505
<i>Injuries:</i>			
Passengers.....	1,525	1,550	1,989
Employees.....	474	364	459
Not passengers.....	632	520	543
Totals.....	2,631	2,434	2,991
<i>Serious (Inc. in above):</i>			
Killed.....	44	20	18
Fractured skulls.....	8	17	10
Amputated limbs.....	1	6	8
Broken limbs.....	33	32	34
Other serious.....	101	114	144
Totals.....	187	189	214

Prizes for Flower Displays.—The Berkshire Street Railway, Pittsfield, Mass., has offered prizes of \$10, \$5, \$3 and \$2 for the best displays of flowers along the lines of the company.

Sunday Service Between London and Port Stanley.—The London & Lake Erie Transportation Company, London, Ont., will establish a Sunday service between London and Port Stanley.

Freight Petition in Massachusetts.—The Worcester & Southbridge Street Railway, Worcester, Mass., has petitioned the Railroad Commission for authority to carry freight and express matter in Southbridge.

Fare Re-adjustment Asked in Raynham, Mass.—The Selectment of Raynham, Mass., have petitioned the Railroad Commission for a re-adjustment of fares on the lines of the Old Colony Street Railway in Raynham.

Freight Train Wrecked.—Five cars of a freight train on the Spokane & Inland Empire Railroad were dinged about a mile west of Garfield on April 16, 1910. The accident is said to have been caused by a broken flange.

Half-Fares for Children Discontinued.—Effective on May 20, 1910, the Chautauqua Traction Company, Jamestown, N. Y., will cancel local one-way and round-trip, one-half fares for the transportation of children between four and 12 years of age and charge full fare thereafter.

Excursion Fare Over Niagara Gorge Railroad.—Effective on May 16, 1910, the Niagara Gorge Railroad, Niagara Falls, N. Y., will establish an excursion fare for the season of 1910 of 15 cents per capita for parties of ten or more persons from Youngstown to Fort Niagara Beach and return.

Elevated Employees in Chicago Request Increase in Wages.—The employees of the elevated railways in Chicago have asked for an increase in wages of from 2 cents to 8 cents an hour. At present the wages of the motormen average 30½ cents an hour; conductors, 24 cents; guards, 22 cents; ticket sellers, \$1.90 a day.

Increase in Wages in Montreal.—The Montreal (Que.) Street Railway has increased the wages of its employees as follows: Men who have served one and two years from 18 cents per hour to 19 cents per hour; men who have served from two to five years, from 19 cents per hour to 20 cents per hour; men who have served more than five years, from 20 cents to 21 cents per hour.

Electioneering by Trolley.—George H. Voight, who is a candidate for the Democratic Congressional nomination in southern Indiana, chartered one of the cars of the Indianapolis & Louisville Traction Company recently, and visited Scottsburg, Underwood, Henryville, Sellersburg, Watson, Charlestown and New Albany, using the tracks of the Louisville & Northern Railway & Lighting Company for the latter part of the trip.

Indiana Commission to Publish Tariff Sheet.—The Indiana Railroad Commission has issued a circular advising shippers that it is preparing to publish a monthly bulletin, in which it will give changes made in tariffs on the railroad and electric railways in the State. The commission has notified the companies to include with new tariff schedules all data concerning increases or decreases between points or in the various classes of freights. The first issued will be published in May.

Pay-as-You-Enter Cars in Louisville.—The 33 pay-as-you-enter cars ordered recently by the Louisville (Ky.) Railway from the Cincinnati Car Company, to be built under license from the Pay-as-You-Enter Car Corporation, New York, N. Y., are being delivered, and the company is placing them in service on its Fourth Avenue line and transferring the cars of the same type now in use on that line to the Preston, Main and Eighteenth Street and other lines. By May 1, 1910, four-fifths of the cars in use on the Louisville Railway will be of the pay-as-you-enter type. Eventually cars of this type will be used exclusively by the company.

Owl Service Campaign in Toledo.—The Toledo Railways & Light Company, Toledo, Ohio, has started a campaign to popularize owl car service. The company is advertising in the newspapers the various lines on which owl cars are operated and the time of leaving, and has placed timetables in every car. These tables are printed in several colors, and are made prominent by the picture of a large owl on the front of which is a face of an owl. The tables are also being distributed to railroad stations, interurban depots, hotels, saloons and restaurants. The service was installed quite recently, and the business has been very satisfactory.

Pennsylvania Commission.—An order has been issued by the State Railroad Commission requiring motormen of street cars, upon approaching a grade crossing of a steam railroad, to bring their cars to a full stop and not proceed until the conductor has signaled from the far side of the crossing. The commission has also ruled that the Schuylkill Railways, Girardville, Pa., shall not issue miners' tickets at reduced rates, holding that the restricted sale of such tickets is "discriminatory and unlawful," and that the tickets should be open to purchase by anyone who desires to use them and who will subscribe to and observe the conditions thereof.

Service Order Which Affects Electrified Lines of Long Island Railroad.—An order has recently been adopted by the Public Service Commission of the First District of New York which relates to cars and stations on

lines of the Long Island Railroad now operated by electricity. All cars on electric lines are to be provided with platform gates or with vestibule doors. Trap-doors also are to be provided, which, when let down, will cover the steps. These trap-doors are to be kept lowered while trains are in motion, and there must be enough men in all train crews to provide a guard for each train opening. It is also provided that the station platforms are to be raised to the height of the car platforms, wherever such platforms have not yet been provided.

Pay-As-You-Enter Cars in Toledo.—Three of the 20 cars ordered recently by the Toledo Railways & Light Company, Toledo, Ohio, from the Kuhlman Car Company, Cleveland, Ohio, have been delivered and will soon be placed in operation. The cars are the first pay-as-you-enter pattern in Toledo, and it is possible that the other cars of the order may be used as prepayment cars, but this has not been determined. The new cars will seat 44 persons. The rear platform is much larger than that on the ordinary cars and is so constructed that it may be enclosed in glass in bad weather. There are two doors at the rear arranged especially for the pay-as-you-enter feature. In the front vestibule there is a lever for the motorman to close the door and fold the step. The interior of the car is finished in natural cherry with an olive green ceiling. Seats are rattan. The straps are covered with celluloid, which can be cleaned easily.

Pay-as-You-Enter a Reasonable Rule.—A jury in the Third Division of the Jefferson Circuit Court at Louisville, Ky., under instructions from Judge Lincoln, held recently that the rule requiring passengers to deposit their fare in a box as they enter a car is reasonable. In instructing the jury the judge said: "The court instructs the jury that the defendant company has the right to make and enforce reasonable rules for the operation of its cars, the collection of fares by its conductor and the control of its passengers, and if the jury believes from the evidence that the rule requiring passengers on pay-as-you-enter cars to deposit fares in the box on the platform, or not allow conductors to collect same from passengers in the car, and that the conductor on the occasion referred to executed and carried out said rule without any insult, violence or abuse, the law is for the defendant, and the jury should so find." The decision was rendered in a suit for \$5,000 damages brought by a woman who on July 19, 1910, in boarding a car of the Louisville Railway, claimed that the conductor had abused and insulted her because she had refused to comply with the rule of the company which requires passengers to deposit their fares in a fare box on the platform of the car before entering the car proper.

No City Passengers on Interurban Line in Buffalo.—The Public Service Commission of the Second District of New York has ordered the International Railway, Buffalo, N. Y., to carry only interurban passengers on Lancaster cars. At the hearing before the commission regarding service on the Lancaster line it developed that one of the chief causes of delay in the operation of cars between Buffalo and Lancaster was the carriage of city passengers. The order provides that: All Lancaster cars east-bound between the starting point at the junction of Main and Clinton Streets, Buffalo, and Lancaster shall stop at all streets and regular stopping places in Buffalo to receive and take on interurban passengers only; but shall not stop between the starting point at the junction of Main and Clinton Streets, Buffalo, and the Broadway city line for passengers to alight. Lancaster cars west-bound shall stop at all streets and regular stopping places in Buffalo between the Broadway city line and the junction of Main and Clinton Streets, Buffalo, for passengers to alight only; but shall not stop at any point between the Broadway city line and the junction of Main and Clinton Streets to pick up passengers. Lancaster cars leaving and coming into the city shall carry signs reading as follows: "No city passengers carried on this car," and in addition before cars leave terminals, and also when stopping for passengers on the outbound trip or discharging passengers on the inbound trip, the conductor shall announce, "No city passengers carried on this car." The company is required by the commission to give publicity to the rules through announcements in the Buffalo newspapers.

Personal Mention

Mr. W. D. Frazer has been appointed acting general manager of the Winona Interurban Railway, Warsaw, Ind., to succeed C. O. Johnson, deceased.

Mr. F. T. Hepburn, formerly general manager of the lines of the Ohio Electric Railway entering Lima, Ohio, has been appointed general manager of the Saginaw Valley Traction Company, Saginaw, Mich.

Mr. Leslie A. Andis has been appointed chief electrician of the Indianapolis & Louisville Traction Company, Louisville, Ky., to succeed Mr. Charles C. Wyman, who has become connected with the Scott County Telephone Company.

Mr. Edwin W. Frink, formerly auditor and traffic manager of the Sandusky, Norwalk & Fremont Railway, Norwalk, Ohio, has been elected president of the company to succeed Mr. George A. Bartholomew, and Mrs. Anna M. Stenz has been elected vice-president of the company.

Mr. C. A. Wilkinson has been appointed superintendent and chief engineer of power plants of the Coney Island & Brooklyn Railroad, Brooklyn, N. Y. Mr. Wilkinson was previously engaged in building and operating large steam and internal combustion power plants in the East for railways, electric light companies and isolated owners.

Mr. W. N. Keiser has resigned as engineer of the Des Moines (Ia.) Electric Company to become connected, on May 1, 1910, with the Union Electric Company, Dubuque, Ia. Mr. Keiser has been in the employ of the Des Moines Electric Company since 1901. He was formerly with the General Electric Company, and at one time was engaged in central station work.

Mr. Charles Wright has resigned as general foreman of the Manchester shops of the Pittsburgh (Pa.) Railways to accept the position of general foreman with the Coney Island & Brooklyn Railroad, Brooklyn, N. Y. Mr. Wright is 31 years old. He has been with the Pittsburgh Railways 16 years, and for the last five years has acted as general foreman of the company. Mr. Wright will assume his duties with the Coney Island & Brooklyn Railroad on May 1, 1910.

Mr. Philip D. Laird has been appointed to the place on the Public Utilities Commission of Maryland which was declined by Judge James A. Pearce, and has accepted the appointment. Mr. Laird was a member of the Maryland legislature in 1886, 1888 and 1890. Later Gov. Frank Brown named him as Land Commissioner. Mr. Laird is now president of the Farmers' Banking & Trust Company, Rockville, from which he has contemplated retiring for some time. He is a native of Cambridge, Md.

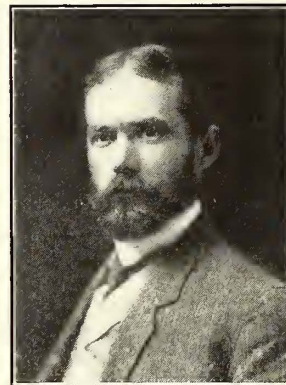
Mr. W. T. Corbusier, who was recently appointed superintendent of the Schuylkill & Dauphin Traction Company, Williamsport, Pa., to succeed Mr. S. S. Straub, was formerly general traffic manager of the Schuylkill & Dauphin Traction Company. He is a native of Elmira, N. Y., and studied electrical engineering at the Polytechnic Institute, Brooklyn, N. Y. He then served in various departments with the General Electric Company and later entered the shops of the Brooklyn Rapid Transit Company. For three years previous to his connection with the Schuylkill & Dauphin Traction Company Mr. Corbusier was in the manufacturing and roofing supply business.

Mr. Paul Shoup, formerly assistant general passenger agent of the Southern Pacific Company, has been appointed assistant general manager of the company in charge of the electric lines, including the Peninsular Railway, San José, and the Los Angeles-Pacific Company. Mr. Shoup entered the service of the Southern Pacific Company in 1891 as a clerk in the office at San Bernardino. When the narrow-gauge road between Riverside and San Bernardino went into the hands of a receiver Mr. Shoup was practically in charge, and he is said to have been largely responsible for converting the road into a paying investment. Mr. Shoup next entered the passenger department of the Southern Pacific Company. Soon thereafter he was sent to San José as district freight and passenger agent of the company. He went to Portland, Ore., later and reorganized the freight department of the Southern Pacific Company in that city. Since December, 1908, Mr. Shoup has given his time to the

interests of the late E. H. Harriman in California not directly related to the Southern Pacific Company.

Mr. W. S. Dimmock, whose resignation as manager of the Puget Sound Electric Railway, Pacific Traction Company and Tacoma Railway & Power Company, Tacoma, Wash., was announced in the ELECTRIC RAILWAY JOURNAL of March 26, 1910, will take up his work at Boston, Mass., with the Stone & Webster Management Association in a few weeks. At present Mr. Dimmock is enjoying his first extended vacation in five or six years. Mr. Dimmock was formerly connected with steam railroad work. He entered the electric railway field in 1892 as general manager of the Omaha & Council Bluffs Street Railway and the Omaha & Southern Railway, Omaha, Neb. In 1900 he resigned from these companies to become general manager of the Richmond, Va., Passenger & Power Company, operating in Richmond and between Richmond and Petersburg. In July, 1901, he entered the employ of Stone & Webster, Boston, Mass., and in August, 1909, was appointed manager of the Tacoma Railway & Power Company, Tacoma, Wash. In January, 1902, Mr. Dimmock was also made manager of the Seattle & Tacoma Interurban Railway, which had commenced operation in September, 1901. This road is now known as the Puget Sound Electric Railway. Mr. Dimmock's connection with Stone & Webster in Boston will have to do largely with the properties in Washington, with which he was connected as resident manager. Before leaving Tacoma Mr. Dimmock was presented a ruby pin surrounded with diamonds as a token of esteem from the employees of the Puget Sound Electric Railway, Pacific Traction Company and the Tacoma Railway & Power Company.

Mr. L. D. Mathes, who for several years has been secretary and treasurer of the Iowa Street & Interurban Railway Association, and who is manager and purchasing agent of



L. D. Mathes

of the Union Electric Company, Dubuque, Ia., was elected president of the Iowa Street & Interurban Railway Association at the meeting of the association in Sioux City, Ia., on April 21, 22 and 23. Mr. Mathes has been actively interested in the Iowa Street & Interurban Railway Association for six years, or since his connection with the Union Electric Company, and he has been largely responsible for the success which has attended the meetings of the association. Mr. Mathes has been engaged in railway work for the last 15 years. His business connections have included the General Electric Company, the Westinghouse Electric & Manufacturing Company, the International Railway and the Norfolk & Portsmouth Traction Company. The property under his management at Dubuque includes 17.27 miles of electric railway and an electric light plant from which light and power are furnished for Dubuque and East Dubuque. In addition, the Union Electric Company owns two parks, one of 85 acres and the other of 73 acres.

OBITUARY

Sumner A. Bemis, formerly general manager of the Bemis Car Truck Company, Springfield, Mass., died at his home in Springfield on April 4. Mr. Bemis was 75 years old at the time of his death. From 1884 to 1904 he was actively engaged in the manufacture of the Bemis patented trucks and journal boxes. For the past six years, however, Mr. Bemis took no active interest in the business.

A. L. Gardiner, assistant counsel of the Interborough Rapid Transit Company, New York, N. Y., is dead. Mr. Gardiner was born in Dundee, Canada, in 1858, and was graduated from Franklyn Academy, Malone, N. Y., in 1880, and from Hampton College in 1884. Soon after being admitted to the bar he became assistant counsel of the Manhattan (Elevated) Railway, New York, N. Y. When the Manhattan (Elevated) Railway was absorbed by the Interborough Rapid Transit Company Mr. Gardiner was appointed assistant counsel with that company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Elmhurst (Cal.) Street Railway.**—Incorporated in California to build an interurban railway between the present terminus of the Sacramento Electric, Gas & Railway Company and the junction of Manzanita Avenue and Helvetia Avenue, Elmhurst. Capital stock, \$100,000. Incorporators: H. J. Goethe, H. A. McClelland, C. M. Goethe and T. P. Beere.

Third Avenue Railway, New York, N. Y.—Incorporated in New York in the interests of the bondholders of the Third Avenue Railroad, the property of which was recently sold under foreclosure to the bondholders and which it is proposed to have the Third Avenue Railway succeed. Capital stock, \$16,500,000. Among the directors are: James N. Wallace, Adrian Iselin, W. E. Roosevelt, Albert W. Scholle, Edward A. Maher and Franklin L. Babcock.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—Incorporated in South Carolina to succeed the Charleston Consolidated Railway, Gas & Electric Company. Capital stock, \$2,000,000. Incorporators: P. H. Gadsden, Julian Mitchell and F. H. Horlbeck.

Clarksburg & Weston Traction Company, Clarksburg, W. Va.—Incorporated in West Virginia to build a 24-mile electric railway from Clarksburg to Weston. Preliminary surveys have been made and construction will begin as soon as the project can be financed. Capital stock, \$500,000. Incorporators: James O. Watson, George T. Watson, A. B. Fleming, Walton Miller and J. E. Watson, Fairmont. [E. R. J., April 16, '10.]

FRANCHISES

Edgewood, Ala.—The Birmingham & Edgewood Electric Railway, Birmingham, has been granted a franchise by the Board of Revenue to build its tracks through the Red Mountain cut into Edgewood. G. F. Brazelton, Birmingham, secretary.

Pasadena, Cal.—The Pacific Electric Railway, Los Angeles, has been granted a franchise by the Council to double track several of its lines in Pasadena.

Rock Island, Ill.—The Tri-City Railway, Davenport, Ia., has been granted a 20-year extension of its franchises by the City Council. The new franchises provide for the construction of several new lines and doubletracking of existing lines.

Wilmington, Ill.—The Illinois Light & Traction Company, Streator, has been granted a 50-year franchise by the Council to build an electric railway in Wilmington, with the proviso that within 5 years the company construct and have in operation an interurban railway between Wilmington and Kankakee.

Waverly, Ia.—The Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., has been granted a franchise by the Council to build a line in Waverly. This line is to be extended from Denver Junction to Waverly, and from Waterloo to Belle Plaine.

Ludlow, Ky.—The Covington, Big Bone & Carrollton Railroad, Covington, has been granted a perpetual franchise by the Council to operate a single-track line in Ludlow. This is part of a plan to build a 22-mile railway between Covington and Big Bone. M. J. Crouch is interested. [E. R. J., March 25, '10.]

Ironwood, Mich.—F. Sullivan and associates have applied to the City Council for a franchise to build a railway in Ironwood and to extend it to Bessemer. [E. R. J., April 16, '10.]

Brooklyn, N. Y.—The Van Brunt Street & Erie Basin Railroad, has been granted an extension of its franchise to operate its line of single track from Erie Basin to Hamilton Ferry, Brooklyn.

***Hastings, Neb.**—Frank E. Scharff, Lincoln, has asked the City Council for a franchise for an electric railway in Hastings. This is part of plan to build a railway from Hastings to Omaha.

***Athens, Ohio.**—The Nelsonville, Athens & Glouster Traction Company has asked the Council for a franchise to build an electric railway in Athens.

Albany, Ore.—The Oregon Electric Railway, Portland, has applied to the Council for a 25-year franchise to build an extension through Albany. This company has just been granted a 25-year franchise to build an electric railway in McMinnville.

Chattanooga, Tenn.—The Chattanooga Railway & Light Company has been granted a 21-year franchise by the Council to double track some of its lines in Chattanooga.

TRACK AND ROADWAY

Alabama City, Gadsden & Attalla Railway, Gadsden, Ala.—This company has begun work on the extension of its line from Gadsden to North Gadsden. C. J. Zell, Gadsden, superintendent.

Decatur, Moulton & Russellville Railway Company, New Decatur, Ala.—This company advises that the project of building a 60-mile railway to connect New Decatur, Decatur, Danville, Jesseton, Needmore, Moulton, Landersville, Mount Hope, Newburg and Russellville is still in a preliminary stage. W. J. Cottingham, New Decatur, is interested. [E. R. J., April 16, '10.]

San Joaquin Valley Electric Railway, Stockton, Cal.—This company announces that it has succeeded in financing its proposed 32-mile railway to connect Modesto, French Camp, Manteca, Ripon and Salida. Work is expected to begin at once. Morris L. Brackett is interested. [E. R. J., April 24, '09.]

Tri-City & Northeastern Interurban Railway, Port Bryon, Ill.—This company is having surveys made of two new routes for its projected line from Albany. One route will be from Hampton to Silvis and Moline and the other 1½ miles above Hampton to Silvis and Moline. J. W. Simonson, Port Bryon, president. [E. R. J., Dec. 25, '09.]

Tri-City Railway, Davenport, Ia.—This company has placed contracts for about 5 miles of track to be used on its lines in Davenport, Rock Island, Moline and East Moline. J. F. Porter, Davenport, president.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—The directors of this company have authorized \$285,000 to be expended in improving its lines in Waterloo. The work will include the double-tracking of several lines in Waterloo and extensions may be built to Charles City, Mason City, New Hampton, Cedar Rapids and Marshalltown. Construction has begun on the new interurban railway to Waverly. T. E. Rust, purchasing agent.

Motor Grand Traction Company, Belleville, Kan.—This company, which is promoting a 150-mile railway between Belleville and Wichita, has recently opened offices in Canton and has started a preliminary survey from Canton to Roxbury and Goerrel. E. S. Alnutt, Belleville, president and general manager. [E. R. J., Feb. 20, '10.]

Cincinnati, Newport & Licking Valley Railway, Cynthia, Ky.—This company, which proposes to build an electric railway between Cynthia and Paris, has opened offices in Cynthia and secured rights of way. W. S. Gray, Louisville, is acting as consulting engineer for the company. Wade Lail is interested. [E. R. J., Feb. 12, '10.]

Detroit United Railway Company, Detroit, Mich.—This company expects to build several new crosstown lines in Detroit. About 5 miles of track will be built. F. W. Brooks, general manager.

Elkton, Fair Hill & Oxford Electric Railway & Power Company, Elkton, Md.—This company advises that as yet no definite time has been set for starting work on its proposed 17-mile electric railway to connect Elkton, Cherry Hill and Fair Hill, Md., and Louisville and Oxford, Pa. It has obtained a charter in Maryland and will apply for one in Pennsylvania as soon as the Legislature meets. Capital stock, authorized, \$60,000, and to be increased to \$500,000. Power stations to be located at Elkton, Md., and Oxford, Pa. Incorporators: Heister Hess, George E. L. Hess, C. P. Canriet, John Lungren and H. E. Mackin. [E. R. J., April 2, '10.]

Portland, Gray & Lewiston Railroad, Lewiston, Maine.—This company has awarded to Fred T. Ley & Company,

Inc., Springfield, Mass., contracts for concrete work for eight bridges varying from 20 ft. to 100 ft. in length and abutments for two steel girder bridges and a number of culverts. [E. R. J., April 2, '10.]

Baltimore & Pennsylvania Railway & Power Company, Annapolis, Md.—This company has completed plans to construct an interurban railway between Hanover and Reisters-town, Md. [E. R. J., Sept. 19, '08.]

United Railways, St. Louis, Mo.—This company proposes to build a 2-mile extension to its Brentwood line.

Butte (Mont.) Electric Railway.—This company will build a 1½-mile extension of the Englewood line to the Butte County Club. J. R. Wharton, Butte, manager.

Public Service Railway, Newark, N. J.—The Assembly has passed a bill permitting this company to construct an extension from North Paterson to Ridgewood via Hawthorne Borough.

Columbus, Urbana & Western Electric Railway, Columbus, Ohio.—This company is securing right of way for a 5-mile extension of its railway from Fishinger's Bridge, 8½ miles north of Columbus, to Dublin. C. W. Van Gundy, Columbus, purchasing agent.

Portland, Eugene & Eastern Railway, Eugene, Ore.—It is reported that financial arrangements have been made by this company to build an extension through Eugene east to McKenzie Valley. It is expected that work will be started soon on the first section of the line to Junction City, between Eugene and Salem, 15 miles. L. N. Roney has the contract for building a bridge over the Willamette River at Springfield. Work is now under way.

Toronto & Eastern Railway, Toronto, Ont.—This company advises that construction will probably start this summer on its proposed 100-mile electric railway to connect Toronto, Whitby, Oshawa, Brownsville, Lindsay, Port Hope, Uxbridge and Peterboro. Capital stock, \$1,000,000. L. L. Murton, Oshawa, solicitor. [E. R. J., April 16, '10.]

Oklahoma City & Suburban Railway, Oklahoma City, Okla.—This company is reported to have let contracts to John Alley and to M. Corrigan, Oklahoma City, to build lines in Oklahoma City; also from Britton north to Edmund, and from a point between Oklahoma City and Greeley south to Moore. W. A. Haller, Oklahoma City, is interested. [E. R. J., Aug. 21, '09.]

Phoenixville, Valley Forge & Strafford Street Railway, Phoenixville, Pa.—This company has awarded the contract for building its line 10 miles from Phoenixville to Strafford via Valley Forge to the Phoenixville Construction Company. A Philadelphia banking house will finance the proposition. Thomas E. O'Connell, West Chester, president. [E. R. J., March 5, '10.]

Lewisburg, Milton & Watsonville Passenger Railway, Milton, Pa.—This company reports it proposes to extend its railway for a distance of several miles. C. S. Johann is in charge of the new engineering work.

Pittsburgh, Butler, Slippery Rock & Grove City Railway, Butler, Pa.—This company announces that it is securing rights of way and active work will begin this summer on its proposed 20-mile railway between Butler, Slippery Rock, Prospect and West Liberty. J. A. Smith, Butler, secretary. [E. R. J., Feb. 12, '10.]

Quebec Railway, Light & Power Company, Quebec, Que.—This company will place contracts during the next few weeks for building 2½ miles of double track. C. E. A. Carr, Quebec, general manager.

Fort Worth, Mineral Wells & Western Railroad, Fort Worth, Tex.—This company announces that contracts will be let about May 15 for the construction of its proposed 60-mile railway to connect Fort Worth, North Fort Worth, Azle, Springtown, Agnes, Poolville, Adell, Authon, Blue Springs and Mineral Wells. Motive power to be both steam and electricity. J. S. Hanford, Beaumont, president.

Mill Mountain Incline, Inc., Roanoke, Va.—Press reports state that this company has awarded the contract for the construction of the 2000-ft. railway up Mill Mountain to C. Markley, Roanoke. Wingate & McGhee, Roanoke, are the engineers. Equipment will be furnished by the Lidgerwood Manufacturing Company, New York. [E. R. J., Jan. 8, '10.]

Union Utilities Company, Morgantown, W. Va.—It is stated that this company will extend the Sabraton Railway to Dellslow and the Morgantown & Pittsburgh Railway to Granville.

SHOPS AND BUILDINGS

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company is preparing plans for a new car house in West Washington Street. The new structure will be for the exclusive use of interurban cars and when it is completed the repair work of the whole system will be done at that point and not at the various small shops scattered over the various lines. The plans for the buildings are now in course of preparation.

Springfield (Mass.) Street Railway.—This company expects to place contracts during the next 4 weeks for the construction of a car house and repair shop in Springfield. George C. Towle, general manager.

Fonda, Johnstown & Gloversville Railroad Company, Gloversville, N. Y.—This company expects to build soon an addition to its car house in Gloversville. W. H. Collins, general manager.

Quebec Railway, Light, Heat & Power Company, Ltd., Quebec, Que.—This company expects to place contracts for building a new car house next to its present car house in St. Sauveur. It will have a storage capacity of 50 cars and will contain repair, paint and carpenter shops. C. E. A. Carr, general manager. [E. R. J., Oct. 30, '09.]

New York, Westchester & Boston Railway, New York, N. Y.—This company has purchased a site in upper New Rochelle, on which it proposes to erect a station. The structure is estimated to cost \$50,000.

Grafton (W. Va.) Traction Company.—This company expects to build a new car house in Grafton during the summer. Geo. L. Hartley, general manager.

POWER HOUSES AND SUBSTATIONS

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—This company will build an extension to its power plant in Waterloo and will install additional equipment. The capacity of the plant will be increased from 1000 hp to 3000 hp.

Twin City Rapid Transit Company, Minneapolis, Minn.—This company has placed contracts with the General Electric Company for one 14,000-kw Curtis turbine and accessories and two 1500-kw, six-phase rotary converters for its power house at Minneapolis.

Butte (Mont.) Electric Railway.—This company expects to build a small substation having a capacity of about 150 kw on its Columbia Gardens line. All material has been purchased. J. R. Wharton, Butte, manager.

Lewisburg, Milton & Watsonville Passenger Railway, Milton, Pa.—This company has awarded a contract to the Allis-Chalmers Company for two 200-kw normal rating, 2300-volt, three-phase, 60-cycle synchronous motor-generator sets to be installed in its new plant at Milton.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company has authorized \$40,000 for the purchase of new equipment for its power plant at Waynesboro and substation at Pen Mar.

Northern Texas Traction Company, Fort Worth, Tex.—This company plans to enlarge its present power house by the installation of a 3000-kw, 25-cycle, 2300-volt, three-phase turbine. The plans for this are being prepared by the Stone & Webster Engineering Corporation, Boston.

Twin City Light & Traction Company, Centralia, Wash.—This company has purchased a site in Centralia for a new power station. The building is estimated to cost \$75,000.

Nooksack Valley Traction Company, Bellingham, Wash.—This company is preparing to double the capacity of its power plant at Nooksack Falls and improve its steam auxiliary plant in Bellingham. It also plans to build a new substation on York Street. Contracts have been placed for the new equipment to be installed.

Wausau (Wis.) Street Railway.—This company has purchased a site at Mosinee for the construction of a power plant to have a capacity of 7000 hp.

Manufactures & Supplies

ROLLING STOCK

Dallas (Tex.) Consolidated Electric Street Railway is rebuilding 10 cars in its own shops at Dallas.

Chicago City Railway, Chicago, Ill., will place an order at once for 50 pay-as-you-enter cars, it is reported.

Illinois Traction System, Champaign, Ill., is reported to be contemplating the purchase of 10 interurban cars.

Metropolitan Street Railway, Kansas City, Mo., has purchased 25 pairs of trucks, type O-50, from the Standard Motor Truck Company, Pittsburgh, Pa.

Spokane & Inland Empire Railroad, Spokane, Wash., has placed an order for 10 cars with the St. Louis Car Company for use on the lines of the Spokane Traction Company.

Twin City Rapid Transit Company, Minneapolis, Minn., reported in the ELECTRIC RAILWAY JOURNAL of Nov. 27, 1909, as building in its own shops 100 new cars, has practically completed the closed passenger cars included in the order.

Galesburg Railway & Light Company, Galesburg, Ill., reported in the ELECTRIC RAILWAY JOURNAL of April 23, 1910, as being in the market for four cars, is drawing up the specifications for six pay-as-you-enter cars which will be ordered immediately.

Macon Railway & Light Company, Macon, Ga., reported in the ELECTRIC RAILWAY JOURNAL of April 2, 1910, to be in the market for cars, has decided to use pay-as-you-enter cars, and will purchase eight new cars of this type and remodel 33 cars.

Lehigh Valley Transit Company, Allentown, Pa., reported in the ELECTRIC RAILWAY JOURNAL of April 9, 1910, as having ordered 10 cars from The J. G. Brill Company, will have these cars built under license of the Pay-As-You-Enter Car Corporation, New York.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill., reported in the ELECTRIC RAILWAY JOURNAL of Feb. 19, 1910, as having ordered four interurban cars from the Danville Car Company, has contracted for only three combination passenger and baggage cars, which will have the following details:

Seating capacity.....48	Bumpers.....plate
Bolster centers.....26 ft.	Curtain fix....Curtain S. Co.
Length over vestibule...45 ft.	Curtain material...pantasote
Width over sills...8 ft. 6 in.	Fenders.....pilots
Width over posts at belt.....8 ft. 5 in.	Heating system..Peter Smith
Height, rail to sills....36 in.	Motors.....Allis-Chalmers
Body.....wood	Sash fixtures..O. M. Edwards
Interior trim.....bronze	Seats.....Hale & Kilburn
Underframe.....composite	Trolley retrievers, Knutson No. 2
Bolsters, body.wrought steel	Trucks.....Taylor, M.C.B.

Central California Traction Company, San Francisco, Cal., mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1910, as having ordered four combination interurban cars from the W. L. Holman Car Company, San Francisco, Cal., has drawn the following specifications for this equipment:

Seating capacity.....50	Car trimmings..A. & W. Co.
Weight.....15 tons	Control system, General Electric
Length of body...41 ft. 8 in.	Couplers.....Janney
Length over vestibule.....50 ft.	Curtain fix....Curtain S. Co.
Width over sills..8 ft. 10 in.	Curtain material, Curtain S. Co.
Width over posts at belt.....9 ft.	Gears and pinions..G. E. Co.
Sill to trolley base.9 ft. 4 in.	Gongs...Adams & Westlake
Height, rail to trolley.....12 ft. 11 in.	Hand brakes.....Peacock
Body.....wood	Journal boxes.....Brill
Interior trim.....mahogany	Sash fix..Adams & Westlake
Underframe.....composite	Seats.....Brill reversible
Air brakes..West. automatic	Seating.....leather covered
	Trucks.....Brill, M.C.B.

Portland Railway, Light & Power Company, Portland, Ore., reported in the ELECTRIC RAILWAY JOURNAL of March 26, 1910, to have purchased 40 cars from the American Car Company, has ordered 10 narrow-gage and 32 standard-gage, pay-as-you-enter cars. The cars differ only in the following

details: The 10 cars will seat 36 passengers each, have 28-ft. 8 in. car bodies, will be 45 ft. long over all, and will be equipped with Westinghouse air brakes, while the 32 cars will seat 40, have 31-ft. 6-in. car bodies, will be 47 ft. 10 in. long over all, and will be equipped with National air brakes. Other specifications of both types follow:

Weight.....36,500 lb.	Gears and pinions...G. E. Co.
Width over posts at belt.....8 ft. 3 in.	Heating system.....electric
Height, rail to sills..2 ft. 7 in.	HeadlightsCrouse-Hinds
Body.....wood	Motors.....G. E.
Underframe.....wood	Paint.....Lowe Bros.
Couplers..Van Dorn No. 11½	Registers.....Ohmer
Curtain fix....Curtain S. Co.	Sanders.....De Witt
Curtain material...pantasote	Step treads.....Universal
Destination signs...Hunter	Trolley poles.....G. E.
Fare boxes.....Brill	Trucks.....Brill Special 22
	Varnish.....Murphy

TRADE NOTES

American Brake Shoe & Foundry Company, Mahwah, N. J., will move its Chicago office on May 1 to the McCormick Building.

Burton W. Mudge & Company, Chicago, Ill., has moved its offices from 400 Commercial Bank Building to 1001 People's Gas Building.

Dressel Railway Lamp Works, New York, N. Y., will locate its Chicago office in Suite 1216, Peoples' Gas Building, 150 Michigan Avenue, after May 1.

Dorner Railway Equipment Company, Chicago, Ill., has removed its headquarters from the Manhattan Building to Room 1730, 193 Michigan Avenue.

Griffin Wheel Company, Chicago, Ill., expects to have a portion of its Denver plant, which was burned last month, in operation about the middle of May.

Chicago Bearing Metal Company, Chicago, Ill., has removed its office to 520 McCormick Building, at the corner of Michigan Avenue and Van Buren Street.

Sherwin-Williams Company, Cleveland, Ohio, on May 1 will move its Chicago city and railway offices from the Railway Exchange Building to 39 Jackson Boulevard.

Perry Ventilator Corporation, New Bedford, Mass., has received an order to equip the 50 all-steel cars being built for the Hudson & Manhattan Railroad with its ventilators.

Alberger Condenser Company and Alberger Pump Company, New York, N. Y., will remove their offices on May 1 from 95 Liberty Street to the West Street Building, 140 Cedar Street.

Hale & Kilburn Manufacturing Company, Philadelphia, Pa., on May 1 will remove its Chicago office from the fourteenth floor of the Fisher Building to room 817 in the same building.

Wisconsin Engine Company, Corliss, Wis., has appointed Benjamin K. Hough its Boston sales manager with offices in the Oliver Building to represent the company in the New England States.

C. A. Wood-Preserver Company, Austin, Tex., has sent a circular stating that, owing to the demand for its wood preserver, orders in quantities should be booked at once for June delivery.

American Steel & Wire Company, Chicago, Ill., announces the appointment of C. H. Rhodes as purchasing agent for the company at Chicago. Mr. Rhodes was formerly in the purchasing department of this company at Pittsburgh, Pa.

McKeen Motor Car Company, Omaha, Neb., recently received an order from the Chicago, Rock Island & Pacific Railroad for two more 70-ft. motor cars for delivery in September and October. With this rolling stock the railroad will have four McKeen cars.

Pressed Steel Car Company, Pittsburgh, Pa., is installing in its power plant at McKees Rocks three 500-kw Westinghouse low-pressure steam turbines to utilize the exhaust from its large complement of non-condensing air compressors and direct-acting hydraulic pumps.

C. Drucklieb, New York, N. Y., has sold the patent, manufacturing and sales rights of his injector sand blast apparatus to J. M. Dutton, of New York, who for the past five

years has managed this branch of the business and who will continue the manufacture and sale of this product.

Allis-Chalmers Company, Milwaukee, Wis., has been awarded the contract for a new 6400-kva, three-phase, 25-cycle, 4000-volt steam turbo-generator, which is to be installed by the Toledo Railways & Light Company, Toledo, Ohio. This unit will operate in parallel with four Allis-Chalmers engines and two Curtis turbines which comprise the present equipment of the plant. Ford, Bacon & Davis, New York, N. Y., are the engineers for the company.

Western Electric Company, New York, N. Y., reports that gross sales for March show an increase of approximately 40 per cent over March, 1909, and, with one or two exceptions, the month was the biggest March the company has experienced. To date the fiscal year ending in 1910 has shown a gain of about 45 per cent over the corresponding period a year ago. The gains are well distributed geographically, indicating a fundamentally prosperous condition of the country at large. At the present time the company has approximately 20,000 persons on its payrolls, which is an increase of about 2000 since the beginning of the current year.

Walpole Rubber Company, Walpole, Mass., has been incorporated with a capital stock of \$3,000,000 to take over the business and assets of the Massachusetts Chemical Company, the Walpole Varnish Works, the Walpole Shoe Supply Works, the Valveless Inner Tube Company and the Walpole Rubber Company, of Granby, Que. The new company will be under the same management which has built up such a large business for the Massachusetts Chemical Company. All departments of the new company are now being operated at their full capacity to supply the demand for rubber goods, insulating tapes and varnishes. Work has been started on a new building at Walpole which will give the company nearly 100,000 sq. ft. of additional floor space.

Ray D. Lillibridge, Inc., New York, N. Y., is the title of a new company which has been incorporated by Mr. Lillibridge and William L. Rickard. The business of an advertising agency conducted by Mr. Lillibridge as an individual and subsequently as a partnership has proved very successful during the 10 years since it was established and this fact has led to the incorporation of the firm. Ray D. Lillibridge, Inc., has moved to 192 Broadway, New York, where the company now occupies four offices comprising the Tower Suite. The company will move its storeroom which has been at 79 Nassau Street for the last eight years. Some of the representative clients of the company are: Wagner Electric Manufacturing Company, Central Foundry Company, Trojan Powder Company, Dodge & Day, Mead-Morrison Manufacturing Company, Robins Conveying Belt Company, Mine & Smelter Supply Company, International Steam Pump Company, Power & Mining Machinery Company, Jeanesville Iron Works Company, Denver Rock Drill Company, Pressed Radiator Company of America.

Ohmer Fare Register Company, Dayton, Ohio, has recently brought to the attention of railway managers the vital part that the fare collecting and recording service plays in maintaining a proper bookkeeping system. The company quotes a manager as saying: "If there is any better system than the Ohmer system, I have failed to hear it." It says that this is why the Pacific Electric Railway has just given the company the third renewal contract for its entire system; why the Denver City Tramway adopted the Ohmer system in its entirety; the Detroit United Railway has adopted the Ohmer system; the Los Angeles-Pacific Company has used the Ohmer system for years, and the Oakland Traction Company has used the Ohmer system for years. The company also says that this is why the Syracuse Rapid Transit Railway and all other companies in Syracuse, N. Y., the Illinois Traction System, the Providence & Danielson Railway, the Pittsburgh Railways, the Northern Ohio Traction & Light Company and many other companies are using the Ohmer system. The company has closed, after a period of tests, a long-term contract with the Southern Pacific Company for equipping all roads owned and controlled by it with Ohmer registers.

ADVERTISING LITERATURE

Graphite Lubricating Company, Bound Brook, N. J., has issued a leaflet calling attention to its graphite and bronze bushings.

Sanitary Rag Company, Kalamazoo, Mich., has published a folder describing its sanitary wiper and pointing out its advantages, both in cost and service.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued its bulletin No. 102, in which an unusual large quantity of rails and equipment are offered for sale.

Consolidated Car-Heating Company, Albany, N. Y., has issued Bulletin No. 10, in which the various parts of the Consolidated buzzer system are described and illustrated.

Indianapolis Brass Company, Indianapolis, Ind., is mailing a card calling attention to the quality and construction of the complete line of trolley wire ears, splicers, crossings, switches, etc., which it manufactures.

Electric Service Supplies Company, Philadelphia, Pa., in the "Keystone Traveler" for April discusses the merits of its "Pay-Within" type of car. Many of the company's specialties are also described, among them Garton-Daniels lightning arrester, Protected bond, the automotoneer, Keystone compound, the St. Louis trolley pick-up and the Lyon reinforced steel gear case.

Gisholt Machine Company, Madison, Wis., has issued an attractive 40-page catalog entitled "Gisholt Boring Mills." It contains specifications and illustrations of the various sizes and types of boring and turning mills which the company manufactures, and illustrations of finishing a few different parts. Several views are presented of the company's plant at Madison. Attention is also called in the catalog to the company's turret lathes and tool grinders.

Western Electric Company, New York, N. Y., has issued Bulletin No. 1005, which is the third of a series of nine bulletins on telephone exchange apparatus which is to be issued. This bulletin is entitled "Branch Exchange Switchboards of Lamp Signal and Magnetic Signal Types." It describes the types of branch exchange equipments which have been designed for use in business establishments, factories, schools and places where a modern private telephone system is required.

National Electric Lamp Association, Cleveland, Ohio, has issued Bulletin No. 7A, which is devoted to the mazda lamps for street lighting. It contains an outline of the historical development of series incandescent lighting, data on the illuminating and electrical equipments for the mazda street series lamp and practical suggestions for the installation of such equipments. In addition there are printed considerable data on the mazda street series lamp and advice as to its various applications.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has published a booklet entitled "How to Build a Rural Telephone Line." The instructions are very complete, in that each part of the line is taken up and described and illustrated. Illustrations are also shown of the various tools used in constructing a rural line. A considerable amount of space of the booklet is devoted to descriptions of telephone batteries, lightning protection and the compact type magneto telephone. As the booklet is more in the nature of a treatise on the subject, the company is selling it at 10 cents per copy. The company has also issued Pamphlet No. 29, in which its various types of common battery telephones are described and illustrated.

Murphy Varnish Company, Newark, N. J., has issued a second edition of its publication entitled "Quality and Economy in Varnish and Varnishing." This publication contains 62 pages and bears the imprint of the American Bank Note Company, New York, N. Y. In a foreword the company says that there are two kinds of varnish trade: one based on popular ignorance of the goods, the other based on the value of the goods; one simply advertises, the other advertises by teaching. Among the many sub-titles of the work are: Varnish Definitions and Explanations, Three Enemies to Fine Varnish, Why the Finest is Cheapest, The Murphy Systems of Finishing, Varnishes for Manufacturers, Specification of Varnish, Natural Wood Stains, Artistic Stains, Enamels, Colors, How to Care for Varnished Things. There is a very complete index of the subjects treated in the handbook. Sections of the book which will appeal particularly to railway men are entitled Perfect Railway Body—The Varnish That Saves Big Money and Murphy's System of Finishing.