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Abolition of Dark Corners in Power Stations

The design of some recently built power stations shows a very desirable trend toward placing auxiliaries in more accessible positions than has been done in the past. Of course, the high price of land generally makes it necessary to crowd the apparatus to an extent very uncomfortable for the station employee, but there seems to be no excuse for having any part of the machinery shrouded in absolute darkness. This condition has been mitigated to a large extent by using gratings for the engine or turbine-room floor. But still more light would penetrate the basement if the generating-room level was supplied only with the walkways actually required for travel from unit to unit. Such an alteration would be analogous to the change from closed to open-pit construction in carhouses. It is a fact that the highly developed steam electric sets of to-day, especially turbo-generators, require much less attention than do their auxiliaries. The solid-floor generating room with its wide spaces between the several units lends itself readily to imposing and handsome interiors. Nevertheless, considerations of appearance should not be permitted to affect the convenient maintenance of the pumps, heaters, condensers and other auxiliaries upon which the efficiency of the station so largely depends.

The Hardness of Wheels

In its report last year the committee on equipment referred to the advantages of lighter weight and saving in cost of turning which would accrue from the use of one-wear steel wheels. The net saving per wheel per 10,000 miles was calculated at 88 cents, based on a life of 75,000 miles. A much larger saving would result if the life of the wheels could be increased by increasing the hardness and wearing qualities of the metal in the tread. It has been suggested that steel wheels might be subjected to heat treatment of the same character as is given to gears and pinions, without adding greatly to the cost, and that the hardness imparted to the metal on the surface of the tread would prolong the life of the wheel by a considerable amount. Undoubtedly heat treatment would do this, but there are two possible disadvantages. One is the difficulty of removing flat spots due to skidding. Flat spots on a case-hardened steel wheel probably would not roll out as they do in soft steel wheels, but would either have to be ground off, or, if allowed to run, might shell out to such an extent that the wheel would have to be scrapped. The other disadvantage would be the increased wear on the rails. The tendency in recent rail specifications has been to raise the percentages of carbon and silicon and obtain a harder and more durable rail. If the wheels are made very hard, then the wear must take place on the rail rather than on the wheel. In attempting to reduce the cost of wheel renewals sight should not be lost of the far greater cost of rail renewals.

Chicago Subway Plans

Subway affairs in Chicago advanced this week along a much smoother course than ever before. Some days ago Mayor Harrison announced that the policy of the new administration would be for Chicago to build its own subways, using as a nucleus for the work the traction fund contributed by the surface lines. This amounts to about \$6,000,000 and is increasing at the rate of \$1,500,000 per year. The administration's announcement was confirmed by resolutions in the City Council to retain jurisdiction over the subway problem rather than pass on the responsibility to a subway commission. Several comprehensive plans are available for the use of the representatives of the City Council, who are expected to choose a subway engineer and adopt plans so that the subway work may proceed at the earliest consistent date. These plans have been submitted by a number of engineers, notably by Bion J. Arnold, George W. Jackson, John Ericson and R. C. St. John. Their gist, except those prepared by Mr. St. John, which are noted elsewhere in this issue, have been presented in earlier issues of this paper, dating back as far as 1900. During the week the local transportation committee held open meetings at which the later plans were considered. The hearings were expected to have been completed during the week and thus make possible an early choice and prosecution of the work. The retiring administration cleared away a number of barriers which had withheld subway progress, and now, since the present administration has announced its policy and since money is available for the construction of a first unit of a comprehensive subway, real work may be expected at no far distant date.

Car-Lighting Economies

The handling of car-lighting circuits during non-revenue runs deserves a little consideration as a possible source of economy on large systems. The savings which may be made by cutting off lights in the car interior when no passengers are being received or carried are obviously trifling per car per diem, but in the course of a year on a system operating many hundreds of cars between route termini and adjacent carhouses only, with signs turned against receiving traffic, there is an unquestionable economy in running the empty cars practically dark. It goes without saying that all non-revenue mileage should be cut down to the lowest possible limit, but where good reason exists for operating cars empty over distances of from 1 to 2 miles at the beginning and end of their evening service it would impose very little additional trouble upon the conductor or motorman to require him to cut off all but the headlight circuit when carrying no patronage. Such a course would indicate to the public that the car was bound for a carhouse or route terminus only, and would in some cases obviate the necessity of slowing down to explain to would-be patrons that the car was running light, with a consequent slight but annually multiplied saving in power and brakeshoes. The practice of running empty cars lighted to the fullest extent perhaps may be commended on the ground that it advertises the service to a slight degree, but it is probable that the public would prefer the operation of dark cars on these non-revenue runs, so that there would be no chance of error from hastening to catch a non-passenger car. Dark or semi-dark cars are operated without trouble by steam railroads when not handling passengers, and the possible saving is worth looking into on electric railways of the larger class.

CRITICISMS OF THE SERVICE

The constant stream of criticisms and comments on the service which flows into the executive offices of every important street railway system from one source or another is inevitably a burden to conscientious managers. It is impossible to escape the tide of public opinion so long as the patronage of the road is composed of the diversified elements encountered even in cities and towns of moderate size, but in the long run a progressive management welcomes suggestions and complaints which are genuine and well-founded. Upon the attitude of the general public depend many corporate policies for success or failure, particularly in connection with the adoption of those equipment details which directly concern passengers.

Of a few typical criticisms overheard recently of extended service under highly competitive conditions it is worth noting that most of them bore upon matters of an incidental character in the territories traversed. One complaint emphasized the difficulty of locating the exact stopping points of cars near congested street corners, on account of the variations in headway and the impracticability of maintaining an evenly distributed service in approaching the series of two or three marked stops beyond each corner. It is doubtful if operating companies can do much to help this situation except to require street inspectors, starters and policemen so far as possible to point out the probable stopping points of specific cars as they approach. The difficulties mentioned occur chiefly during the rush hours, when extra inspectors are on the lines. Something can perhaps be done to save the time lost when a car slows down to, say, 1 m.p.h. and then hitches slowly forward to the next designated car stop. There is unquestionably a point in the speed of a car where it is better to come to a full stop and receive or discharge passengers than to slow down almost to a standstill and then proceed at a snail's pace to the marked post farthest from a given street intersection. In other words, it does not always pay to try to fill regularly designated berths beyond each street intersection, but the public must depend upon the judgment of inspectors and motormen.

Another complaint common on large systems where waiting rooms are sub-let in part to victuallers is directed against the condition of these premises, when permitted to be run without strict supervision by the railway company. It is unnecessary to emphasize the influence of clean, well-ventilated and comfortable waiting rooms upon competitive traffic, but it is worth while to point out that unless the company exercises rather strict oversight of the conditions, the ventilation is likely to be neglected, dirt will accumulate, unpleasant odors will assail patrons who are driven indoors by unseasonable weather, and sometimes considerable disorder exists. It costs very little to hold the lessees of waiting room privileges in check if the matter is properly arranged in the original agreement, to enforce rules against the smoking of employees in uniform in and about such places, and to provide inexpensive seats on the outside for passengers who prefer to stay there while waiting for connections.

The question of car design in relation to popular satisfaction with the service is always one of live interest and is too broad to be disposed of in a paragraph. Only two or three points can be mentioned. Serious criticism has been voiced concerning the location of electric heaters immediately under the

seats and within a few inches of the body; the installation of narrow running boards has been subjected to adverse comment, as has the foreshortening of running boards at the platform ends of open cars. The use of large projecting bolts in the side sills directly over narrow running boards has also attracted unfavorable discussion. Of course, car design is necessarily a question of many compromises, and space liberalized at one point restricts that available elsewhere within the clearance diagram. But it will pay to study all such points with extreme care in the design or purchase of new rolling stock.

SINGLE-TRUCK CARS AND OTHER FEATURES OF THE HAVANA SYSTEM

In the interesting article on the Havana Electric Railway from the pen of F. W. Hild, formerly assistant general manager of the Havana Electric Railway, published elsewhere in this issue, we believe that no one feature will attract more attention than the discussion of the author on the relative merits of single and double-truck cars. Stated briefly, all city service in Havana is conducted with single-truck cars, and Mr. Hild justifies this practice by the results which have been secured in that city in the way of large traffic and in low power consumption per car mile, per seat mile and per passenger carried. Due allowance should be made for the fact that the use of the single-truck car was necessary because of the conditions in Havana. The city is one of the oldest in the Western Hemisphere, and with its narrow streets is more like one of the old towns in southern Europe than like a typical city of the same size in the United States. It is well known that in many of the European cities where double-truck cars are used in the newer portions of the city single-truck cars have to be employed in the older portions, because of the physical limitations of clearance. But whether the double-truck car was practicable in Havana or not this fact does not explain away the low power consumption, the small accident expense and the high traffic records of the short single-truck cars in that city.

Operating practice in the United States at present is distinctly in favor of long, double-truck cars for service in large cities, but this has been the case for only the past ten or fifteen years. Up to about 1895 nearly all electric railway cars in large cities were mounted on single trucks. Then, as Mr. Hild says, the much larger carrying capacity of the double-truck car, or, expressed in another way, the reduced operating cost per seat for motormen and conductors, was so evident that the long, double-truck car became standard in most cities. The St. Louis electric railway system was among the first to introduce double-truck cars, and from that point the practice soon spread eastward and westward. For a long time single-truck cars were retained in Washington and were run to a large extent in trains, but now only a few companies consider their retention advisable for city service. Perhaps the United Traction Company of Albany is the most prominent advocate left of the single-truck car. Three main arguments are advanced in its favor. One is its low power consumption. The second is that more cars can be run at the same operating cost—that is, for the same cost a shorter headway between cars can be given than if double-truck cars are used. The third is that the truck maintenance cost is less, because only one-half the number of trucks is employed. Against this must be placed a

high labor operating cost per seat and possibly a higher track maintenance per passenger.

As Mr. Hild says, the question is one which must be determined largely by local conditions. No general rule can be laid down that long cars are superior to short cars under all circumstances, or vice versa. We believe, however, that, whatever the past situation, two recent developments in car construction have modified materially the relation between these two types of cars. One of these is the great reduction in weight per seat which has been effected in double-truck cars. This has resulted in a corresponding decrease in the power consumption per seat. A proportional reduction in weight may be possible in the average single-truck car. But these changes practically reopen the entire question of relative power consumption per seat of both types of car, and all existing figures will have to be revised to accord with the latest figures on weights.

The second factor which has thrown a new light upon the question under consideration is the general adoption for city service of the principle of prepayment operation. One serious charge against long cars has always been that when the car was crowded and passengers were constantly entering and leaving the car it was difficult for the conductor to collect all the fares. In fact, the advocates of short cars have claimed that the loss through missed fares often more than made up the difference in the cost of labor between the long car and the short car. But if the conductor of a long prepayment car collects the fares of passengers as they enter, the difficulty of missed fares should practically disappear. Hence, so far as fare collection is concerned, there is almost no limit to the car length except that the effect of using too long a car would be unduly to lengthen the time of stops. So far as the stimulation of traffic is concerned, there does not seem to be any fixed relation between the volume of traffic and the headway of cars. When the headway is less than a certain minimum, say two minutes or one and one-half minutes, cars pass so frequently that probably no real benefit is derived from operating at a shorter interval. As the interval is increased a certain proportion of those who otherwise would ride short distances will walk, so that while it is difficult, if not impossible, to say how many passengers are lost in this way in any particular case, a frequent service is necessarily a stimulant of traffic.

The operating practice in Havana embodies a number of other interesting points besides that of the use of short cars. One is the employment of mixed-pressure turbines, designed normally to operate with the exhaust steam from the reciprocating engines with which they are thermodynamically connected, but so arranged as to run at constant speed, irrespective of the amount of exhaust steam received from the engine. This result is accomplished by supplying steam directly from the boiler when greater pressure is required and by shunting the exhaust steam from the engine past the turbine and directly to the condenser when a lower pressure in the turbine is necessary.

Another interesting feature is the use of surface condensers whose shells and pipes are lined with aluminum to reduce or eliminate the corrosion due to the circulating water. Conditions in regard to corrosion of condensing parts, not uncommon where salt water is used, seem to be unusually severe in Havana, and the use in that city of aluminum surfaces to prevent its occurrence will constitute a very interesting experiment.

SYSTEM OF THE HAVANA ELECTRIC RAILWAY COMPANY

BY F. W. HILD, FORMERLY ASSISTANT GENERAL MANAGER AND CHIEF ENGINEER OF THE COMPANY AND NOW GENERAL MANAGER OF THE PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

The American visitor to Havana will find many things to surprise him. Conscious of the wonderful progress of his own great cities, many a tourist on his first journey, recalling somewhat dimly that only during the last decade has Havana been undergoing modernizing influences, feels it his bounden duty to show the "benighted" native the advantages and glories of modern appliances and conveniences. He will instruct him in the mysteries of the electric bell, the telephone, the electric light, the electric street car, the phonograph, the camera and so on. On arrival he is amazed to find that the Cuban is not only entirely accustomed to all these modern appliances, but the tourist often finds that in Havana the latter are frequently of more recent and advanced design than those of his own city. Fortunately for the appreciation of our own intelligence, this

cious "patios," their soft coloring, the old Spain of the discoverers and the conquerors. One can easily imagine emerging from them the mailclad "caballeros," clanking impressively along the crooked, narrow streets.

In the cool interiors of these quaint old buildings the business man will store and display the very latest goods of the European and American markets. He will have for evening illumination the latest metallic-filament lamps, the most recent arc lamps. He will communicate over the latest type of automatic telephone, secure that no one can "listen in." He will see cabs and "taxis" passing at frequent intervals, and street cars one about every minute.

When it comes to street cars, the Habanero who has traveled will tell you with pride that there are few better systems anywhere. The natural modesty of the writer, who was connected with the street railway system for some years, although he has left Havana for other fields, forbids the expression of his opinion. Nevertheless he cannot refrain from pointing out certain features for some of which superlatives might be used.

Excluding subway and elevated systems and confining ourselves to street surface railway systems, it will be found that the Havana Electric Railway Company:

(a) Earns more per track mile per annum than most other surface systems. For 1910 this exceeded \$44,000 per mile of single track.

(b) Operates probably more cars per mile of track than most other systems.

(c) Operates cars on more frequent, that is on less, headway than any system in cities of its size, and it probably is true that in much larger cities the car densities do not exceed that of Havana. Thus the daily schedules call for an average of 210 cars on some 50 miles of city track, or more than four cars per track mile. In the downtown districts there are several stretches where 146 cars per hour are operated, while in the outlying districts, virtually the suburbs, the headways range from 4 minutes between cars of the Principe division, which is the weakest, to 55 seconds and 1½ minutes on the Vedado, Jesús del Monte and Cerro divisions. Thus it is clear that the basic principle of successful electric street railway service, i. e., very frequent small units, finds probably its fullest expression in Havana; and that it pays is shown by the substantial earnings of the company and the harmonious relations of the latter with the public.

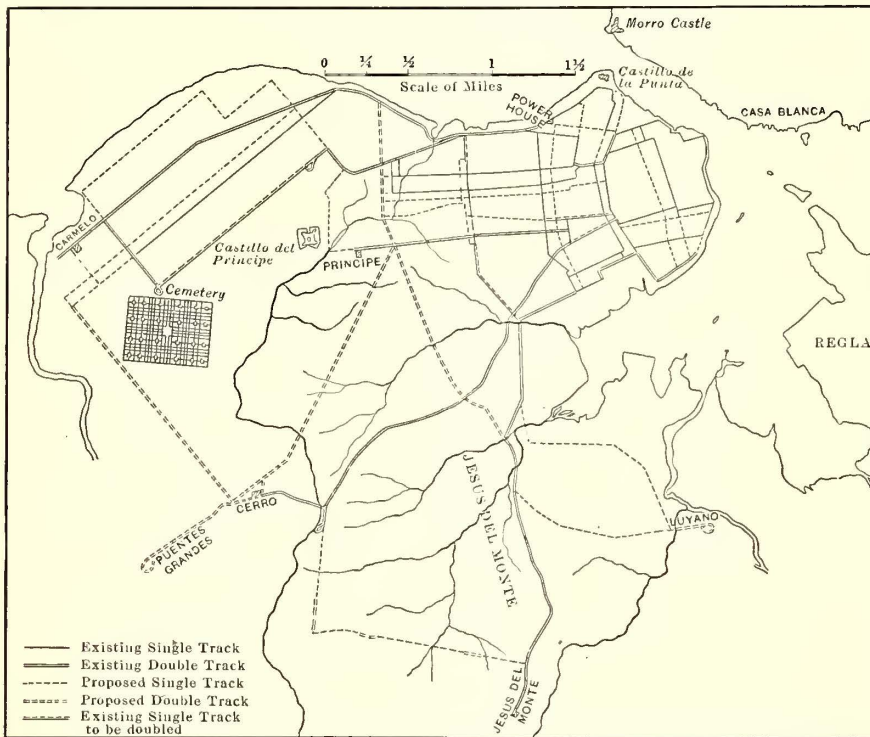
(d) Operates more cars and carries more passengers per unit power required than probably any other; and, accordingly,

(e) Has probably the smallest power plant for the number of cars and passengers moved.

During 1910 the following obtained:

Power plant capacity, 2550 kw. To this, during the last months of the year, was added 1500 kw in mixed-pressure turbines, of which one-half has been called upon for occasional operation.	
Output of plant, kw-hours.....	13,261,126
Purchased power, kw-hours.....	674,681
Revenue car miles.....	8,283,804
Freight and other car mileage (estimated in equivalent passenger car miles).....	207,000
Passengers carried	46,228,453
Average kw-hours per car mile.....	1.64
Average watt-hours per seat mile.....	51.2
Average watt-hours per passenger carried.....	301

(f) Has probably a smaller accident account than any other railway system of equal or even of much smaller size. During 1910 all items of expenditures entering into this amount,



Havana Electric Railway—Map of City Showing Lines of the Havana Electric Railway Company

type of American visitor is met very infrequently now. The great majority of Havana's visitors had already heard of the beauty and progress of this famous Cuban capital, and are, therefore, in a measure prepared to see and enjoy what is beyond question one of the cleanest, most picturesque and most beautiful cities in the world.

The climate is unequalled, being far more comfortable in summer than that of our Northern cities and, of course, much milder in winter than any of the Southern cities. Those who have sweltered in the street "canyons" made by the tall buildings in our large cities and who recall the many deaths and prostrations due to summer heat may perhaps be surprised to learn that in Havana the thermometer rarely, if ever, registers above 85 deg. Fahr. in the shade and that heat prostrations are unknown. There is always a cool, balmy breeze tempered by the ocean. It is small wonder that the electric fan has practically no sale in Havana.

No city in the Western Hemisphere presents such contrasts of the old and the new. Forming the extremely narrow streets are ancient, massive, solid masonry structures, suggesting in their design, their high columns, arches and portals, their spa-

including salary of claim agent, totaled \$5,502.73, or less than one-quarter of 1 per cent of the gross receipts.

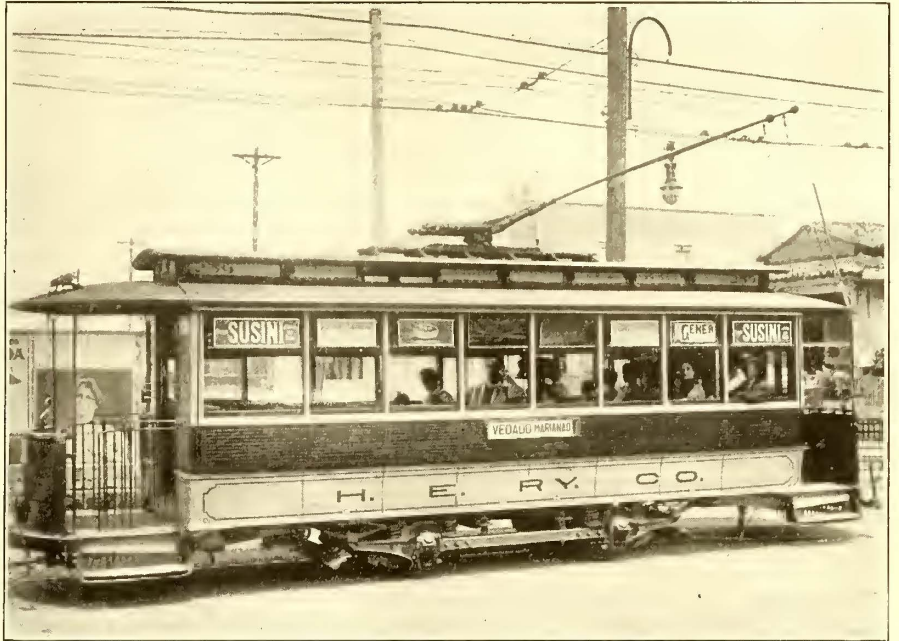
Much of this remarkable showing is due not so much to managerial and engineering foresight as to the natural limitations imposed by local conditions. Thus the extremely narrow streets and the consequent sharp curves have compelled the adoption of the compact, light, single-truck car and adherence to that model. Finally, the track mileage, totaling about 60 miles, is much less than that found in cities of equal size and population.

Let us consider the effect of the single-truck car. Some years ago a man in a Middle West city found his attention riveted by the fact that nearly one-half of the total operating cost was platform labor. It was by far the largest of all the items in the cost of operation. He reasoned, "If I build cars twice as big and run them half as often I shall still be able to carry the same number of passengers and cut the platform expense in half." Thus came the big double-truck car, but with it also came of necessity vastly larger car equipments, enormously greater power plants, heavier distributing and trolley copper, heavier and more costly rails. From the standpoint of the public the less frequent headway was unsatisfactory and eventually a return to the headway of the smaller cars came about.

From the standpoint of the company there were a number of other disadvantages to the long cars. For appreciable periods during the day they carried relatively few passengers per car. The dead weight per passenger carried, and hence the cost of moving him, greatly increased; but, probably worst of all, the fares collected with respect to the number of passengers carried greatly decreased. Now, it is the belief of the writer, based upon some observation and experience, that the great majority of street car employees are thoroughly honest, and that by far the greatest percentage of shortage in fare collection is due to the inability of the conductor to make the col-

thirty-two people is too capable a man to continue long in the job. He would inevitably advance into a better position.

Of course, prepayment systems, and, to less extent, recent improvements in car construction in the way of reducing weight, have largely met the difficulties outlined above. The writer does not wish to be understood as advocating the smaller single truck car everywhere in preference to the big double truck car. On the contrary, the larger car is undoubtedly in-



Havana Electric Railway—Side View of Standard Single-Truck Car

dispensable in many places. He believes, however, that the big car idea has been greatly overdone, and that on nearly every surface system there is room and profitable use for the light small car.

The net result of the adoption of the big car, however, has been an increase in the operating ratio, whereas the Havana system, in spite of certain operating difficulties later touched upon, operates at a ratio lower than most other properties.

The present relatively small track mileage of Havana, together with the liberal concession for extensions to the system obtained by General Manager Steinhart for the company, permits of intelligent, non-competitive, profitable expansion. The per capita earnings, \$8.24, are well below the saturation point for a city of this size.

FORMATION OF THE COMPANY

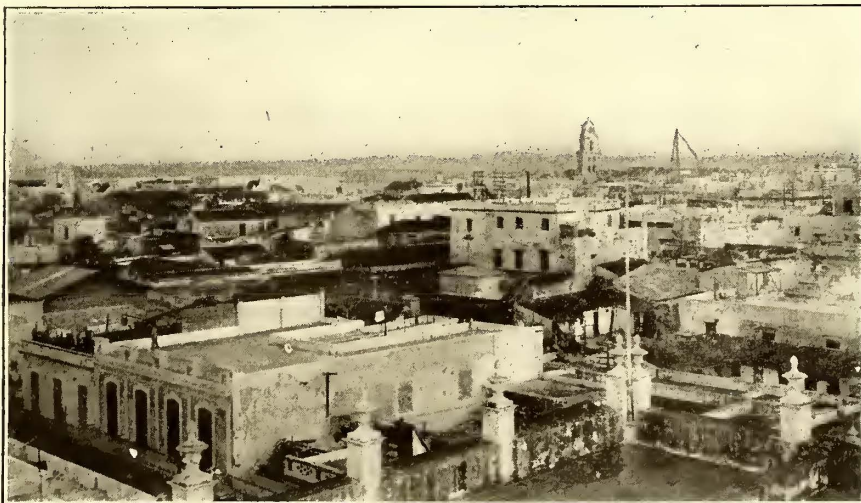
Shortly after the Spanish War a syndicate of Canadian, American and French capitalists formed the Havana Electric Railway Company and acquired:

- The Trigo concession,
- The Torre-Plá concession, and
- The Ferro-carril Urbano,

comprising one steam dummy line and sundry little horse car lines. These concessions were exchanged by military decree during the first intervention for the present concessions and franchises of the Havana Electric Railway Company. In 1908,

during the second intervention, General Manager Steinhart succeeded in having some 30 miles of extensions approved and authorized by governmental decree.

The old systems were torn out and scrapped and an entirely new railway was built, so that the present system is to-day about ten years old. Subsequently, in 1904 the Tranvia de Marianao and the Insular Railway, joining Havana and the town of Marianao, were built; they are owned and operated



Havana Electric Railway—Bird's-Eye View of City

lections, whether because of the type of the car or because he cannot remember the passengers who should have paid. Doubtless every reader of this article recalls instances of having ridden on a street car without payment of his fare. It is a further theory of the writer (leaving out of consideration the recent developments in prepayment and fare box constructions) that any man who can successfully perform all the duties of a conductor and collect all the fares in a car seating more than

by the Havana Electric Railway Company. All the concessions and franchises run to 1949. A system of mule-drawn stages operating in the city and suburbs was also purchased in 1905 and is operated by the company.

The terms of the concessions were laid down by the military engineers of the first intervention, under the direction of Col. William H. Black, then head of the department of public works of the island of Cuba. The construction called for was of the highest class.

who believed that any other would be unduly hard on the wheels of the cabs and coaches. This, of course, necessitates careful attention and considerable work by the track men. In addition to the section before mentioned the track includes some Phoenix rail, 95.3 lb., from Arthur Koppel, Germany; some Trilby rail, P. S. 243, 90 lb., from the Pennsylvania Steel Company, and more recently some Ougrée X, 1909, 95.3-lb. rail made by the Société Anonyme d'Ougrée, Marihay, Belgium. The original special work was of Pennsylvania construction;



Havana Electric Railway—View of City from Across the Bay

The census of 1907 gave to Havana a population of 302,526, but as this includes the small towns on the east side of the bay the population served by the railway system is about 275,000. The city is for the most part quite level, but toward the south, as indicated by the names "Cerro" (hill) and "Jesús del Monte" (Jesús of the Mountain), the ground rises considerably and affords some long and fairly severe grades for the cars to negotiate.

TRACK AND ROADWAY

The map on page 906 shows the system as constructed and

the newer work is of Lorain guarantee construction with renewable manganese centers.

A form of track gage and standard devised locally has been found rather useful. It consists of rail sections united by I-beams and is frequently checked by comparing with it the wheel gage and a good steel tape. Experience showed that the ordinary track gage, because of rough handling, soon became inaccurate. Hence each of the present gages consists of two heavy forgings united solidly by a 2-in. pipe. These gages have proved very satisfactory and although checked with the



Havana Electric Railway—A Handsome Avenue in Havana

projected. The roadbed throughout Havana and Marianao is solid concrete with steel ties spaced 10 ft. apart. The rail specified by the army engineers was Pennsylvania section, No. 255, weighing 90 lb. This is an extremely difficult section for operation owing to its very shallow and narrow groove, so that a very slight departure from the gage, which is standard, makes itself known by the sound and wear of the car wheels. This section was insisted upon by the army engineers,

standard semi-weekly have very seldom required adjustment. During the construction of new track the gages are checked daily.

Along part of the bay front the tracks are raised and carried by a steel elevated structure. A plate girder drawbridge for single track with wood trestle approaches spans the Almendares River and joins the Havana Electric Railway Company tracks with the Insular Railway.

The company is required to pave between its rails and tracks and for 50 cm outside its rails. The paving is wood block, asphalt block, macadam and, for the most part, granite blocks. At present the city of Havana is being sewered and paved, so that considerable of the existing older pavement will have to be replaced with granite. The granite blocks came from Norway, which produces a very excellent quality of blocks.

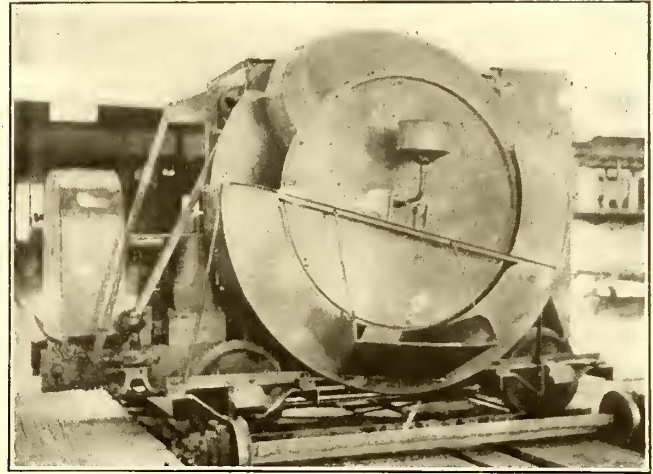
The Insular Railway, which is double-tracked, has native hardwood ties spaced 24 in.; 60-lb. T-rails, made by John Cockerill, of Belgium, and 75-lb. T-rails, made by the Lorain Steel Company. The ballast used is broken stone and cinders mixed.

The requirement of concrete roadbed in the city work has resulted in the development of a special concrete mixer, which has been found very satisfactory and economical as to handling. As shown in the illustration, it is a motor-driven drum mixer, mounted on a special steel truck with 20-in. cast-iron car wheels. The unique feature is the system of loading: Three large vanes secured to one side of the drum and projecting some 18 in. beyond its perimeter scoop the material from the loading bin, which is fastened to the truck very close to the ground. These vanes have curved surfaces so that as the drum revolves the material slides along these surfaces by gravity and falls into the drum itself. On repair jobs the mixer is derailed beside the work and the material wheeled and dumped into the bin by wheelbarrows. On new work the mixer remains on the rails coupled to two flat cars containing the material, the water being carried in barrels or in tanks and the entire train moved by a motor car. The mixture is discharged from the mixer into a chute which conducts the concrete to a platform forming the front part of the mixer, from which it is shoveled or raked into place between the rails ready for the tampers. The mixer was built in the shops of the company.

POWER PLANT

The power house is a prominent sight from the steamers passing or entering the Havana harbor. It is practically on the ocean front at the corner of Colon and Blanco Streets, and its tall steel smokestacks can be seen from a great distance. Judging from its construction, the builders evidently had in

River, and is hauled by the company's cars to the storage bins at the power house, which have a normal capacity of 400 tons. From these bins, which are built of reinforced concrete and located on the ground, the upper surface being level with the boiler-room floor, the coal is conveyed to the boilers by a Heyl & Patterson traveling crane conveyor. The crane receives the coal into its buckets from openings at the bottom of the bins and carries it by means of an endless chain up and over to the



Havana Electric Railway—Concrete Mixer

boilers. Six Muñoz 500-hp boilers with individual stacks and arranged for hand firing form the steam-generating equipment, and saturated steam at 140 lb. gage pressure is generated. A concrete reservoir having a capacity of some 340,000 gal. receives the condensation from the surface condensers and this water is delivered to a Cochrane feed water heater by two motor-driven Worthington centrifugal pumps. From the feed water heater three Smith-Vaile duplex steam pumps supply the boilers. The plant includes a Kennicott water softener for treating the make-up water, which contains much lime and magnesia. An interesting feature is the open construction of the boiler room which the climate permits. It has no sides other than the fire wall which separates it from the engine room and, excepting the corrugated steel roof which projects and overhangs enough to protect the firemen from the sun's rays, the boiler room and its contents are quite exposed.

The engine room contains three Allis-Chalmers vertical cross-compound condensing engines, 28 in. and 60 in. x 42 in., direct-coupled to G. E. direct-current generators, rated at M.P.-10-850 kw, 550 volts, 80 r.m.p. One G. E. rotary converter rated T.C.-12-500-600-600-r.p.m. is used, with a bank of airblast transformers stepping down from 2300 volts. The switchboard for the equipment is G. E. standard for double trolley, and includes twenty-two black-enameled slate panels. The feeder panels have double-throw switches cross-connected so as to enable the accidental grounds to be confined to one polarity. Wheeler surface condensers of the Admiralty type are provided, one for each engine.

When the need of additional power became manifest, and as the company had been purchasing power for two of its outlying lines, it was decided to install alternating-current machinery and transmit three-phase, 60-cycle current at 13,200



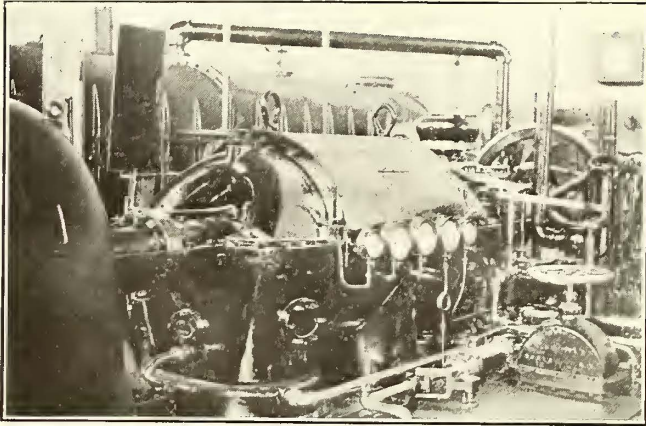
Havana Electric Railway—Plaza de Arma

mind the hurricanes which occasionally visit this part of the island. Its huge massive brick walls, some 30 in. thick, are solidly founded on massive concrete carried down to solid rock. It has never suffered damage from any of the storms of which that of last October was one of the most severe. A similar heavily constructed fire wall separates the boiler plant from the engine and generator plant.

Coal is stored at La Puntilla, at the mouth of the Almendares

volts to two substations. Therefore, during the last part of the year just ended there were added to the plant two Westinghouse mixed-pressure turbines, each rated at 750 kw, three-phase, 60 cycles, 2300 volts, 3600 r.p.m. Each turbine has a direct-coupled exciter. In addition, a 20-kw motor-generator set is available for excitation.

For each turbine there is provided a Wheeler surface condenser outfit consisting of:



Havana Electric Railway—Mixed Pressure Turbine and Condenser

One Wheeler surface condenser and feed water heater, having not less than 5350 sq. ft. of cooling surface.

One 14-in. centrifugal circulating pump direct connected to 10-in. x 10-in. vertical steam engine.

One 8-in. x 18-in. x 12-in. rotary dry vacuum pump.

One 6-in. x 10-in. x 10-in. horizontal direct-acting suction, valveless, hot-well pump with hot well and float.

For the control of the alternating-current system is provided a switchboard consisting of:

Two exciter panels.

Two generator panels.

Two transformer panels.

One tie-line panel connecting to the lighting system.

Two outgoing line panels.

Three blank panels for future needs.

The three-phase, 2300-volt current from the generators is conveyed by triple-conductor varnished-cambric lead-covered cable to oil switches and to the 2300-volt buses, which are located in the basement directly below the switchboard panels. From this bus system the current is led through oil switches to the G. E. transformers which supply the 500-kw rotary converter and to two banks of oil-cooled Westinghouse transformers having a total capacity of 1200 kw and stepping up the voltage to 13,200. From these transformers the high-voltage current is carried by cables to oil switches and the 13,200-volt buses, which are contained in a concrete structure on a gallery directly above the switchboard panels. From these buses three high-tension feeders supply, by means of varnished-cambric, lead-covered cables, the two outlying substations and the portable substation which is normally kept at the power house. All the cable was furnished by the Standard Underground Cable Company, and, with the exception of the airblast transformers and the converter which constitute the 500-kw rotary outfit, all the alternating-current machinery in the plant and in the three substations is of Westinghouse manufacture.

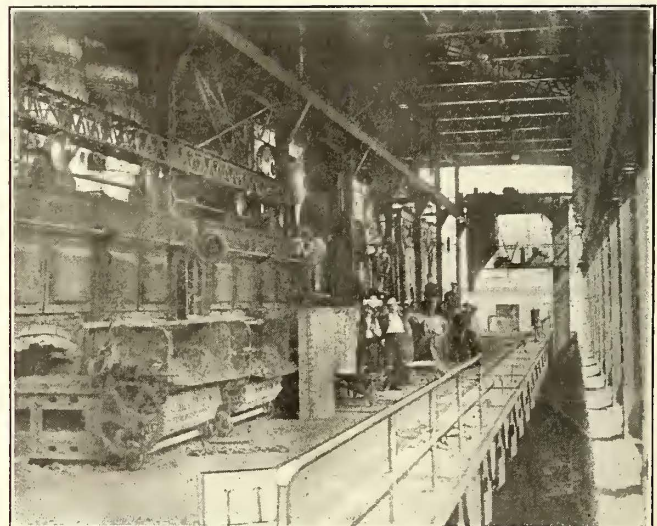
The electrical installation is of the usual type, and contains no special features. The steam installation, however, has two quite new features, one with the turbines and the other with the condensers.

STEAM INSTALLATION

The turbines are of the Westinghouse-Parsons mixed pressure reaction type, each designed to take the exhaust steam from an engine. Since the loads on the engine and turbine are in a measure independent, the former generating direct current

and the latter alternating current, a governor on the turbine is necessary. The 500-kw G. E. rotary and the 300-kw Westinghouse rotary in the portable substation tie these two loads together. Nevertheless, the fluctuations and differences of loads are such that the turbine usually has more or less exhaust steam than its loads demand. The design of the turbine is such that not only variable quantities of steam but also variable pressures at the turbine inlet are required for proportionately variable loads. Thus the pressure on the low-pressure piping and against the low-pressure piston of the engine varies with the load, and no attempt is made to utilize the low-pressure piping for a storage reservoir. To handle these conditions, the Westinghouse engineers have devised a very ingenious form of governor. It is in effect a modification of the governor used on the high-pressure Westinghouse turbines. When there is a lack of low-pressure steam or a lack of inlet pressure the governor automatically admits boiler pressure steam into the pipe leading to the turbine, the steam first being expanded to the pressure required by the turbine. This part of the governor mechanism functions then substantially like a reducing valve. On the other hand, when there is an excess of steam or excess of inlet pressure the governor automatically opens a by-pass valve and shunts the excess of steam into the condenser, thereby lowering the inlet pressure to that required by the turbine. Of course when the pressure of the exhaust steam from the engine is just what the turbine requires, then both the high-pressure valve and the by-pass valve remain closed and only the exhaust steam passes into the turbine. Each turbine with 27½-in. vacuum at its discharge is designed to deliver 450 b.h.p. at 10 lb. absolute pressure at the inlet, or 1350 b.h.p. at 20½ lb. absolute pressure at the inlet, with intermediate outputs at substantially proportionate inlet pressures.

The original plans for the power house contemplated the building of a tunnel from the power house site to the ocean to convey cooling water for the condensers. It was found, however, that a large well which was to form the end of the tunnel, into which both salt water and fresh water seeped, sufficed to supply the plant requirements. This water, however, has proved to be extremely hard on the condensers, which suffered corrosion from it at a very rapid rate. Tubes of every manu-



Havana Electric Railway—Open Boiler Room

facture known were tried, but all failed in a comparatively short time.

CONDENSERS

The older condensers in use with the engines are cast iron throughout, excepting the tubes, pump valves, the pump piston rod and the pump cylinder lining, all of which are brass. While, of course, the tubes owing to their thinness failed more frequently than any of the other parts of the condensers, it was found that the rate of corrosion was more rapid with the cast-

iron parts than with the brass pieces. Careful investigation showed that there were no stray ground currents of electricity which might be causing electrolytic corrosion. This was to be expected, for the d.c. distribution system is insulated in both polarities, the double trolley being used. This was further confirmed by the fact that the corrosion was confined to the metals in contact with the circulating water. The other parts of the condensers handling the condensation showed only moderate rusting and the ordinary mechanical wear.

Analysis of the circulating water showed it to have the elements of an electrolyte. It is of course well understood that practically all commercial castings and alloys contain two or more dissimilar elemental metals; thus in the iron castings are found carbon, manganese, silicon and phosphorus, while in the brass castings, tubes and drawn brass are found copper, zinc, tin and sometimes nickel.

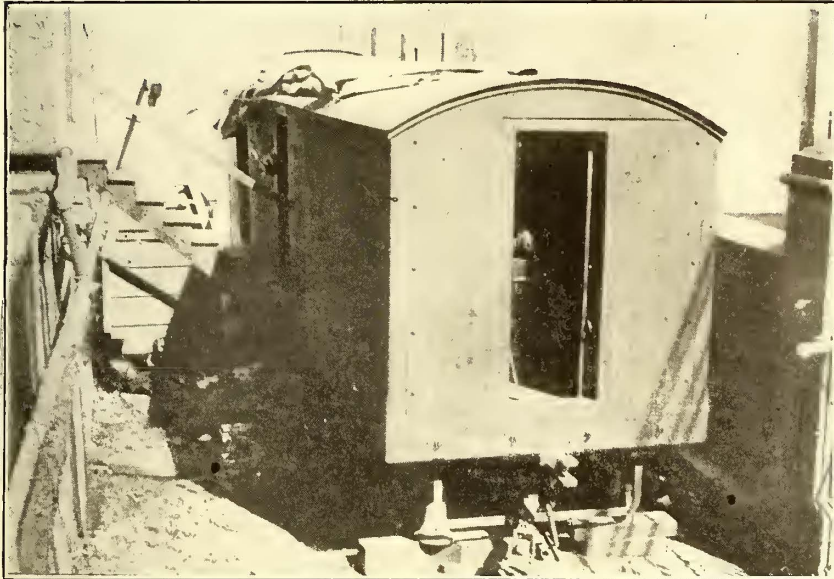
It follows that given two or more dissimilar metals in the presence of an electrolyte we have in effect a battery, and when these dissimilar metals are fused together as in castings and alloys we have a short-circuited battery. The metal which is electro-positive to the others then disintegrates and thus we have roughly the modern theory of corrosion.

The solution which naturally suggests itself is to construct whatever apparatus is thus liable to corrosion so that only one

ocean is now in progress of construction. This tunnel and the well will be lined throughout with concrete so that the future cooling water supply will be sea water.

SUBSTATIONS

The largest of the three substations is located on the Calzada de Jesús del Monte. It is known as the "Agua Dulce substation" and consists of a reinforced concrete structure containing two 300-kw, 60-cycle Westinghouse rotaries with two sets of oil-cooled transformers, stepping down from 13,200 volts to the voltage required by the rotaries. Electrolytic lightning arresters are connected to the high-tension feeders close to the wire entrances and cable pot-head, and the feeders then pass through choke coils, disconnecting and oil switches to the high-tension bus, which is in a concrete compartment. From the bus the current is led through oil switches to the transformers. The switchboard includes eight black slate panels for the control of the substation apparatus and three pairs of d.c. feeders. Two feeders, one of triple-conductor lead-covered cable, direct from the power house, and the other an exposed aerial line from the Insular substation, supply the alternating current. The substation building is in the rear of a two-story residence building newly erected and owned by the company, the rentals from which more than pay the interest charges of the buildings and machinery.



Havana Electric Railway—Portable Substation



Dwelling House and Substation

metal, preferably an elemental metal well down in the electro-negative end of the metallic series, will be the only metal to come in contact with the electrolyte, i.e., the circulating water in the case of these condensers. It was hoped that lead, which has so well proved its corrosion-resisting qualities in the lining of vessels containing hydrochloric acid, in storage batteries and as the covering of insulated cables in salt water, could be so adapted, but the several condenser manufacturers claimed that the inert quality of lead and its low heat conductivity made it impracticable. However, the Wheeler Condenser & Engineering Company in conjunction with the Aluminum Company of America developed and constructed two surface condensers lined with aluminum throughout the path of the circulating water, and these have recently been installed in Havana. The tubes are of copper, lined with aluminum. The condenser shell is cast iron lined with sheet aluminum; the tube sheet is rolled aluminum; the centrifugal circulating pump is cast aluminum, as is also the foot valve. The suction and discharge pipes are sheet aluminum, shaped to pipe form, with the edges lap-welded.

The city of Havana is now having constructed a complete system of sewers and drains, and in the prosecution of this work considerable pumping is necessary. It was feared, as this work neared the power house, that this pumping would diminish the available cooling water in the well, so a tunnel to the

The Insular substation, a reinforced concrete building, located at the intersection of the Insular Railway and the Ferrocarril de Marianao, an electrified branch of the United (steam) Railways, contains one 300-kw Westinghouse rotary converter with the customary transformers, switchboard, arresters, etc.

The portable substation contains equipment identical with that in the Insular substation. It is contained in a special constructed double truck car, and has proved its value many times.

ELECTRICAL TRANSMISSION

The scheme of high-tension transmission embodies a triangular feed. Starting from the power house, one high-tension cable is carried directly south to the Agua Dulce substation. One other goes west to the Almendares River where it is spliced into an armored submarine cable and thereby conducted to a switch house on the west bank of the river. From this switch house three bare copper wires, made up of old scrap trolley wires, are carried on a cross-arm on the top of the Insular Railway poles to the Insular substation. From this station three similar bare-copper wires are carried across open country on steel towers, spaced 175 ft. apart, to the Agua Dulce substation.

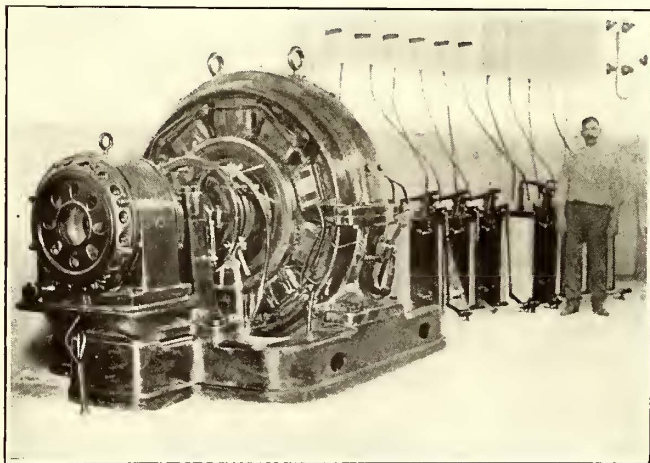
On the outer ends of the cross-arms of both the Insular poles and the tie-line poles are ground wires, for which old scrap trolley wire was used. The Insular poles are creosoted

pine and the cross-arms are native hard wood called "majagua," and are painted with carbolineum. The cross-arm braces are flat steel bars extended to about 11 in. above the cross-arms and serve to carry the ground wires about level with the transmission wires. About one-half of the poles carry vertical ground wires from the junction of the cross-arm braces into the ground. The ground wires on the cross-country tie line are threaded through eyebolts which project above the steel cross-arms to which they are bolted and of course each tower makes good ground connection. These ground wires together with the Westinghouse electrolytic lightning arresters installed at the two substations, the switch house and the power house form very effective lightning protection, no injury to the apparatus having as yet occurred despite several very severe electrical storms. Prior to the installation of the alternating-current apparatus ground wires had demonstrated their efficacy in protecting the car equipments. On the Insular Railway this piece of track runs through exposed open country for about 6½ km (4 miles), and it was a regular experience up to the summer of 1907 to lose a number of motor armatures during nearly every storm. That summer a couple of ground wires, made up of old scrap trolley wire, were put up and since then not an armature has been lost due to electrical storms.

The insulators used on the 13,200-volt lines are Thomas No. 2017, 5⅜ in. high by 6¾ in. diameter, tested to 50,000 volts. Steel bolts are cemented into the insulators and with porcelain bases form the pins for carrying the insulators.

The steel towers were built by the American Steel Company of Cuba. They came through the October hurricane without a single instance of failure or bending. A number of built-up steel poles of other types used in the service of other companies were bent double by the same storms. The steel towers are built in three sections, two of which when assembled and erected project 30 ft. above the ground, while the three sections make a tower 49 ft. 6 in. high above ground. The cross-arm is a 6-in., 8-lb. steel channel, 7 ft. 10 in. long with five holes punched 23 in. apart to receive the insulator pins and the ground wire eyebolts, and is bolted to the flat surface forming the top of the tower.

The high-tension cables and the d.c. feeder cables are carried by the steel tubular poles which support the span wires carrying the trolley wires. The d.c. feeder cables were originally run through conduit laid along the tracks in various parts of the city, but since the beginning of the sewer and paving work



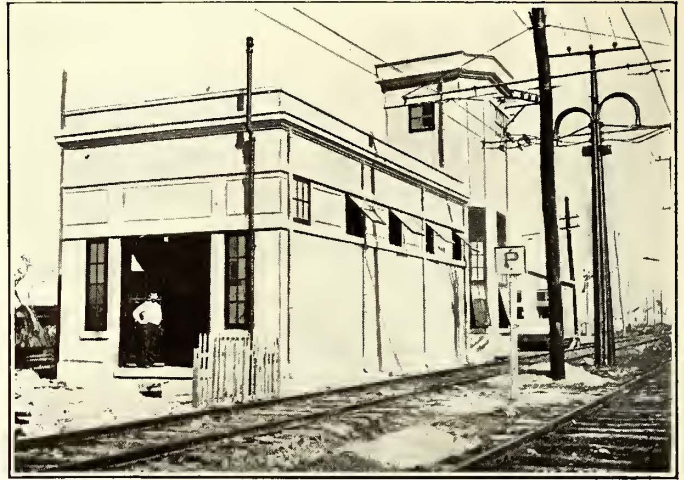
Havana Electric Railway—Interior of Substation

they have been withdrawn from the ducts and are now being carried overhead. Steel bands clamped to the top of the poles, holding a wood block with ordinary 2-in. porcelain knob laid on its side, carry a 7/16-in. galvanized steel messenger cable, from which the feeder cable is suspended by zinc clips spaced 24 in. apart. This form of construction, common in telephone work, was deemed necessary by the frequent joints in the cables, which it was believed greatly decreased the mechanical

strength of the latter. The arrangement adopted has proved to be very satisfactory.

DOUBLE TROLLEY SYSTEM

The double trolley system is used throughout the Havana Electric Railway Company's lines, and while it multiplies the number of overhead wires and always necessitates the presence of the car conductor on the rear platform at curves and special works in order to guide the trolleys, no difficulty in op-



Havana Electric Railway—Insular Substation

eration is encountered. Practically all the overhead special work was designed and constructed in Havana. Except on the Insular Railway, which has center poles and brackets, and in parts of Marianao, which have a small stretch of side poles and brackets, span wire support of the trolley wires is the general construction. Ordinarily 26 ft. 6 in. top, three-section, steel tubular poles placed along the curbs are used, with of course larger and heavier poles in certain locations. In the very narrow streets of old Havana 4-in. pipes are placed opposite each other on both sides of the street, close against the fronts of the buildings, and these vertical pipes are joined together by a horizontal pipe and elbows. Span wires secured to the vertical pipes carry the trolley wires. The overhead insulators for the d.c. system were supplied principally by the General Electric Company, but the products of most of the other supply companies are also in use.

NEXT ARTICLE

In a following article the writer will describe the shops, rolling stock and operating practice of the Havana Electric Railway Company.

GERMANY BEGINS TRUNK LINE ELECTRIFICATION

Germany took an important step toward the electrification of its trunk line railways on March 27 when the Prussian House of Deputies voted a credit of £2,500,000 as a first instalment for the electrification of several sections of the Prussian State Railways. The sections on which electric traction is to be introduced are Magdeburg-Leipzig, a distance of 80 miles of double track, and several lines in Silesia, having an aggregate length of 280 miles of double track. Apart from the main lines there are sidings and additional lines at or near stations, making a grand total of 960 miles of single track to be completed within two years. It is understood that the military experts hesitated to indorse electrification at first, owing to the opinion entertained by some that it was easier for the enemy to interrupt traffic on an electrified line than on an ordinary railway, but any objections originally entertained by the Ministry of War were withdrawn. The Prussian Ministry of Public Works intends to propose further electrification of the State lines as speedily as the money can be found for this purpose by the Minister of Finance and voted by the Prussian Diet.

**RESULTS OF 1200-VOLT DIRECT-CURRENT OPERATION
ON THE WASHINGTON, BALTIMORE & ANNAPOLIS
ELECTRIC RAILWAY**

On Feb. 7, 1908, the Washington, Baltimore & Annapolis Electric Railway, comprising 96.33 miles of single track between the cities named, was opened for a combined single-phase and direct-current operation. It was soon found that the complicated equipment required to operate with both systems was not satisfactory for the development of a reliable and profitable service. Therefore, after careful consideration it was determined to replace the combination equipment by a 1200-volt d.c. system. This change was inaugurated on Feb. 15, 1910, without any interruption of the schedules.

FINANCIAL IMPROVEMENTS

The installation of the d.c. equipment produced immediate economies in current consumption and greater reliability of service. Furthermore, successful operation for over a year has demonstrated that the maintenance of 1200-volt d.c. equipment offers no greater difficulties than standard 600-volt ap-

per car mile. On the other hand, the gross earnings rose from 41.36 cents per car mile to 42.56 cents per car mile. Owing to the reduction in operating expenses the net income was 23.71 cents per car mile, as against 17.58 cents per car mile. Still better results appear in the comparative statement for January, 1911, and January, 1910, which shows an increase of 17.37 per cent in gross earnings, a decrease of 1.38 per cent in operating expenses and an increase of 70.1 per cent in net earnings. For the seven months from July 1, 1910, to Jan. 31, 1911, the percentage of operating expenses was only 50.43 per cent as against 60.8 per cent for the same period a year before.

COMPARISON OF TRAIN DETENTIONS

The great betterment in the service will be appreciated by examining the accompanying tables, which give the train detentions in February, 1910 and 1911. These tables show that the total schedule car miles operated increased from 103,718 miles to 117,416 miles and that the number of car miles operated per minute detention from all causes increased from 28.97 miles to 104.46 miles. Fully 97.9 per cent of the d.c. trains were on time. The analysis of causes shows that the greatest improvement was effected in the item marked "electrical," which covers

REPORT OF TRAIN DETENTIONS—FEBRUARY, 1910.

Total number scheduled trains operated.....	3,276
Total number scheduled trains operated on time.....	3,027
Total number scheduled trains operated late.....	249
Total number minutes detentions scheduled trains operated.....	3,579
Per cent of scheduled trains on time.....	92.39+
Per cent of scheduled trains late.....	7.60-
Average delay of each train late (minutes).....	14.37
Total scheduled car miles operated.....	103,718
Total car miles per minute detention.....	28.97

DETENTIONS SEGREGATED—FEBRUARY, 1910.

Causes.	Detentions, Percentage.	Total Minutes Detentions.
Mechanical	4.5	161
Electrical	33.1	1,186
Trolley pole.....	1.7	61
Overhead	2.7	96
Track .....	...	...
Meeting and passing points.....	6.7	240
Traffic	2.3	83
Fires .....	...	...
City cars	3.4	123
Local business.....	5.6	202
Connections	3.7	134
Power off.....	16.3	586
Deraillments .....	.2	8
Interlocking and signals.....	.2	8
Other trains	5.9	213
Train orders.....	2.1	77
Baggage express.....	.1	3
Doubleheading, etc.....	1.1	42
Arriving late.....	5.4	194
No available cars.....	1.6	70
Miscellaneous	2.5	92
	99.1	3,579

REPORT OF TRAIN DETENTIONS—FEBRUARY, 1911.

Total number of scheduled trains operated.....	3,384
Total number of scheduled trains operated on time.....	3,313
Total number of scheduled trains operated late.....	71
Total number minutes detention scheduled trains operated.....	1,124
Percentage of scheduled trains operated on time.....	97.90
Percentage of scheduled trains operated late.....	2.10
Average delay of each train late (minutes).....	15.83
Total scheduled car miles operated.....	117,416.36
Total scheduled car miles operated per minute detention.....	104.46

DETENTIONS SEGREGATED—FEBRUARY, 1911.

Causes.	Detentions Percentage.	Total Minutes Detentions.
Mechanical	2.31	26
Electrical	19.12	215
Trolley pole.....	4.00	46
Overhead	6.31	71
Meeting points.....	2.22	25
Passing points.....	2.22	25
Traffic	8.54	96
City cars (Washington).....	16.28	183
Local business.....	1.25	14
Arriving late.....	2.40	27
Doubleheading .....	.98	11
Flow trouble .....	.89	10
Connections	5.96	67
Power off (U. Ry.).....	.44	5
Power off (Washn. Ry.).....	2.40	27
Power off (W. B. & A.).....	2.22	25
Deraillments	6.68	75
Other trains	2.58	29
Train orders.....	.53	6
Snow .....	.44	5
Ice on trolley wire.....	8.01	90
Accidents	3.65	41
Miscellaneous .....	.44	5
	99.96	1,124

Washington, Baltimore & Annapolis Railway—Comparative Record of Train Detentions from All Causes During February, 1910, and February, 1911

paratus. The records of the company show that there has been a noteworthy decrease in those operating costs which are affected by the character of the equipment. Comparing the last six months of 1909 and 1910 respectively, it appears that the maintenance of the a.c. passenger cars, item 32 of the interstate classification, cost 0.85 cent per car mile, whereas with the d.c. passenger cars the same item amounted to only 0.19 cent per car mile. The maintenance of the electrical equipment of the cars, item 36, was reduced from 0.37 cent to 0.24 cent per car mile. It should be added that the figure of 0.37 cent per car mile for electrical equipment of a.c. car does not include the amounts spent by the manufacturers and which were not included in the railway company's accounts. The transportation expense for carhouse employees, item 66 of the classification, was reduced from 1.08 cents per car mile to 0.49 cent per car mile. Stated in another way the latter figures mean that 25 men instead of 60 are now employed in the maintenance of the cars. Perhaps the most significant change was in the power consumption, the cost of which was reduced from 5.89 cents per car mile to 3.82 cents per car mile, a difference so great that, roughly speaking, it would require one additional passenger per car mile to pay for it, assuming a fare rate of 2 cents per car mile.

The total operating expenses for the semi-annual periods named were reduced from 23.78 cents per car mile to 19 cents

all operating equipment on the car. When single-phase rolling stock was in service electrical causes were responsible for 33.1 per cent of the detentions, amounting to a delay of 1186 minutes. Under the 1200-volt system the same causes were responsible for 19.12 per cent of the delays, but the total number of minutes' detention was reduced in much greater proportion, amounting to 215 minutes only. Another significant item is that of "power off." The delays from this cause were lowered from 586 minutes to 62 minutes. The total minutes detention from all causes was reduced from 3579 to 1124. A portion of these delays is unavoidable because this company operates over foreign lines in Baltimore and Washington. In Washington, particularly, the cars are likely to be held up by blockades, as shown by the fact that 183 minutes were lost from this cause in February, 1911. It should be stated, also, that even the present electrical equipment of the cars is quite complicated, as the conditions call for operation with 1200-volt single trolley and ground return on the interurban division, 600-volt single trolley in Baltimore, and 600-volt double trolley and underground conduit in Washington. In view of these handicaps the records now made on this line are in every way creditable to the equipment and to those who maintain it. The tables of detentions show only the scheduled trains, as no extras or express cars are recorded.

ROLLING STOCK

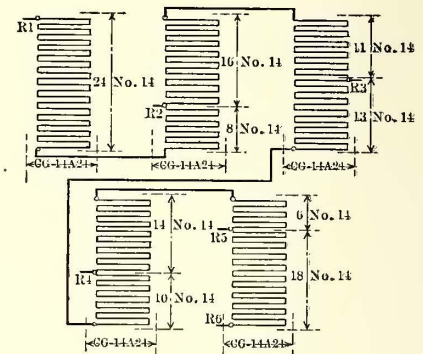
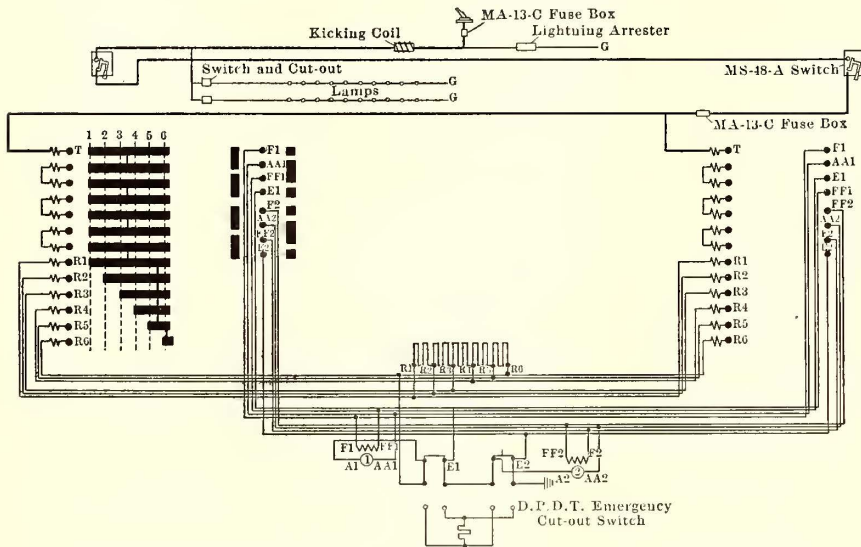
The original single-phase cars were 24 in number, 62 ft. long over all and weighed 59 tons complete. The d.c. cars are 51 ft. long and weigh 39 tons complete. The present rolling stock is made up of 44 cars as follows: 26 straight passenger cars; 13 combination passenger, smoking and baggage cars; 3 motor-equipped baggage cars; 1 private car; 1 city type car for Annapolis. There are besides 25 flat car trailers.

The 26 straight passenger cars include 9 cars ordered in September, 1910, and which have just been equipped. The

The 1200-volt car has been in operation since September, 1910, without having cost a cent for replacement, except in the renewal of 15 grid resistances which were burned out on account of snow. The car is inspected weekly on a 500-mile basis at a cost of about 60 cents per inspection. The lamps on this car are arranged 12 in series.

MAINTENANCE AND EQUIPMENT FEATURES

Careful attention has been given to the wiring of all cars in view of the use of a potential which sometimes goes as high as 1300 volts. Formerly the 600-volt and 1200-volt cir-



Approximate Resistance.

R1-R2	5.66 Ohms.	R1-R6	21.23 Ohms Total.
R2-R3	4.78 "	R2-R6	15.57 "
R3-R4	4.07 "	R3-R6	10.79 "
R4-R5	3.54 "	R4-R6	6.72 "
R5-R6	3.18 "	R5-R6	3.18 "
		R6	0 "

Electric Ry. Journal

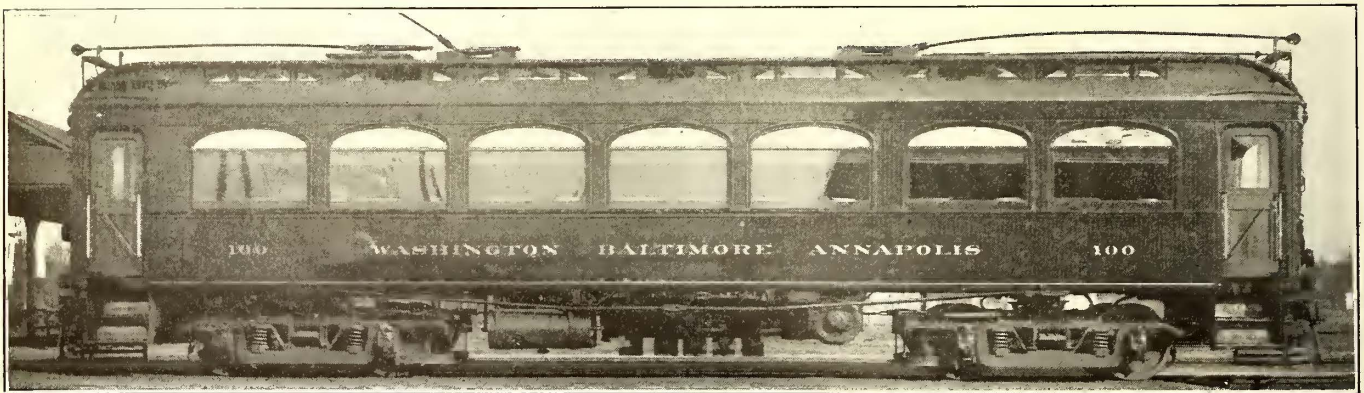
Washington, Baltimore & Annapolis Railway—Connections of R-200-A Controllers, Two Motors and Trolley and the Resistance Connections of the Permanent 1200-Volt D.C. Equipment

standard equipment embraces Niles bodies, Baldwin trucks, four GE-205 motors per car, C-80 automatic control and 650-volt motor-generator sets for the lighting and control service. The three baggage motor cars are each equipped with four GE-207 125-hp motors and C-74 hand controllers. They are used for hauling freight cars in the interchange business with the Baltimore & Ohio and the Pennsylvania Railroads.

The private car does not differ materially from the standard passenger cars. It has no end observation windows, but the

wires were run together, but they now are placed in separate iron conduits to avoid all possibility of short-circuits between adjacent wires. The positive trolley wire has also been placed in conduit. The panel-boards are placed in transite-lined cabinets, with the 1200-volt board at the bottom. The heaters are 12 in series on the 1200-volt circuit, while the lights are five in series on the 650-volt motor-generator circuit.

The motors have given very satisfactory service. In fact, there have been no burn-outs whatever except on one occasion,



Washington, Baltimore & Annapolis Railway—Special Car for Excursions

side sash are much larger. This car was built principally to accommodate parties of diplomats, foreign military attachés and others who visit the United States Naval Academy at Annapolis in large parties. A charge of \$60 is made for the trip between Baltimore and Washington or Washington and Annapolis, corresponding to an 80-mile excursion. The rate for the shorter trip from Baltimore to Annapolis is \$40.

The single hand-braked city car is used in local service at Annapolis. It is unique in being operated at 1200 volts at all times. This car carries two GE-217-A 50-hp motors and R-200-A control. The wiring diagram and resistance connections of this equipment are shown in the accompanying illustrations.

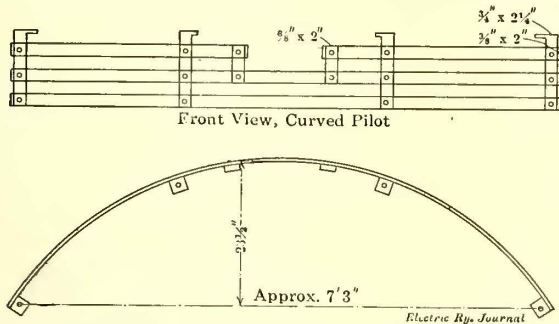
when three motors were injured in this way on account of running through water. All of the motors were installed with slotted commutators and Le Carbone type E brushes applied at 4-lb. tension. While a few of these brushes have been broken in service, not one has been worn out, although some of them had run for 80,000 miles from Feb. 15, 1910, to April 6, 1911.

The pinions and gears are of the General Electric Company's grade F type. None of these have shown any signs of serious wear since their installation on Feb. 15, 1910. The gears are lubricated with Galena gear grease, 1 lb. of grease being applied every month instead of say 5 lb. at longer inter-

vals. This practice avoids the fouling of the streets, which is an important matter in Washington, and economizes material.

The original armature bearings are still in service, without exception. These bearings are brass, lined with GE-17 alloy, and as purchased for replacement cost 32 cents per pound. The axle bearings are cast iron lined with babbitt metal costing 8½ cents per pound and made up by the company as follows: 75 per cent lead, 15 per cent antimony and 10 per cent tin. These axle bearings have run for 35,000 miles and were then removed principally because of collar wear. The journal bearings are brass lined with the same composition, and are still in use after having made 80,000 miles since their installation in February, 1910, up to April 6, 1911.

The company's experience with Standard rolled-steel wheels has been very satisfactory. These wheels are turned about every 45,000 miles, which corresponds to the general overhaul-



Washington, Baltimore & Annapolis Railway—Home-Made Car Pilot

ing period. Some of the wheels have already made over 90,000 miles and are still in use. The original single-phase cars were equipped with steel-tired wheels.

Reference has already been made to the lubrication of gears and pinions. The lubrication of rolling stock has also been done according to a Galena mileage contract. The accompanying drawing shows a compressor oil reclaiming tank which was built by the railway in line with suggestions made



Washington, Baltimore & Annapolis Railway—Interior of Special Car

by the lubricating company. The railway has also devised two steam-heated soaking tanks for reclaiming waste and draining car oil.

Among the miscellaneous features of the car equipment are home-made curved pilots, built up of $\frac{3}{8}$ -in. x 2-in. iron bars as shown in an accompanying drawing; also copper sheathing to protect the wooden risers of the car steps. The sheathing is screwed into the risers on the old cars, but is tacked on in the later cars.

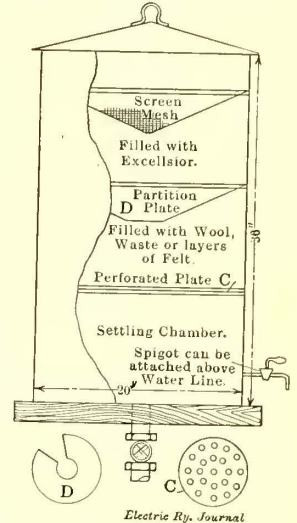
The effective sanding of the track at all times is obtained

by the use of the Ohio Brass Company's diaphragm sander valve in connection with armored hose and iron pipe. The sand is led through a hose placed directly over the center of the truck. Then it is blown through a connecting iron pipe which is carried from the truck frame with a bend for discharging the sand directly in front of the wheel.

SHOP EQUIPMENT, PAINTING AND MISCELLANEOUS

The general layout of the shops of this company was shown on page 246 of the ELECTRIC RAILWAY JOURNAL of Feb. 15, 1908.

The equipment comprises just the machinery required for straight maintenance, such as a wheel lathe, wheel press, two turning lathes, two drill presses, shaper, planer, circular saw, band saw, bolt cutter, armature bander, armature slotter and an emery wheel. There is also a blacksmith's shop equipped with a steam hammer, forges and babbitt pot. The transportation facilities of the shop include a transfer table and a Whiting 30,000-lb. crane.



The sand-drying arrangement is rather unusual. It consists of a solid concrete structure which has two large openings at the top for the entrance of wet sand and a small trapdoor at the side for the removal of the sand. The sand is dried by six coils of 1-in. steam pipe which are carried on the inner walls of the structure.

Cars go into the paint shop once a year. Under present conditions this brings three cars into the shop every month for an exterior touch-up consisting of three coats of varnish. The first two outside coats are given two days each and the third coat three days for drying, making seven days in all. In addition to this, two coats of varnish are given inside. The cost of doing this work varies from \$77 to \$80. The standard outside car color is Sherwin-Williams body green. Only plain soap and water are used for car cleaning.

The operation of the Washington, Baltimore & Annapolis Electric Railway is in charge of J. N. Shannahan, second vice-president and general manager; the general superintendent is J. J. Doyle and the master mechanic Joseph Osbelt.

BIRMINGHAM TRAMWAYS REPORT

The Birmingham municipal tramways committee reports that for the financial year ended March 31, 1911, the gross profits amounted to £122,503. The committee decided to allocate £41,000 to the relief of the tax rates and place £24,000 to reserve, the balance of the gross profits being applied to the payment of interest and sinking fund. The amount handed over to the city treasurer toward the reduction of the taxes twelve months ago was £32,914. The adoption of current meters on the cars resulted in a saving of about £5,000 in nine months. The number of passengers carried on the city lines was 84,727,449. There are over 56 miles of single track, and the average traffic revenue per car mile was 23.16 cents, against 23.26 cents; the total revenue was £318,882, against £308,283, and the operating expenses £196,379. The average expense per car mile was 1.46 cents, as against 15.138 cents in the preceding year. The average fare paid per passenger was 1.8 cents, and the average cost per passenger 1.6 cents, the same as in the preceding year. The number of car miles run on the city lines was 6,536,471, and the number of car miles run inside and outside the city was 7,575,662. The average number of miles per car a day was 79.26 and the average number of car hours a day was 10.67. Estimating the population of the city at 570,113, the average journeys per capita per annum was 149, as compared with 144 in the preceding year.

METROPOLITAN STREET RAILWAY REORGANIZATION PLAN

An estimate of the earning capacity of the present Metropolitan Street Railway system was submitted by Guy E. Tripp, of Stone & Webster, chairman of the joint committee of bondholders, at the hearing before the New York Public Service Commission, First District, on May 17.

Commissioner Maltbie asked for a statement of the assets of the Metropolitan Street Railway as shown by its books and by the books of the receivers as of Sept. 30, 1910, without any reference to the physical property which has been inventoried and appraised. He thought that in order to reach a decision as to what assets were absolutely good the commission ought to know what expectations there were of securing money or its equivalent from other sources. There were certain things that might be called contingent assets, that might turn into property or its equivalent.

Charles F. Mathewson, counsel for the joint reorganization committee, thought the appraisal sheet included every absolute asset and the suggestion that there would be \$5,000,000 reorganization assets outside of the physical properties had been explained as far as was possible at the present time. The decisions of the courts up to date assured the ownership of \$1,200,000 Central Park, North & East River Railroad bonds.

Schuyler C. Stivers, accountant for Ford, Bacon & Davis, testified that from the beginning of the receivership to March 31, 1911, there had been expended on the physical property which is now a part of the Metropolitan system \$7,605,125, of which \$194,964 had accrued since Sept. 30, 1910. These expenditures were for rehabilitation of the property and were as follows: Extraordinary expenditures on physical property included in extraordinary operating expenses, \$2,772,922; extraordinary expenditures on physical property not included in operating expenses, \$6,879,540; total extraordinary expenditures on physical property, \$9,652,462; additions included in operating expenses and paid for by receivers' certificates, \$624,825; total, \$10,277,287; less amount paid (from trust funds (insurance and sale of property, etc.), \$2,672,162; net addition to property, \$7,605,125.

Another table presented by Mr. Stivers showed that from Sept. 25, 1907 to March 31, 1911 the following maintenance charges were included in operating expenses by the receivers: Way and structures, \$2,851,702; equipment, \$4,465,457; total, \$7,317,159. These amounts are in addition to the extraordinary expenditures shown in the preceding paragraph.

TESTIMONY OF GUY E. TRIPP

Guy E. Tripp, of Stone & Webster, chairman of the joint reorganization committee, testified that from an analysis made in his office he found that the expenditures made by the receivers on the leased lines to March 31, 1911, were \$2,409,000.

Mr. Tripp made the estimate of earnings given on page 917. In making this estimate he added to the gross earnings as shown by the receivers' reports to the bondholders' committee an item of \$43,000, representing the increased revenue from the advertising contract from Jan. 1, which made the total revenue from this source \$300,000 per year. Mr. Tripp took the operating expenses as shown in the report of the receivers and deducted an amount to bring the charges for injuries and damages to 7 per cent of the gross earnings, which called for a reduction of \$298,000. In his judgment there was no possible chance under ordinary business conditions that the fixed charges would fail to be met and that there would be a very substantial surplus. If one cent were allowed for transfers, about \$1,000,000 would be added. The property was in good operating condition.

The amount charged by the receivers during the period for maintenance was that which Mr. Tripp thought should be allowed, so that he made no change in this item. He believed that the expenditure or reservation of \$2,650,000 annually would maintain the property in first class operating condition. A new company should start with a surplus or sufficient work-

ing capital to provide necessary funds while this sum was being built up. This amount is about 20 per cent of gross earnings and is based on a study of the earnings of the electric properties in the system from the year ended June 30, 1898, to the year ended June 30, 1909, made by H. W. Brown, formerly auditor for the receivers. Mr. Tripp supplemented this by actual figures obtained from the receivers' reports and from other sources so as to carry the results to March 31, 1911. Mr. Brown eliminated in his calculations the subsidiary properties that were dropped from the system from time to time. This caused complications because Mr. Tripp wanted to include the expenditures made by the receivers in rehabilitating the properties and add them to the other figures, particularly in the case of the Third Avenue Railroad, which was turned over to the receiver in poor condition.

Mr. Tripp's estimate of the earnings of the electric railways on Manhattan Island from July 1, 1897 to March 31, 1911, including the Third Avenue road, showed \$187,000,000. The expenditures for maintenance and renewals, including those for the Third Avenue road as nearly as they could be figured, were \$36,777,000, or nearly 20 per cent. Included in these expenditures were items of new property, like purchases of cars for the Third Avenue system, \$3,200,000; purchases of cars by the receivers of the Metropolitan system, \$2,200,000; new track and extensions by the Metropolitan receivers, \$400,000; and expenditures on carhouses in addition to the insurance on properties destroyed by fire, \$1,200,000. If 20 per cent of the gross revenues proved sufficient under these conditions, the calculation verified Mr. Tripp's general opinion that that proportion would be sufficient on the average to take care of maintenance and depreciation of street railways in any part of the United States.

To determine this expense Mr. Tripp personally made an examination of the Chicago surface railways at the time of the receivership of the Chicago Union Traction Company properties for Judge Grosscup of the United States Circuit Court and recommended the adoption of 20 per cent on one system and 22 per cent on the other. The allowance of 20 per cent had worked out satisfactorily on the Stone & Webster properties.

Mr. Tripp testified that the Stone & Webster properties had made agreements with non-cumulative preferred shareholders that before dividends were declared 20 per cent of the gross earnings should be set aside for maintenance and depreciation, the preferred shareholders agreeing that that was fair and a protection against the undue withholding of dividends and the common stockholders believing that after that had been done they were safe in paying dividends on the non-cumulative preferred stock.

It was almost impossible to draw a line closely between maintenance and depreciation as street railway accounts were kept ordinarily because many charges to maintenance were really replacements and renewals.

Mr. Tripp testified that the total capitalization of the street railways controlled by Stone & Webster was about \$150,000,000 and their gross earnings last year were \$23,000,000. The firm had on its books and under way over \$40,000,000 of work, a large portion of which was for outside clients.

In Mr. Tripp's opinion the presence of some physical deterioration would not make a property worth less if it had been in operation for a number of years and had been well maintained in operating condition. The going concern value would be sufficient to offset the physical depreciation in such a case. The determination of going concern value was a matter of business judgment.

Mr. Mathewson, referring to the expenditure of \$985,000 for storage battery experiments and of over \$300,000 for experiments with compressed air propulsion, representing a part of \$13,355,000 of superseded property, asked Mr. Tripp whether it was necessary to make experiments and expenditures in the development of the going concern value before the highest state was reached. Mr. Tripp answered that it was and that he would consider such items a proper part of the cost of the financial going concern value. Con-

sidering the cost of underground construction in New York these expenditures were proper and prudent and should be capitalized for part of the cost at the beginning of the enterprise.

Commissioner Maltbie asked whether the cost of all of the experiments made from the beginning of the enterprise should be so capitalized and Mr. Tripp said that it was not necessary that all should be so treated. The line should be drawn at what ordinary business prudence would direct the management to do when it was considering such a change as that from cable power to an underground conduit system. All these costs should be capitalized perpetually from the beginning or a return should be allowed sufficient to enable the investor to get his capital back. If the capital had not been so returned these costs should be capitalized. In this case, whether the money had been returned or not, Mr. Tripp believed the costs should be capitalized.

Common sense and ordinary business conditions would not allow the continual capitalization of subsequent expenditures throughout the period of existence of a successful company, and Mr. Tripp thought that after a reasonable time and expenditure had been allowed to enable the management to get the property into good condition a higher return might be permitted so as to meet necessary expenses of this nature. Thereafter the best way to provide for these expenditures would be to charge them to operating expenses if the company could secure the necessary rates.

In a going concern it would be preferable if the company continued in business to repay the investor the cost of acquiring the going value through the method of a larger return in later years. But in a case like this where the company was bankrupt and a new arrangement was to be made with new owners, not necessarily the original owners, capitalization was only fair. The value was to be based on the cost of reproduction and this should include the cost of reproduction of every bit of the property. The cost of reproducing the going value was just as tangible a cost as that of reproducing an engine. It was a valuable asset and the owners of the property were entitled to it. If it were possible to conceive the streets of New York free from a surface line and the existing system was created therein it would take five years after the completion of construction to arrive at the present efficient operating condition, that is to say, to get the physical parts of the property working properly.

ESTIMATE OF EARNING CAPACITY METROPOLITAN STREET RAILWAY COMPANY OF NEW YORK.

SUBMITTED BY GUY E. TRIPP, OF STONE & WEBSTER.

Gross passenger earnings, year ending March 31, 1911.....	\$13,011,660
Other income, year ending March 31, 1911.....	654,606
Increase in advertising from \$256,822, as shown in "other income" account to \$300,000 (the new contract).....	43,177
Total gross earnings.....	\$13,709,443
Operating expenses, year ending March 31, 1911.....	9,087,751
Less decrease in injuries and damages account from \$1,208,893 to \$910,816.....	298,077
Total operating expenses, including depreciation, 64.1 per cent.....	\$8,789,674
Net earnings.....	\$4,919,769
Taxes.....	\$1,296,759
Less decrease in franchise taxes from \$590,793 to \$200,000....	390,793
Total taxes, 6.6 per cent.....	\$905,966
Net profits.....	\$4,013,803
Fixed charges:	
Rentals \$1,810,553, less \$212,000 on securities held by committees.....	\$1,598,553
Interest on underlying bonds.....	542,500
Interest on real estate mortgage.....	47,500
Interest on \$11,768,100 new 4's.....	470,724
Total fixed charges.....	\$2,659,277
Balance for \$38,933,400 income bonds, or about 3.48 per cent..	\$1,354,526

As an illustration Mr. Tripp recalled an experience he had in the installation of a turbo-generator at an old power station where three years were required to make the generator operate properly and at the efficiency guaranteed by the manufacturer. To meet the excess operating expense during this period a claim for \$20,000 was made. The manufacturer paid

\$10,000 for an amicable settlement and the balance of \$10,000 was charged to operating expense by the company.

In the case of the Metropolitan system time and money would be required to adjust the property to the needs of the people. During the first period of five years the operating ratio, excluding maintenance items, would be higher than after the conclusion of that period and the gross earnings would be 5 per cent less than they would after the public became accustomed to more riding and the service was made better. This would mean that instead of earning \$4,000,000 net the property would show average net earnings for five years of between \$2,000,000 and \$3,000,000. The difference, say \$5,000,000, would be the cost of securing the going value. The cost of the experiments with compressed air and storage batteries should be added.

MEETING OF COMMITTEE ON BUILDINGS AND STRUCTURES

A meeting of the committee on buildings and structures of the American Electric Railway Engineering Association was held in New York on Monday, May 22. The committee members present were the following: Chairman, Martin Schreiber, engineer maintenance of way Public Service Railway, Newark, N. J.; vice-chairman, F. F. Low, architect Boston Elevated Railway, Boston, Mass.; G. H. Pegram, chief engineer Interborough Rapid Transit Company, New York, N. Y.; C. H. Clark, engineer maintenance of way Cleveland Railway, Cleveland, Ohio.; M. H. Bronsdon, chief engineer Rhode Island Company, Providence, R. I.; F. G. Simmons, superintendent of way Milwaukee Electric Railway & Light Company, Milwaukee, Wis., and J. H. Frank, architect Philadelphia Rapid Transit Company, Philadelphia, Pa. H. H. Adams, superintendent rolling stock and shops Metropolitan Street Railway, New York, was also present.

The subjects discussed were those relating to economical maintenance of buildings and bridges, heating systems for carhouses, shops and waiting rooms, roof and floor construction, types of doors and toilets, use of cold-water paint, proper facilities for employees, division of facilities in carhouses and methods of fire protection.

REPORTS ON BRIDGES AND BUILDINGS

Mr. Schreiber reported that the great majority of companies which replied on the data sheet maintained their buildings and bridges directly instead of by the contract system quite customary some years ago. Mr. Simmons said that in Milwaukee there was a superintendent of buildings who employed bricklayers, plumbers, steamfitters and any other kind of mechanics required. Such men might be regular employees of another department, but they were subject to the call of the superintendent of buildings. The bricklayers, for instance, might be required to lay conduit.

Mr. Pegram thought that it was foolish even for a small road to let out maintenance work on contract. One advantage of hiring the men directly was that they could be secured for much lower wages because their steady employment was guaranteed. Furthermore, such men were more reliable and did better work than those secured at higher prices for intermittent employment.

Mr. Bronsdon said he employed two masons and five carpenters with one foreman to care for all bridges, buildings, culverts, etc. They did practically all kinds of mechanical work except plumbing.

It appeared from the replies on the data sheets that most of the companies did not file written reports at regular intervals on bridges and buildings. Mr. Simmons was strongly in favor of such reports. Mr. Bronsdon said that formal bridge reports were made annually, all changes being noted on the individual drawings. Minor details, like the replacement of bridge planking, were considered as matters of daily maintenance. Messrs. Clark and Schreiber have written reports at frequent intervals.

It was agreed that the committee should submit two report forms for adoption, one covering bridges and another covering buildings.

HEATING SYSTEMS

The next subject discussed was the heating of carhouses, shops and waiting rooms. Mr. Simmons said that in Milwaukee the steam and hot-air systems required practically the same b.t.u. output from the central station, but the maintenance of the direct steam heating was much less for the same efficiency. He did not believe in heating storage carhouses, but considered heat necessary for operating carhouses in Northern climates, owing to the necessity of thawing snow off cars, etc. Mr. Schreiber said that his company did not heat operating carhouses. One of the great difficulties in proper heating was due to the frequent opening of the track doors. Personally he was in favor of a blower system, because of its low first cost, low upkeep and ease of control as contrasted with the difficulty of maintaining long lines of steam piping.

The replies to the data sheet showed that over one-half of the companies favored steam heating. The discussion by the committee on various methods of steam heating for carhouses tended to bring out the superiority of the vacuum system for long-distance service.

There was a general sentiment in favor of the blower system for all shops except the painting department. It was pointed out that in the latter case the dust particles brought in by the blower would injure the varnish on the cars. Mr. Schreiber said that his company used both direct and indirect heating in its Plank Roads shops. It was concluded to present in an appendix to the report a series of letters from users explaining the merits of each system and to summarize these expressions in the report itself.

A discussion on the heating of waiting rooms followed. Mr. Schreiber referred to the use of two sizes of standardized cast-iron pot stoves in Detroit. He favored a hot-water system for small isolated waiting rooms instead of steam owing to the simplicity of installation. If stoves were used, they should be of the simplest type with interchangeable parts as developed in Detroit.

ROOF CONSTRUCTION

Mr. Schreiber introduced the subject of the most economical roof construction from the maintenance standpoint. Concrete was very costly in his territory. For instance, the estimated price of one concrete roof was \$30,000. A fixed charge of 5 per cent on this sum would readily take care of a great deal of maintenance if a cheaper construction was adopted. Mr. Low thought that the roof covering and flashings were the really important items of roof maintenance. Messrs. Bronsdon, Low and Simmons said they were using center gutters on their buildings to keep the water away from the walls. The water, however, is discharged at the side. Mr. Low said that in Boston the new tar and gravel roofs are given a top layer of a home-made composition of coal tar, asbestos fiber and ground slate. This is also used for patching old tar and gravel roofs and for mopping over patented roof coverings. It could also be used for corrugated-iron roofs. As this composition makes a smooth covering any leak can readily be detected. There was a general feeling in favor of copper for flashing and of copper or lead for counter-flashing.

FLOOR CONSTRUCTION

The data sheet showed an overwhelming sentiment in favor of concrete for carhouse floors. Mr. Simmons uses renewable wood strips along the rails to avoid trouble from the break-up of concrete. Mr. Schreiber advocated first-class track construction in carhouses and the use of good concrete over 12 in. of cinders to avoid trouble from disintegration. Mr. Simmons thought that the wood strips would accomplish the same end for less money. Sulphur-bearing cinders should be used only where they could be kept dry in order to avoid shortening the life of rails.

For carshops the committee favored cement floors except wood blocks for machine shops where there is much dragging.

Cinders were suggested for blacksmith shops, concrete with or without tile finish for engine rooms. Offices and men's rooms should be of wood, preferably maple. Concrete or cinder floors were suitable for shelters, according to the character of the structure.

CARHOUSE DOORS

The discussion on carhouse doors brought out some interesting experiences with rolling steel doors. From the maintenance point of view the wooden door was favored. Mr. Pegram said that he was now using folding or lift doors. Mr. Low thought that any door used should be capable of repair at home.

COLD-WATER PAINT

Mr. Schreiber said that he used cold-water paint over oil paint in all buildings. It was good for at least five years. He recommended the use of white paint for brightening interiors.

PROPER FACILITIES FOR EMPLOYEES

The first matter taken up under facilities for employees was whether the location of the men's quarters should be on the ground floor or on the second floor. Mr. Schreiber said that his company had tried both ways and found that it was difficult to make the men go upstairs. In one of the Chicago carhouses even the auditorium was located on the ground floor despite the high price of land. Mr. Schreiber submitted drawings of the latest Chicago and Public Service carhouses, showing the comparative areas for employees' facilities, including lockers, receiving rooms, shops, etc. The latest Public Service carhouse has a clubroom on the second floor with stage and kitchen equipment. The toilets are on the ground floor adjacent to the men's room, which is in constant use. Mr. Frank also submitted plans of the men's rooms at the elevated-subway terminal at West Philadelphia.

Mr. Adams said that the New York practice was to have the dispatchers' and receivers' offices, and, if possible, the lunch room on the ground floor. Mr. Adams thought that it was of questionable wisdom to install shower baths at carhouses as they were seldom, if ever, used.

Quite a number of companies were of opinion that lockers for transportation men were unnecessary if protected motor-man's cabs were used, since in that case arctics, rubber coats, etc., are not needed by the men. There was some discussion about the possession of the locker keys. Many of the companies furnish individual keys to the men, but have a master key as well.

ASSEMBLY ROOMS

The discussion on clubrooms showed that the men take much more interest in them when a room is located in each carhouse rather than at a central point. It was the general feeling that every carhouse ought to have an assembly room of some kind.

Mr. Pegram spoke strongly in favor of lunch rooms and barber shops for operating carhouses. Mr. Adams said that one of his lunch rooms was proving profitable despite outside competition. Food is sold at cost plus a slight profit for the holder of the privilege. The rental money is turned over to the employees' fund.

Mr. Simmons said that in a smaller city not one-fourth of the men would use a carhouse lunch room because they can go home. Mr. Low had found that a carhouse restaurant was desirable in Boston residence sections. Mr. Schreiber thought that the development of the dairy lunch room in recent years had done much to keep the men away from the saloons. In general, such eating places ought to prove a good thing for large operating carhouses.

Mr. Simmons said he would favor barber shops whenever he could get a barber to install a complete equipment and pay rent for the space. Mr. Adams said that the Metropolitan Street Railway Company's barber shops were quite successful. Mr. Schreiber thought that ordinarily a barber shop in carhouses was inadvisable.

Referring to amusements and games, Mr. Schreiber said that bowling alleys were too costly for most companies. Pool was

popular and far less expensive to maintain. One company provides only such table games as checkers, chess and cards. Mr. Schreiber believed that it would be desirable to get expressions of opinions on this topic from transportation superintendents. Messrs. Low and Simmons thought that it was very desirable to have the recreation rooms in charge of an attendant and to charge small fees for such games as pool and bowling.

THE 100-CAR CARHOUSE

The next topic taken up was the division of floor area in a 100-car operating carhouse for the superintendent, depot master or starter, clerks and receivers, men's room, locker room, toilet room with number of closets and urinals and assembly room or auditorium. The final report will contain a number of drawings showing sizes and locations of the utilities mentioned.

FIRE PROTECTION

The subject of fire protection for carhouses and car yards was introduced by Mr. Clark, who submitted an illustrated paper by Henry N. Staats. Mr. Staats described the sprinkler installations of the Cleveland Railway Company, and mentioned the excellent service they had given to date. He also referred to the protection of yards by a system of standpipes with monitor nozzles as described in the *ELECTRIC RAILWAY JOURNAL* of Oct. 8, 1910.

The general discussion on fire-protection devices brought out the fact that small chemical fire extinguishers had proved an excellent auxiliary for controlling small fires before the sprinklers were affected. Mr. Schreiber read the underwriters' rules for sprinkler maintenance, which he followed with a specification submitted by the Fire Underwriters' Electrical Bureau, New York, for the complete fire-protection system of a proposed carhouse.

In conclusion there was a general discussion on inside hose connections, water and salt pails, rules for the government of employees in case of fire, fire drills, and on the general responsibility for the maintenance of fire-fighting equipment. On the Public Service Railway weekly reports are made by the shop foremen and monthly reports by the building department. This checking system has been found very satisfactory.

PROPOSED DEPRECIATION ACCOUNT IN NEBRASKA

A hearing was held before the Nebraska State Railway Commission at Lincoln, Neb., on May 10 in reference to a proposed depreciation account for electric railways. The hearing was based on tentative rules which the commission proposed to adopt, ordering both the street and interurban railways to set aside to the credit of maintenance and depreciation accounts through monthly charges to operating expenses 5 per cent per annum of the present value of their depreciable physical property used in operation. The subject was raised primarily in connection with an application by the Lincoln Traction Company to increase rates. This company asserted that it has not been allowed enough for depreciation.

R. A. Luessler, assistant general manager Omaha & Council Bluffs Street Railway, argued at first that depreciation should be based on gross receipts on the ground that earnings reflected the use of the property and that use was the principal but not the only factor in depreciation. Later he approved a suggestion to base the depreciation charge on the car mileage. J. H. Smith, secretary Lincoln Traction Company, approved the use of car miles as a basis for the charge. He urged that a rule be adopted that would apply alike to all companies in the State.

Mr. Luessler thought that conditions were different in every city and that the commission should make a separate rule for each company. He suggested that the commission fix a minimum charge for depreciation. He said that the Omaha company set aside last year 17 per cent of its gross earnings for maintenance, depreciation and replacement.

L. E. Wetting, an accountant for the commission, said that the Omaha & Council Bluffs company set aside \$33,000 more than it expended. He added that the Lincoln company expended altogether \$80,000 for these purposes last year and had asked permission to set aside \$107,000.

MAY MEETING OF THE ILLINOIS ELECTRIC RAILWAYS ASSOCIATION

Representatives of fourteen electric railways, members of the new Illinois Electric Railways Association, held a profitable meeting at the La Salle Hotel in Chicago on May 19. G. T. Seeley, general manager South Side Elevated Railroad Company, presided and announced that H. E. Chubbuck, president of the association, was en route to Cuba on a business trip. The roll call was answered by representatives of the following roads: Chicago & Joliet; Chicago & Southern; Rockford & Interurban; Illinois Traction System; Springfield Consolidated; East St. Louis & Suburban; Aurora, Elgin & Chicago; Central Illinois Public Service Company; Chicago, Ottawa & Peoria; Chicago, Lake Shore & South Bend; South Side Elevated; Metropolitan West Side Elevated; Northwestern Elevated; Chicago & Oak Park Elevated.

REPORT OF CONFERENCE COMMITTEE

H. J. Vance, superintendent Chicago, Ottawa & Peoria Railway, reported that the committee appointed to confer with the Central Electric Railway Association had been unsuccessful in its attempt to make arrangements for use of the Central Electric Railway Association mileage books. Mr. Vance had just received a letter from that body stating that it declined to permit the members of the Illinois association to use its interchangeable mileage unless the Illinois roads became members and assisted in the support of the Central Electric Railway Association. Mr. Vance thought that because none of the Illinois systems had physical connections with the Indiana roads it would not be feasible for them to join the Central Electric Railway Association only for the sake of the mileage. He said that six or seven of the Illinois roads still issued and honored the mileage books authorized by the Illinois Bureau, which really had been the predecessor of the new Illinois Electric Railways Association. He recommended that the chair appoint a committee of traffic representatives of the Illinois lines to formulate plans for extending the use of the present Illinois mileage books.

INTERCHANGEABLE MILEAGE

C. E. Flenner, Aurora, Elgin & Chicago Railway, told of the work of the Illinois Mileage Bureau which was established six or seven years ago. The books of this bureau were still sold in large numbers on some of the roads, and monthly settlements were made between the roads according to the coupons lifted. Mr. Flenner favored the continuation of this plan.

On motion of George Quackenbush, Illinois Traction System, the association instructed the chair to appoint a committee of five with power to organize and represent the association in working out plans for continuing and promoting the use of an interchangeable mileage book. The present books are sold at the reduction of one-sixth under the regular rates. Mr. Quackenbush said the Illinois Traction System rates were based on 2 cents a mile and 1000-mile books were sold at 1½ cents per mile.

Robert Barnett, Chicago & Southern Traction Company, reported that the plans for a joint ticket office and information bureau in Chicago has not yet been completed for submission to the association. Expressions of willingness to enter into the project had been received from the Illinois Traction System, the Chicago, Ottawa & Peoria Railway and all the roads reaching Chicago except the Chicago & Joliet Electric Railway and the Chicago & Milwaukee Electric Railroad.

L. E. Gould, *ELECTRIC RAILWAY JOURNAL*, reported for the block signal committee that it had accepted an invitation to meet with the membership of the block signal committee of the American Electric Railway Engineering Association and Transportation & Traffic Association at Pittsburgh on May 8, but the Pittsburgh meeting had been postponed to a date later to be announced. After this meeting the Illinois committee would have a definite report to make. The committee was inclined to co-operate fully with the committee of the American Association and was grateful for the privilege of meeting with it.

Marshall E. Sampson, Central Illinois Public Service Company, made a report of the work of the executive committee and a résumé of the recent legislation which he thought might be of interest to electric railways in Illinois. This report was discussed by C. F. Hewitt, East St. Louis & Suburban Railway; George Quackenbush, Illinois Traction System, and J. M. Felldhake, South Side Elevated Railroad, Chicago.

The chair announced that, as instructed at the March meeting, it appointed as members of the program committee C. E. Flenner, George Quackenbush and L. E. Gould.

WOOD PRESERVATION

An address by C. P. Winslow, Forest Service United States Department of Agriculture, on the subject of preservative treatments of timber, was then delivered and illustrated by lantern-slide views. A few of the more important features of Mr. Winslow's address are presented.

The annual consumption of timber in this country is about 23,000,000 cu. ft., which, if combined, would make a block of wood 800 ft. high and 1 mile square. Because this amount of timber is three or four times the annual growth, considerable increase in price must be expected unless the use of wood is greatly economized. More than 85 per cent of the railroad ties annually replaced have been destroyed by decay and the rest by rail wear. Since 1904 the number of wood-preserving plants in this country has increased from 30 to 82, and since 1907 the amount of timber treated has increased from 68,000,000 cu. ft. to 99,000,000 cu. ft., an increase of 45 per cent in three years. The railroads are given credit for having been pioneers in work of wood preservation. The electric lines in 1909 used 835,000 ties, of which 10 per cent had been treated. Fifteen tie-treating plants are now owned by steam and electric railways. The first step in the preservation of a tie was to peel the bark from it, which process more than paid for itself by giving increased life. The second process was to pile the ties openly so that moisture would not collect and so that seasoning might proceed rapidly. The third and most important step was to inject or apply some preservative.

The materials used for preservation might be subdivided into two classes, oils and salts. In the oil class were crude oil and creosote, which represented the distillates of coal tar. Both of these materials preserved ties by making them waterproof. Crude oil was much used by the Santa Fé Railroad. The salts used as preservatives were represented chiefly by zinc chloride, customarily applied as a 3 per cent or 4 per cent solution forced into the tie, with the intention of having the tie retain $\frac{1}{2}$ lb. to $\frac{1}{3}$ lb. per cubic foot of wood. The chief objection to this zinc chloride process was its tendency to leach out, but this was balanced by its low cost.

The methods followed in applying preservatives were by brush, open-tank or pressure-cylinder treatment. The Indianapolis, Columbus & Southern Traction Company had a pressure plant built under the supervision of the Forest Service at a cost of about \$8,000. The pressure cylinder of this plant was 6 ft. in diameter by 45 ft. long, and the plant had a capacity of 85,000 ties per year if operated steadily. Such plants give very efficient service.

The speaker then presented a considerable number of data on the economies of timber preservation. He said that many roads anticipated a life of ten years for ties treated with zinc chloride. He called attention to experiments made by the Forest Service in which 3000 hemlock and tamarack ties were laid in 1907. Of these ties 2700 had been treated and these were now in excellent condition. The 300 ties which had not been treated were in such condition that 14 per cent must be renewed immediately. From 40 per cent to 60 per cent of the latter number had been rail-cut $\frac{1}{2}$ in. and the remainder were affected with decay.

The speaker stated that the wood preservative committee of the American Railway Engineering & Maintenance of Way Association estimated the life of creosoted ties to be from fifteen and one-half to nineteen years and zinc-treated ties from ten to fourteen years.

The preservation of poles was next discussed. Measure-

ments had been taken of the circumference of 186 poles of chestnut wood that had been butt-treated six years ago. These now showed a reduction in diameter of sound wood of less than 0.5 per cent. The Bell Telephone Company was reinforcing decayed poles by setting a creosote stub close to them and bolting and wiring the old pole to the stub. This was cheaper than renewing the old pole.

The speaker next discussed the cost of treatment and illustrated his remarks with charts showing the costs of treated and untreated ties after successive years of use. The annual saving based on his figures was about 6 cents per tie per year if some preservative was used. He spoke favorably of the use of tie plates and noted that the preservation of a tie relieved the company of repurchasing a tie at an increased cost due to the general up-trend of prices.

The speaker said that white cedar poles had a life of from fourteen to fifteen years and could have butt treatment with creosote at a cost of about \$1.25. This treatment should increase their life considerably, and he estimated that if only two years' additional service was obtained from a pole its treatment would have paid for itself. He next described in general the work and facilities of the Forest Service Laboratory at the University of Wisconsin, in Madison. The university furnishes a \$50,000 building and the government supplies the apparatus and employs about fifty technical men to conduct the work. Some of the studies regularly conducted by the government experts are on the following subjects: Cell structures and heat conductivity of wood, chemical analysis of preservatives, timber testing, wood preservation, distillation, paper and pulp, and engineering work in connection with the construction of treating plants. The department would appreciate closer relations with the electric railways and would welcome inquiries or statement of results having to do with the subject of the use and preservation of wood.

DISCUSSION OF WOOD PRESERVATION

When questioned by A. A. Anderson, Springfield Consolidated Traction Company, Mr. Winslow said that several methods had been evolved for the combined use of zinc chloride and creosote, and also for the use of zinc glue and tannin in combination. These processes are designed to provide against the zinc chloride leaching out of the wood.

C. N. Wilcoxon described the treatment which had been given the 45-ft. transmission-line poles on the Chicago, Lake Shore & South Bend single-phase road. These poles were impregnated with creosote for their full length, were set in concrete and after several years' service showed no evidence of decay.

B. I. Budd, Metropolitan West Side Elevated, said that his company required for renewals from 1,500,000 ft. to 2,000,000 ft. of lumber per year for its elevated structure. He called attention to the way in which the inner guard rails had been coated with grease by drippings from some earlier equipment that had been grease-lubricated. These guard rails had been in service seventeen years and still were in good condition while the outer guard rails had required frequent renewal. G. T. Seeley, South Side Elevated Railroad, said that practically 90 per cent of his track was laid with tie-plates and screw spikes and that a life of fifteen to seventeen years was anticipated for the ties.

ENTERTAINMENT

After luncheon at the La Salle Hotel a party of thirty was entertained on a 100-mile ride over the third-rail system of the Aurora, Elgin & Chicago Railroad as the guests of E. C. Faber, general manager. A special train consisting of a day coach and a buffet parlor car took the party from the joint terminal of the Aurora, Elgin & Chicago Railroad and the Metropolitan West Side Elevated Railroad over the latter road to the Chicago city limits and thence over the Aurora, Elgin & Chicago Railway to Aurora, then back to Eola Junction and thence to the power plant at Batavia, where an inspection was made by the party. On the return trip luncheon was served and the party reached the Fifth Avenue terminal in Chicago at 6 o'clock.

The next meeting of the association will be held in September.

PROVISIONS OF NEW HAMPSHIRE PUBLIC SERVICE COMMISSION LAW

The measure to create a public service commission in New Hampshire, the passage of which by the Legislature of that State was noted in the *ELECTRIC RAILWAY JOURNAL* of May 13, 1911, page 849, was signed by the Governor on April 15, 1911. The measure is entitled "An Act to Establish a Public Service Commission," and the term "public utility" as defined in the bill was made to include "every corporation, company, association, joint stock association, partnership and person, their lessees, trustees or receivers appointed by any court whatsoever, except municipal corporations, owning, operating or managing any plant or equipment or any part of the same, for the conveyance of telephone or telegraph messages, or for the manufacture or furnishing of light, heat, power or water for the public, or owning or operating any ferry or toll bridge."

The commission is to be composed of three persons to be appointed by the Governor with the consent of the Council. The terms of the first appointees are to expire the first Monday in June, 1913, the first Monday in June, 1915, and the first Monday in June, 1917. Successors to the first commissioner are to be appointed for six years. The chairman of the commission is to be appointed and commissioned as such, and is to receive a salary of \$3,500 a year; the member who is to be known as the clerk is to receive a salary of \$3,200 a year, and the other member of the commission is to receive \$3,000 a year. No person who has any pecuniary interest in a railroad or public utility is to be appointed to the commission. The commission is authorized to expend not more than \$4,000 annually, but with the consent of the Governor and Council is to have power to expend such additional sums as may be deemed necessary.

The office of the commission is to be at the State House. The commission is empowered to investigate complaints if made by city councils, mayors or selectmen, or upon appeal in writing of 100 or more customers or subscribers in cities of 20,000 inhabitants, or on complaint of not less than 25 persons in all other cities or towns. All hearings are to be open to the public. The commission is empowered to subpoena witnesses and administer oaths and in the case of witnesses who refuse to testify, the commission is authorized to apply to any justice of the Superior Court for an order directing any person so refusing to show cause before the Superior Court why he should not be committed for contempt. No person is to be excused from testifying upon the grounds that the evidence might tend to incriminate him. All the powers and duties conferred upon the Board of Railroad Commissioners, except in so far as they might be inconsistent with powers or duties imposed in the new act, are conferred upon the new commission.

The act stipulates that "every railroad corporation and every public utility shall furnish such service and facilities as shall be reasonably safe and adequate and in all respects just and reasonable" and "all charges made or demanded * * * by any public utility * * * shall be just and reasonable and not more than is allowed by law or by order of the commission." The commission is empowered to inspect any of the property or records of the companies which come within its jurisdiction, and is also empowered to establish a system of accounting and records to be used by public utilities and prescribe a system of accounts for each class. No public utility, however, is to be required to keep any system of accounts or records which would conflict with any requirements made of it by the Interstate Commerce Commission.

Every company which comes within the jurisdiction of the commission is to file with the commission and keep open to public inspection schedules showing the rates, fares, charges, etc., for any service rendered by it. These records are to be in such form as the commission may require. No change

is to be made in any charge by any company except after thirty days' notice to the commission. The commission is empowered to investigate difference in rates and pending such an investigation is empowered to suspend the schedule during the investigation for not more than six months. If in the opinion of the commission, after a hearing, any charge demanded or proposed to be demanded is deemed unreasonable, or if any rate is deemed insufficient, the commission can determine the reasonable charges to be observed and fix the same by order. The burden of proving the necessity of the increase rests with the corporation.

No railroad is to begin the construction of an extension or branch without the consent of the commission and no franchise or right under any franchise is to be assigned, transferred or leased without the approval of the commission. Any company that proposes to transact a business which comes under the provisions of the act is not to begin business in the State without the consent of the commission. "No public utility shall directly or indirectly acquire the stocks or bonds of any other corporation incorporated or doing business in this State and engaged in the same or a similar business unless authorized to do so by order of the commission."

No company coming within the provisions of the act is to issue any stocks, bonds, notes or other evidence of indebtedness payable more than twelve months from date without first procuring an order from the commission. The amount of bonds is to be fixed by the commission in accordance with its opinion of what is reasonably requisite for the purpose for which the issue is to be made. Every company issuing stocks, bonds or other evidence of indebtedness is to file with the commission an account showing such details as the commission may require in regard to the disposition of the proceeds of the issue. When a corporation increases its capital stock it is to offer the new shares proportionately to its stockholders at a price not less than par determined by its stockholders. Exceptions to this provision, however, is made when an increase in capital stock does not exceed 4 per cent in the capital stock of the corporation. In such cases the directors may sell the new shares at public auction to the highest bidder at not less than par.

The commission is to investigate the causes of all accidents on the railroads of the State which result in the loss of life and all other accidents which in the opinion of the commission ought to be investigated.

Article B of Section 14 of the law provides: "Any party in interest aggrieved by any order of the commission, or by any part of an order containing distinct and severable provisions, may appeal therefrom by complaint in the nature of a bill in equity filed in the Superior Court in any county in which the appealing party might commence an action at law, or at the option of such party in the county of Merrimack, against the commission as defendant, to vacate and set aside such order or part thereof upon the ground that the same is unlawful or unreasonable. If such order contains distinct provisions, the complaint shall state whether the whole thereof is claimed to be unjust and unreasonable, and shall distinctly specify the portions complained of if less than the whole. Upon the filing of such complaint the clerk of the Superior Court shall issue an order of notice in accordance with equity practice, which shall be served upon some member of the commission. The answer of the commission shall be filed and a copy furnished to the appellant within thirty days of service, whereupon the proceedings shall be at issue and stand ready for trial upon thirty days' notice given by either party to the other, and the same shall be tried and determined as other suits in equity. Any person or corporation interested may intervene and become a party to such proceedings, and the court may order such persons or corporations to be joined as parties as justice may require. All issues presented by such an appeal shall be tried and determined by the court."

A fine not to exceed \$5,000 may be imposed upon any company which violates any provision of the act or which fails to comply with any order or requirement of the commission.

CHICAGO SUBWAY PLANS

On May 22 the Council transportation committee began public hearings at which were received plans of several engineers who desired to be appointed chief subway engineer for the proposed subways which the city of Chicago will build with its traction fund. Among the engineers speaking for their plans were Bion J. Arnold, John Ericson, George W. Jackson and R. C. St. John, who formerly was assistant subway engineer under Mr. Arnold. The subway schemes of these engineers, except that of Mr. St. John, have been announced in previous issues of this paper.

The St. John plan comprises 5.4 miles of subway, or 21.5 miles of single track. The cost per mile of single track would be \$700,000. He proposes to continue the stub terminals of the L roads, and suggests utilizing two sides of the present loop—on Fifth Avenue and Van Buren Street—so as to give another means of through routing in addition to the subway. Eventually these elevated structures would be replaced by subways, but Mr. St. John thinks the section involved should not be shut off from adequate service, nor should a subway loop succeed the present overhead scheme. The routing plan is as follows:

A north and south subway from Chicago Avenue to Twelfth Street through North and South State Streets, with a two-track connection with the Northwestern Elevated at or near Franklin Street and a two-track connection with the South Side Elevated at or near Twelfth Street. Also a portal at Chicago Avenue near Dearborn Avenue, and a portal in South State Street, near Twelfth, for connection with the surface lines. Cost, \$7,500,000.

There are also to be two east and west subways, one of which should be in Randolph Street from North State Street to a connection with the Oak Park Elevated at or near Sangamon Street, and a portal just east of Desplaines Street for a connection with the surface lines; the other in Harrison Street from South State to a connection with the Metropolitan Elevated lines at or near Sangamon, and a portal just east of Desplaines for connection with the surface lines. Cost, \$7,500,000.

The St. John plan is for a high-level subway, with room for a lower level without encountering the Illinois tunnel. The cantilever style of construction would permit this, it is asserted. It is found impossible to include the Van Buren, Washington and La Salle Street River tunnels, the engineer claiming that "they are not located so that they might economically be used in connection with any initial subway system."

This plan has single bores between stations and a drainage system so the tubes can be washed nightly to improve hygienic and aromatic conditions. A system of ventilation by fans and exhaust pipes is also provided.

Mr. St. John favors the widening of sidewalks as on State Street from 20 ft. to 30 ft. as facilitating the arrangement of station entrances as well as being essential for pedestrian traffic. With surface cars in subways he thinks vehicle traffic can easily be handled in a roadway of 20 ft. less width.

The initial plan provides for four tracks each on Harrison and Randolph, two surface and two elevated, and six on State Street. The latter tube will have a capacity for eight tracks, if the necessity arises, at but little additional expense. Mr. St. John estimates that ten-car trains can be run at one and one-half minute intervals at the maximum.

R. C. St. John, the engineer who submits the report, has been actively engaged in municipal and railroad engineering problems since within a year of his graduation from the College of Civil Engineering, Cornell University, in 1887. He has served as trainmaster on the Iron Mountain Railway, assistant superintendent and acting superintendent of the Great Northern, assistant engineer Pennsylvania Railroad and chief assistant engineer Michigan Central Railroad. He did the principal subway work in Chicago for John Ericson and made a complete supplemental report for him on the Chicago sub-

way in 1909 for which he was awarded a gold medal by Cornell University. For eighteen months prior to last April he was chief assistant engineer for Bion J. Arnold, Chicago's traction expert.

ADVERTISING IN CONNECTION WITH THE NEW YORK SUBWAY PROPOSALS

The campaigns which are being conducted by the Brooklyn Rapid Transit Company and the Interborough Rapid Transit Company to interest the public in their respective proposals for the construction of rapid transit lines in Greater New York has been referred to previously in the ELECTRIC RAILWAY JOURNAL. Both companies are distributing liberally pamphlets showing the routes of the lines which they propose to build and giving the principal provisions of their offers. One of the most striking advertisements in the daily papers is repro-

The Kind of Lines the Interborough Wants

These are the lines which under the Interborough offer may be recaptured by the city after ten years. Recaptured? Yes, with several strings attached. These strings are shown by the artist, and they are held closely in the hands of the large man whose picture is herewith presented.

RESERVED FOR THE METROPOLITAN ELEVATED

SOME OF THE LINES PROPOSED UNDER THE IRT PLAN

NO STRINGS ON THIS (UNPROFITABLE)

ATLANTIC OCEAN

RICHMOND

WEST CHESTER

MADISON AVENUE

42ND STREET

59TH STREET

125TH STREET

146TH STREET

161ST STREET

181ST STREET

205TH STREET

215TH STREET

230TH STREET

245TH STREET

265TH STREET

285TH STREET

305TH STREET

325TH STREET

345TH STREET

365TH STREET

385TH STREET

405TH STREET

425TH STREET

445TH STREET

465TH STREET

485TH STREET

505TH STREET

525TH STREET

545TH STREET

565TH STREET

585TH STREET

605TH STREET

625TH STREET

645TH STREET

665TH STREET

685TH STREET

705TH STREET

725TH STREET

745TH STREET

765TH STREET

785TH STREET

805TH STREET

825TH STREET

845TH STREET

865TH STREET

885TH STREET

905TH STREET

925TH STREET

945TH STREET

965TH STREET

985TH STREET

1005TH STREET

The Kind of Lines the City Wants

This is the system which under the Brooklyn Rapid Transit offer the city may use after ten years.

No strings attached to this.

Only three short connections (indicated in broken lines) necessary to make a continuous, comprehensive system which, if the Brooklyn Rapid Transit does not operate satisfactorily, can be leased to some other operator.

Advertisement in New York Subway Campaign

duced herewith. This advertisement was published by the Brooklyn Rapid Transit Company. In reproducing it the details of the routes have been lost, but the wording in the upper left-hand corner of each map can be read without difficulty.

COS COB POWER STATION OF NEW HAVEN RAILROAD TO BE ENLARGED

The New York, New Haven & Hartford Railroad will more than double the size of its Cos Cob (Conn.) power station. Orders have been placed for four Westinghouse-Parsons turbo-generators each of 4000-kw capacity, single-phase rating, at 80 per cent power factor, which will increase the generating capacity of the station from 12,000 kw to 28,000 kw. The present boiler equipment will be increased proportionately and

the coal-handling plant will be rearranged and enlarged. The Fred T. Ley Company, of Springfield, has been awarded the contract for erecting the addition to the present building in which the new machinery will be installed. The additional capacity of the station will be utilized for supplying current to the electrified Harlem River branch, the New York, Westchester & Boston Railway, the Tarrytown, White Plains & Mamaroneck Railway, the local street railway system in Port Chester, N. Y., and the lighting system in Greenwich, Conn. It will also take care of future extensions of the main-line electrification east of Stamford, Conn.

NOTES ON THE PHILADELPHIA ELEVATED-SUBWAY SYSTEM

The Elevated-Subway division of the Philadelphia Rapid Transit Company, which was incorporated as the Market Street Elevated Passenger Railway Company, now consists of 7.32 miles of double track. The first section of 4.98 miles of double track was placed in operation in March, 1907. The second section, 1.41 miles (all subway), was opened for service in August, 1908. The entire system was completed on Oct. 4, 1908.

The following paragraphs will review the growth and character of this service and will also present data on various features of rolling stock maintenance.

INCREASE IN CARS

At the beginning of operation the equipment consisted of forty cars. This number was increased to eighty in February, 1908, further increased to 100 in December, 1909, increased to 120 at the close of 1910 and to a total of 135 by May, 1911.

All cars are equipped with two GE-66 motors, 125 hp each, Westinghouse compressors, type D. 2 E. G. and D. 2 E. Z. with electro-pneumatic brake and the M. E. 17 brake valve. The car bodies are of steel construction with steel side sheets and steel underframes as built by the Pressed Steel Car Company. The interior finish is mahogany. The bodies are mounted on Curtis or Brill M. C. B. type 27 trucks. The first forty cars have 6-in. axles and 4 $\frac{1}{4}$ -in. x 8-in. journals. The balance of the cars have 6-in. axles, and 5-in. x 9-in. journals. Both steel-tired and solid steel wheels are in service in these trucks. Hedley anti-climbers are being applied to all cars.

INCREASE IN PASSENGERS AND CHANGES IN TRAIN SERVICE

The average number of passengers carried daily has increased as follows:

During 1907	40,000 on 498 miles of double track
During 1908	60,911 on 587 miles of double track
During 1909	83,677 on 732 miles of double track
During 1910	113,365 on 732 miles of double track
During 1911 (to May 15)	126,000 on 732 miles of double track

At first the schedule called for two-car trains on a 5-minute headway from 5:00 a. m., until 11:45 p. m. from the Sixty-ninth Street terminal in West Philadelphia. The length of trains has been gradually increased and the headway shortened so that today five-car trains and a 2 $\frac{1}{2}$ -minute flat headway is maintained during the a. m. and p. m. rush hours. During the non-rush hours a three-car train service with a 3 $\frac{1}{2}$ -minute headway is maintained. The average speed, including stops, is 15.76 m.p.h. The average station stop is 22 seconds.

MAINTENANCE COST OF IMPORTANT ITEMS

The average cost for a period of six months in the year of 1910 for electrical inspection and repairs, which comprise control and motor inspection and repairs, was \$1.78 per 1000 car miles. For the same period the cost of pit inspection and repairs, comprising control, motors and third-rail shoes, was \$1.08 per 1000 car miles.

The cost of lubrication is remarkably low as shown by the following figures:

Year.	Cost per 1000 Miles.
1908	\$0.1027
1909	0.0803
1910	0.0880

LUBRICATION METHODS

Perfection packing and Galena oils are used exclusively for car lubrication. New waste is thoroughly saturated for a period of 60 hours. It is then wrung by hand so that 1 lb. of waste will contain about 3 pints of oil before it is placed in armature and axle-bearing boxes in layers. When cars are in for inspection the top layer only is removed, and a fresh one applied. To lubricate journal boxes, a piece of waste is made into the form of a roll and placed in the rear of the box around the journal, thus forming a dust and oil guard. The box is then packed so that the waste extends to the center of the journal on each side. On this division it has been found that this method of packing journal boxes will make further lubrication unnecessary for a period of one year except when a journal bearing is changed, upon which only enough oil to lubricate the newly supplied bearing is added. Waste that is removed is kept in separate cans for armature, axle and journal use. After the waste has been re-saturated for forty-eight hours, it is re-used in the same class of bearings from which it was removed.

The initial lubrication of gears and pinions consists of 13 lb. of lubricant to each gear. The lubricant is applied so as to coat both the gear and pinion thoroughly. At each inspection period or every 1350 miles the lower half of the gear casing is removed to re-apply to the gear and pinion whatever quantity of lubricant has dropped into the bottom half of the casing. The average amount of new lubricant applied is about $\frac{1}{2}$ lb. for every 5000 miles of service.

STAGGERED MOTOR BRUSHES AND IMPROVED THIRD-RAIL SHOES

L. A. McCoubrie, superintendent of the elevated division, and C. F. Raydure, shop foreman, have patented two devices which are now extensively used on the elevated-subway rolling stock. One of these devices is a brush holder which permits the motor brushes to be set in staggered relation and the other is an improved type of third-rail shoe.

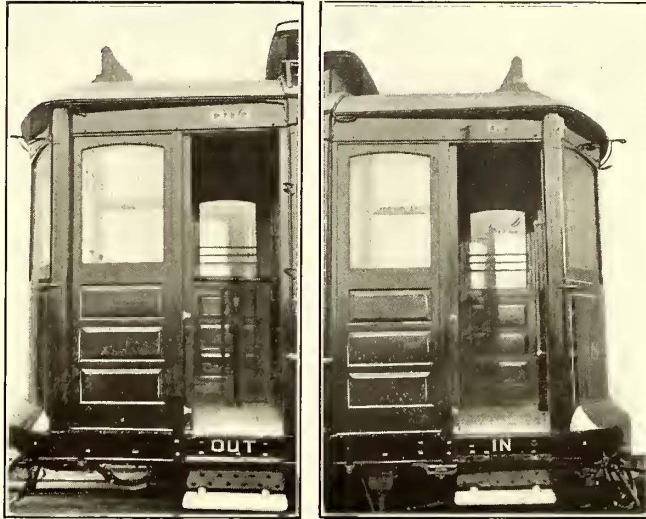
The brushes are set so that those of the same size are diagonally opposite. This arrangement prevents the formation of ribs or ridges on the commutator because any inequality started by the edge of one brush is immediately worn away by the other brush. Both of the long brushes overlap the center line of the commutator by $\frac{1}{2}$ in. Before the staggered brushes were used it was necessary to turn down the commutators every 30,000 miles. The re-equipped commutators, however, have already made over twice this mileage and still show no need for turning.

The original under-running third-rail shoes used on the Philadelphia system were equipped with half-coil springs, the tension of which was maintained with difficulty. When the spring broke about half an hour was required to drive out the holding pins to insert another spring. It was frequently necessary to adjust the tension by moving the shoe holder along the vertical rack. In spite of this, the old type could not be kept from chattering and gave poor contact when passing over special work. The first new shoes were applied in March, 1910. They are now giving satisfactory service on cars. The full coil spring used on this shoe has its tension easily maintained by the adjustment of one nut. The contact piece, which is attached by two easily removable studs, is made of plain gray iron and costs about 26 cents for tapping and drilling. Up to March 8, 1911, 41,855 miles had been obtained from the first of these shoes without renewing the contact piece. No adjustments have been necessary on any of the new shoes since their installation. The company manufactures all parts of the shoe except the springs. It is figured that these shoes will save \$25 a week in labor maintenance charges alone when applied on 120 cars.

William G. McAdoo, president of the Hudson & Manhattan Railroad, was injured on May 18, 1911, by being thrown from an automobile which he was driving near New Brunswick, N. J. Mr. McAdoo is understood to be convalescing rapidly.

ONE-MAN PREPAYMENT CARS AT MISSOULA, MONT.

The Missoula (Mont.) Street Railway is now operating ten prepayment cars of the conductorless type on 17 miles of track, of which about 10 miles is outside of the city limits and constitutes a semi-interurban run. These cars are 38 ft. 9 in. long over the vestibules, 25 ft. 9 in. over the body and 6 ft. 6 in. over each platform. The width of the car inside is 8 ft. 2 in.; of the eight cross seats on each side 35½ in., and of the two sliding doors at each end 27½ in. The bodies are mounted on



Exit and Entrance of Missoula One-Man Prepayment Car

No. 39-E maximum traction trucks with their pony wheels placed forward to secure the greatest overhang. Two E-G 219 motors are supplied per car.

S. R. Inch, manager of the Missoula company, reports that so far the one-man system of operation and fare collection has proved entirely satisfactory. It has been in operation for over a year, during which period not a single platform accident has occurred. The local public is used to the system and little trouble has been experienced in explaining it to strangers.

The marked success of the one-man method has led the Missoula management to believe that such operation, owing to

ate in conjunction with the steps, which are 14 in. wide. The exit door and step is operated by one lever and the entrance door and step by another. Both levers are under the control of the motorman and no doors are opened until the car has reached a complete stop. The exit and entrance portions of the platform are separated by the usual pipe railing, as shown in one of the illustrations. All vestibule grab-handles are concealed when the doors are closed so that it is not possible to board the car while it is in motion. A Brill No. 4-A fare box is used for fare collections, tickets being deposited in it as cash. The passengers deposit their own fares and the motorman makes change only. Although the cars are equipped with air brakes and trolley retrievers, it has not been found that the motorman has too much to do to enable him to look after his other duties. The cars are provided with the usual push-buttons to permit passengers to give alighting signals.

THE CORRECTION OF MOTOR LUBRICATION TROUBLES

The Galena-Signal Oil Company recently has assembled some practical data on car maintenance practice in a pamphlet entitled "Fifty Motor Troubles and Suggestions." The following paragraphs constitute a digest of the principal features of this booklet which relate to lubrication:

The non-alignment of bearing shell openings in motor shells produces bearing troubles by the tilting of the armature. The openings should be rebored and the shafts trued. Shimming with liners is not good mechanical practice.

It is not considered good practice to use bearings babbitted out of center.

All split bearings should be chamfered lengthwise to within ¼ in. of each end. This prevents the bearing from pinching on the shaft, permits the oil to be drawn freely to the inside of the bearing and stops the oil from flowing outside.

An oil-soaked armature will cause grounding, sparking, heating and other serious damage. Use no more oil than necessary, Varnish the bead ring and inspect frequently.

When small portions of babbitt break off at the bearing collar they work back and become lodged between the shaft and the inner side of the bearings. The grinding of these particles heats the bearing.

When the dowel pins are in poor condition or missing, or when the dowel pin holes are worn badly, the bearing will shift



One-Man Prepayment Car for the Missoula Street Railway Company

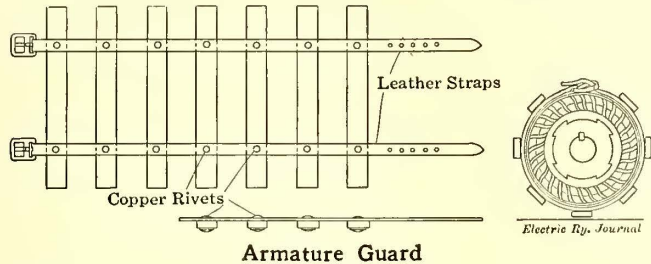
its low labor cost, should prove particularly attractive to other cities which serve populations of 20,000 or less. The method of operating this type of car is as follows:

Passengers enter and alight at the front platform, entering the car at the right of the motorman and leaving the car at his left. Cars are stopped at the near crossings. The doors of the rear platform are locked to prevent passengers boarding and alighting from that end. The rear platform is used for smokers. The vestibule doors are of the sliding type and oper-

ate in the shell. Consequently the slot in the shell will be moved from the center of the shaft so that the oil will run outside of the bearing instead of running through the oblong slot to the bearing. In old-type motors this slot should not be less than 1 in. wide x 3 in. long, and, in fact, it should be as large as the design will permit. On modern motors, where the dowels are on the flange of bearing instead of on the bottom, lateral lost motion allows the bearing to slip off the dowel pins and to turn around, thereby closing the oil space.

If the slot in the grease receptacle of a motor shell is too small and out of center it should be enlarged either by closing and drilling a 1½-in. hole in the center or by widening and lengthening the original slot. A large percentage of hot bearings and lubricating troubles is due to the improper position of the dowel pin and slot.

The rapid starting of a car tends to make the pinions of the motors climb on the engaging gear. When motormen skip resistance points a destructive pounding is set up on the bearings



if there is any play due to worn shaft or babbitt as the result of rise and fall of the heavy armature at every start and stop of the motor.

A knife-edge will be formed if the inside edge of the oblong slot in the top of the bearing is not beveled off. This edge will cut the oil away instead of allowing it to work its way between the shaft and the inside of the bearings.

Proper clearance should be allowed in fitting the bearings to the shaft. Under heat there is an expansion of the shaft from 0.005 in. to 0.007 in.; therefore, .01 in. should be allowed between the shaft and the bearing to insure sufficient space for lubrication. This suggestion applies especially to the GE-800 motor.

When the dust cap on the commutator is off, grit and iron from the brake shoes will get into the bearings. Gear grease will work into the bearings at times and cause them to heat.

An armature should never be permitted to lie or to be rolled on the floor. It should be placed on a rack and carefully covered, especially in shops where iron dust is prevalent and where machine work is done. If it is necessary to roll an armature on any part of the floor, canvas or carpet strips should be avoided owing to their liability to pick up and hold metal particles which frequently penetrate the insulation and cause serious damage. A simple method for preventing such trouble can be introduced in the form of wooden strips, which are wrapped around the armature as shown in the accompanying sketch of an armature guard.

Weak fields will cause heating by allowing an extra amount of current to pass through them, thus unbalancing the motors. This unbalanced condition will eventually cause hot bearings.

Bottom oil feeders will become glazed if they are allowed to press too tightly against the shaft or are permitted to remain too long in service. They then wipe off oil instead of furnishing it to the bearing.

Capillary feeding is impossible in the new type of oil-lubricated motors if the wool waste is forced into receptacles which are too tight. Poor waste may cause heating by hardening and drying.

Babbitt metal which is too hard or too soft causes trouble. Metals which are remelted or overheated lose their good properties and should be reinforced with new material. Poor tinning and insufficient heating of the mandrel often produce defects after pouring and give bad results.

Hot bearings are sometimes caused by the use of fouled lubricating vessels.

Short circuits in armature coils generate heat which is communicated through the core to the bearings.

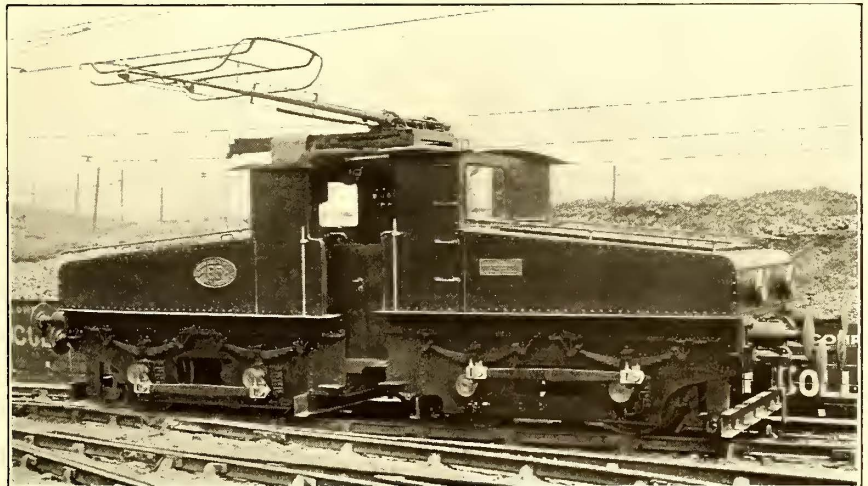
SLOW-SPEED DIRECT-CURRENT LOCOMOTIVES FOR COLLIERY SERVICE

The adaptability of the electric locomotive for switching and low-grade freight service is shown by an installation made for the Harton Coal Company, Limited, South Shields, England, by Siemens Brothers' Dynamo Works, Limited, of London. Since December, 1908, six locomotives have been placed in service from time to time on 7.2 miles of single track. The comparative operating cost of steam and electric locomotives has not yet been exactly determined by the coal company, but the latter was so well pleased with the electrified lines that it decided to install electric service on an entirely new branch. Currents up to 800 amp are taken from a 500-volt d.c. line carrying one or two figure 8 wires of 65 mm (about No. 00 B. & S. gage) cross-section. The Siemens sliding bows used for this purpose operate successfully for clearances varying from 10 ft. 6 in. to 21 ft. above the level of the rails.

Of the six locomotives in service the first two have two axles, the third and fourth have four-wheel swiveling trucks and the fifth and sixth are of the articulated design shown in the accompanying cut. The first locomotive weighs 25.85 long tons and carries two 130-hp motors, each of which is coupled to the driving axle by gearing with a ratio of 1:5.47. The truck wheelbase is 9 ft. 10¼ in., the wheel diameter 39¾ in., and the total length over the buffers 20 ft. 3 in. The tractive effort is four tons. The second locomotive is similar to the first, but is considerably lighter. It carries only two 50-hp motors, geared 1:6.25. This locomotive weighs 14.4 tons, has a wheelbase of 5 ft. 11 in., a wheel diameter of 31½ in. and a total length over the buffers of 17 ft. to facilitate operation on short curves. The tractive effort, based on the hour rating of the motors, is 1.87 tons.

Locomotives Nos. 3 and 4 are operated on a line on which loads of about 110 tons must be hauled over a maximum grade of 2½ per cent. Each of these locomotives is equipped with four 50-hp commutating pole motors, similar to those on locomotive No. 2. The trucks are of 4 ft. 9 in. wheelbase each and 12 ft. 6 in. between centers. The wheels are 33½ in. diameter. The total weight of each locomotive is 33.25 tons, and the tractive effort 3.76 tons.

Locomotives Nos. 5 and 6 are used for switching in the yard



British Direct-Current Locomotive for Colliery Service

and must operate over a curve of 36-ft. radius. As a result of the previous experiences with the other locomotives it was considered advisable to retain the minimum wheelbase of 4 ft. 9 in. and the wheel diameter of 33½ in., but to adopt a construction which would reduce to the lowest possible limit the overhang of the buffers on curves. Each locomotive weighs 17 tons and is 27 ft. 8 in. over all. It was found necessary in order to obtain this weight without exceeding 7 ft. 7 in. between the ends of the buffers and the center of

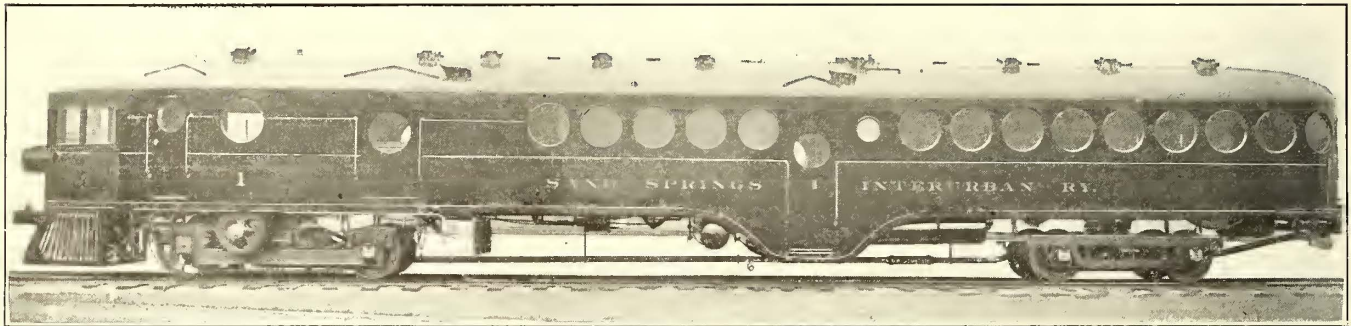
the wheelbase to construct the locomotive in two halves. These halves are joined in the center by link couplings to form a single articulated locomotive. Each part carries a 150-hp commutating-pole motor and runs on fixed axles independently of the position of the other half. Each motor is coupled to one of the driving axles in the ordinary way, the other axle being driven by means of side coupling rods and cranks. In this way the entire weight of the locomotive is made available for adhesion.

The seventh and eighth locomotives will weigh about 40 tons and will be equipped with four 70-hp motors, giving a tractive effort of 5 tons. They will be used on an overhead line 8 miles long, which will be equipped with a Siemens catenary having spans up to 210 ft.

GASOLINE MOTOR CAR FOR TULSA, OKLA.

The accompanying illustration shows a 72-ft. gasoline motor car recently built by the McKee Motor Car Company of Omaha, Neb., for the Sand Springs Interurban Railway of Tulsa, Okla. This railway company has now about 6 miles of track in operation with this one motor car but is planning to extend its line and has placed an order for a second car, which is to be a duplicate of the car now in service on its line.

The general dimensions of the car body is as follows: Gage, 4 ft. 8½ in.; length over sills, 70 ft.; length over all, 72 ft. 9¾ in.; width over side sills, 9 ft. 8 in.; width over all, 10 ft. 2¾ in.; height, inside floor to ceiling, 7 ft. 5⅝ in.; height, rail to roof, 11 ft. 9 3/16 in.; length of passenger compartment, 28 ft. ⅞ in.; length of smoking compartment, 16 ft. 4½ in.;



Gasoline Motor Car for Tulsa, Okla.

length of baggage compartment, 8 ft. 6 in.; total seating capacity, 83 passengers; total weight, 68,000 lb.

The engine is a McKee 200 hp, with six 10-in. x 12-in. cylinders, air-starting and reversible. The engine frame is of one solid casting of cast steel. The cylinders are cast in sets of three, of high grade cast iron, and the water jackets are ⅛-in. copper. The crankshaft is of high grade carbon steel, each crank being fitted with a counterbalance. The crankshaft sprocket, securing the two halves of the crankshaft together, is of forged steel. The drive from the crankshaft is by means of 5-in. Morse silent chain. All bearing brasses are hard phosphor bronze and all valves are nickel steel.

All gears used in the transmission are of vanadium cast steel, and the other castings are of cast steel. The clutches are operated by means of two air cylinders controlled by an actuating valve in the engine room convenient to the motorman. The car is equipped with extra low gear, giving a speed of 8 m.p.h. on low speed and 22 m.p.h. on direct speed.

The car is equipped with New York Gregory brake valve, emergency hand brake, Wyoming sanders, acetylene headlight, M. C. B. Climax couplers, whistle, warning gong, communicating signals, lamp and flag brackets, tools, etc.

The motor truck is of built-up steel design with a wheelbase of 9 ft. 5 in. The front axle journals are 6 in. x 10 in. and the rear axle journals are the standard 4¼ in. x 8 in. The total weight on the drivers is 24,900 lb. The bolsters are fitted with automatic frictionless roller side bearings, and the journal bear-

ings and wedges are standard M. C. B. All castings are malleable iron. The driving wheels are 42-in. steel-tired spoked wheels, and the rear wheels are 33-in. rolled steel of special design.

The rear truck is of built-up steel design with a 7-ft. wheelbase, and M. C. B. journals 4¼ in. x 8 in. are used. The truck is built on a solid cast-steel frame center. The bolsters are of cast steel, fitted with automatic frictionless roller side bearings. The wheels are 33 in. rolled steel of special design.

The underframing of the car is constructed of structural steel shapes, with one-piece cast-steel body bolsters. The center sill is a 8-in., 22¾-lb. I-beam and the side sills are 6-in. 8-lb. channels. The upper framing is largely of 2-in. grooved steel and 3-in. and 4-in. channels. The sections are securely braced to resist the maximum strain. The windows are round, with an opening of 24¾ in. The sheathing is No. 12 American Bessemer, securely riveted to the framing and forming trusses to support the car.

The roof is of No. 16 sheet steel, closely riveted, and all seams are soldered solid, so as to make an absolutely tight roof. Draft rigging is applied at each end. The pilot is of structural steel frame, the slats being of ¾-in. pipe, securely bolted and braced to the front of the car underframe.

Compressed air for brakes and whistles and for starting the engine and operating the clutch gears is supplied by a pump driven by the engine and also by an emergency gasoline-driven air compressor installed in the engine room. The supply is carried in two 18-in. x 96-in. and one 18-in. x 111-in. seamless steel tanks, secured in the car underframe. The gasoline is carried in an 18-in. x 111-in. seamless steel tank, with a total

capacity of 120 gal., and connected to the air system through a special valve and reducer, which delivers the gasoline to a small gasoline tank in the engine room, whence it flows by gravity to the engine. The water cooling circulation consists of rotary circulation pump, cooling coils and expansion tank.

The car is lighted by an acetylene system, with thirteen oval lamps in the passenger compartment, one bracket lamp in the baggage-room, one bracket lamp in each toilet, one bracket lamp in the engine-room and one lamp in the center vestibule. The car is heated by hot water, the heating system being connected into the water circulation from the engine. Ventilation is provided by means of intake air ducts, which deliver air at various points adjacent to the floor of the car, and foul air is exhausted at the roof by suction or exhaust ventilators.

The interior finish of the car is in mahogany, with two toilet-rooms fitted with Duner hoppers. The floor is of 13/16-in. hard maple with false flooring of No. 12 sheet steel. The ceiling in the passenger compartment is of pressed board formed to fit the roof of the car.

The seats are Hale & Kilburn spring cushions, upholstered in plush for the passenger compartment and in rattan for the smoking compartment. Drop benches are provided in the baggage compartment for use by negroes.

The car is thoroughly insulated by the use of pith placed between the top and the false flooring, and between sheets and interior finish and by linofelt placed between roof sheets and ceiling. The aisles in the car are covered with rubber matting.

News of Electric Railways

Public Hearings on Chicago Subway Plans

At the suggestion of Mayor Harrison the committee of the City Council of Chicago on local transportation has placed itself on record as favoring absolute municipal ownership of the subways, the construction to be paid for entirely by the city without aid from any other outside source. The initial cost will be paid from the city's traction funds, and the construction will be limited to the extent of these funds unless other municipal funds are found available.

The committee proposes to hold a series of hearings on subway plans, the first on May 22, 1911. They will be open to the public. Three engineers who have presented subway recommendations or plans to the Council will be invited to present arguments in support of their plans. They are Bion J. Arnold, chairman of the board of supervising engineers; City Engineer John Ericson, under whose supervision the municipal subway bureau prepared the plans known as the Johnston plans, and George W. Jackson, who submitted a report to the Council. The first of the public hearings is referred to at length on page 922 of this issue.

Mayor Harrison appeared at a recent committee meeting and asked to be notified when the subway discussion was taken up. The Mayor is reported to have said that he would like to see the committee adopt a policy of municipal ownership and construction of the subway with the city's share of the traction company profits or such other funds as may be available for city use.

Alderman Charles M. Foell, who acted as spokesman for the Republican minority on the committee, declared himself in favor of municipal ownership of the subway and control of it through leases to the users, but he expressed doubt about the wisdom of limiting the committee's study to a subway such as can be built from the traction fund, which now contains \$6,109,835, and is increasing at the rate of \$1,500,000 a year.

Mayor Harrison is reported to have said:

"Chicago will not need a large subway like New York for at least fifty years to come. One of the pledges of my election was that I would give the people a municipally owned subway, and that is my policy now. What I ask is that the committee go on record for a municipally owned subway, built with the funds now in the hands of the city, obtained as the city's portion of traction receipts, and not take any money from outsiders. If you take money from the street car companies they become part owners of the subway, and I do not want this."

Governor Foss Again Urges Utilities Commission in Massachusetts

Eugene N. Foss, Governor of Massachusetts, on May 19, 1911, again urged the Legislature of that State to establish a public service commission in accordance with the recommendations which he made in his message to that body. On May 19, 1911, the Governor said:

"I again call attention to the desirability of establishing in this State a utilities board. I have already advocated the establishment of a utilities board which should comprise the functions of the present Railroad Commission, the Gas & Electric Light Commission, the Boston Transit Commission, and the Highway Commission. I believe that the large expenditures now incurred by these several boards as a whole can be rendered far more efficient by a combined general management, controlling the several divisions of work properly assigned to subordinate offices. The very fact that there now exists a difference in efficiency between these different commissions indicates the necessity of raising them all to at least the standard of the one that is now best.

"I recommended Mr. Scovall's report to your careful attention with the further comment that I believe the present annual expense at \$4,750, which is paid for office rent by the Highway Commission, can be eliminated when the commission now at work upon the office space within the State House shall have concluded its work. I believe also that a far larger proportion of the expenses of this commis-

sion should be met by increased license fees on high-powered motor vehicles, since these expenses are kept at a high figure largely because of the excessive wear due to these vehicles. I approve the pending appropriation for the Highway Commission, amounting to \$261,250, with the urgent recommendation that the commission be consolidated with others, as stated, into a utilities board."

Report on Cost of Toronto Municipal Railway

The City Engineer of Toronto, Ont., has prepared a report on the cost of constructing the proposed municipal street railway lines on St. Clair Avenue and on Gerrard Street East. The cost of construction of the St. Clair Avenue line, from Avenue Road to the Grand Trunk tracks, 2.65 miles, follows:

Rail structure.....	\$111,450
Overhead construction.....	10,600
Car houses and repair shops.....	35,000
Passenger equipment.....	49,000
Operating equipment.....	16,500
Transformer station and feeder wires.....	40,000
	\$262,550
Contingencies, engineering, etc.....	18,378
	\$280,928

The cost of the Gerrard Street East line, from Greenwood Avenue to Main Street, 1.85 miles, follows:

Rail structure.....	\$69,000
Overhead construction.....	8,510
Car houses and repair shops.....	35,000
Passenger equipment.....	42,000
Operating equipment.....	16,500
Transformer station and feeder wire.....	40,000
	\$211,010
Engineering, contingencies, etc.....	14,770
	\$225,780

The cost of operation of the two lines is estimated by the engineer as follows:

	St. Clair Line.	Gerrard Line.
Day service, 6 a. m. till 12 p. m.		
Speed—miles per hour.....	7.95	7.40
Cars required.....	4	3
Total car mileage—527.4, at 31.7 cents per car mile.....	\$181.45	
Total car mileage—399.6, at 31.7 cents.....		\$126.67
Night service, 12 p. m. to 6 a. m.		
Total car mileage, 63.6.....	20.16	
Total car mileage, 44.4.....		14.7
	\$201.61	\$140.74

It is expected that the engineer's report will be presented to the Ontario Railway & Municipal Board when the city's application comes before that body for the construction and operation of the lines as a municipal undertaking.

Proposed Boston & Western Electric Railroad Has Novel Construction Plan

The Boston & Western Electric Railroad, which has been chartered to build a high-speed interurban electric railway from Waltham to Marlboro, and which secured a certificate of exigency from the Massachusetts Railroad Commission, despite the protests of the Boston & Maine Railroad, which it would parallel for a long distance, and the Boston & Worcester Street Railway, with which it would enter into competition, has practically reached an agreement with the Boston & Maine Railroad to use the Central Massachusetts Railroad right-of-way from Waltham through Weston and Wayland to South Sudbury. The Central Massachusetts Railroad has a wide roadbed, or right-of-way, and uses only the north side of it. This would avoid any takings of private land except in a few places where the right-of-way may not be wide enough, and it would create no additional structure in the places it passes through.

When Mr. Hight, of counsel for the Boston & Maine Railroad, referred to the matter before the Railroad Commission, he said that since it has been determined that the Boston & Western Electric Railroad is to be built the Boston & Maine Railroad is willing to co-operate for the benefit of the public. Samuel W. Powers, who is counsel for the Boston & Western Electric Railroad, explained what his

company has been doing to secure a route. It was intended to build through private land on the south side of the Central Massachusetts, and the people there suggested that the road be built on the north side. On the north, however, the people raised the same objections and argued that the line should go on the south side. Then the use of the line owned by the Central Massachusetts Railroad was suggested.

The only objection raised before the Railroad Commission was that of the Boston & Worcester Street Railway, through its counsel, Guy W. Cox. Mr. Cox declared that the Boston & Maine Railroad was to acquire the Boston & Western Electric Railroad so that it virtually would mean the electrification of the Central Massachusetts Railroad for a distance to the injury of the Boston & Worcester Street Railway. The matter comes up for a hearing on June 8, 1911, before the Railroad Commission. Then the Boston & Western Electric Railroad will have detailed plans to offer.

Public Meeting to Consider Cleveland Franchise Amendments

Councilman Kramer, chairman of the street railway committee of the City Council of Cleveland, announced that he would call a meeting of the committee on May 24 or May 25, 1911, to consider the proposed amendments to the Tayler franchise. The city officials, officers of the Cleveland Railway and the public were to be invited to be present, as the committee wished to hear arguments for and against the amendments. The committee expects the discussion to center about the amendment to require the company to spend \$2,500,000 at once for improvements. This will add \$125,000 a year to the interest fund and some questions are likely to be asked as to whether increased traffic will care for this additional expense. The officers state that for each dollar expended for cars the same amount will have to be added for extensions at the power plants, which are running up to capacity now. It would seem that the \$250,000 will have to be about evenly divided between cars and power. Several members of the Council believe that the addition recently made to the operating expenses and the additional interest required by the issue of bonds can all be cared for within the 3-cent fare limit, as the growth in traffic will be heavy with the greater facilities.

Argument in Detroit Rental Suit in June

At the close of the session of the Wayne County Circuit Court on May 15, 1911, it was agreed that arguments in the case of the City of Detroit against the Detroit United Railways should be begun on June 5, 1911. The city has made a charge of \$200 a day for the use of streets occupied by the Fort Wayne and Belle Isle line, which the company has refused to pay. The company contends that the interests of the city, the company and the public are interdependent, and that before such a charge as this can be made it must be ascertained where the rights of one end and those of the other begin. Corporation Counsel Hally, for the city, maintains that the municipality has the right to fix any rental that it sees fit. Attorney Fred A. Baker, acting for the company, states that this is one of the most important cases ever presented, because of the principle of interdependence which the court must decide upon.

City Counsel Hally has demanded that the Lake Shore & Michigan Southern Railroad complete its work of eliminating the crossing at Beaubien Street, Detroit, so that the street railway can finish its subway and begin to operate its cars in the regular course. For some time it has been making a detour on temporary track.

Sand Springs Interurban Railway Placed in Operation.—The Sand Springs Interurban Railway was placed in operation on May 14, 1911, between Sand Springs and Tulsa, Okla., a distance of about 6 miles. The road is being operated with a McKean motor car, described elsewhere in this issue. It is proposed to extend the line to Collinsville and Oologah to connect with the Iron Mountain Railroad.

Report on Pennsylvania Railroad Terminal Improvements in Philadelphia.—It has been announced that the

board of engineers which has been considering the question of the improvement of the Broad Street Station of the Pennsylvania Railroad in Philadelphia, Pa., and the electrification of the suburban lines of the company out of that city has completed its work and will present its report to the directors of the company within a few days.

Complaint Against Schenectady Railway Closed.—The Public Service Commission of the Second District of New York has closed upon its records the complaint of residents of Rexford Flats, Saratoga County, and Alplaus, Schenectady County, against the Schenectady (N. Y.) Railway. The complaint asks for increased passenger service and improvement of waiting rooms. The company has satisfied the complaint without the necessity of further formal proceedings on the part of the commission.

Annual Convention of the American Society of Civil Engineers.—The forty-third annual convention of the American Society of Civil Engineers will be held at Chattanooga, Tenn., from June 13 to 16, 1911. The headquarters of the society will be at the Hotel Patten. There will be an informal reception at the Hotel Patten on the evening of June 12. The following days will be given over to executive sessions. The committee of arrangements of the board of directors is composed of Hunter McDonald, chairman; William E. Belknap and Charles Warren Hunt.

Meeting of New England Street Railway Club.—The regular monthly meeting of the New England Street Railway Club was to be held at the American House, Boston, Mass., on May 25, 1911. Dinner was to be served at 6:30 p. m. The regular business meeting was set for 8 p. m., after which there were to be two addresses. Walter M. Denman, designing and consulting engineer, Springfield, Mass., was to deliver an address on "Concrete Bridges for Electric Railways," illustrated by the aid of a stereopticon. A. A. Hale, engineer of the Griffin Wheel Company, Boston, Mass., was to deliver an address, "Chilled Iron Car Wheels and Their Relation to Service Conditions."

Professor Bemis Engaged for Toledo Appraisal.—Prof. Edward W. Bemis, New York, who had much to do with the valuation of the Cleveland Railway property under the late Mayor Tom L. Johnson, has been employed to represent the city of Toledo, Ohio, in appraising the property of the Toledo Railways & Light Company for the negotiators, Mayor Brand Whitlock and President Albion E. Lang, of the company. In accepting the appointment Professor Bemis stated that he would begin the work on May 20, 1911. It is understood that he is to receive \$50 a day and his expenses for the service. On the evening of May 15, 1911, the City Council adopted a resolution appropriating \$8,000 for the expenses of the appraisal. The members of the administration are anxious to complete the appraisal so that negotiations on the question of fare may proceed.

Public Service Railway Employees' Smoker.—The West Hoboken Social Club, which is composed of employees of the West Hoboken division of the Public Service Railway, Newark, N. J., gave a smoker in the clubroom of the West Hoboken carhouse on Friday evening, May 19. The program for the evening consisted of several vaudeville acts, followed by five boxing exhibitions. Both employees of the company and outside talent participated in the entertainment. During the course of the evening Newton W. Bolen, superintendent of transportation of the company, addressed the men. The smoker lasted from 8:30 p. m. until midnight so as to permit as many men as possible to attend. More than 300 men from the various divisions of the company were present. This was the last of the entertainments which are held at this carhouse every second month during the winter.

The Gould Policy.—In a letter addressed to the editor of the *Landmark*, Norfolk, Va., to correct a statement made by that paper in regard to the proposed bonds to be issued in connection with the financing of the merger of the electric railway and light properties in Richmond and Norfolk, Frank J. Gould, New York, N. Y., chairman of the board of directors of the Virginia Railway & Power Company, Richmond, Va., said: "In becoming financially interested in the traction development of your city and vicinity, it will be the object of the Virginia Railway & Power Company, after the merger with the Norfolk Company, to

continue upon the same basis of operation that we have established in Richmond. Our policy, as you probably already know, is to eliminate politics from the operation of the company entirely and give to the public the best service that it possibly can. I, personally, consider the elimination of politics from public service corporations as one of the essential things to serve the public."

Report of Congress of Technology.—So many inquiries have been addressed to the officers of the Massachusetts Institute of Technology asking if the proceedings of the recent Congress of Technology are to be published that tentative arrangements have been made with the McGraw-Hill Book Company, New York, N. Y., to bring out a volume if sufficient interest is shown by those who desire such a publication. This volume would include papers and abstracts of the six sections of the recent congress, somewhat condensed and arranged for the greatest usefulness as a reference book. It would be well printed, in standard 6 in. x 9 in. size, bound in suitable cloth binding and contain approximately 500 pages. The papers were some seventy in number and embraced a wide variety of topics of scientific interest. The book would be issued in cloth at \$3 net per copy. Orders in advance of publication will be accepted at \$2.50 net, prepaid, per copy. The committee on publication desires remittances with orders, but if the immediate response is not sufficient to warrant the undertaking, all remittances will be refunded promptly. Orders should be addressed to Walter B. Snow, 170 Summer Street, Boston, Mass., and checks should be made payable to him.

Final Conferences on New York Subway Proposals.—The committee of the Board of Estimate and Apportionment of New York, of which Borough President McAneny of Manhattan is chairman, and the members of the Public Service Commission of the First District of New York held another conference on the two pending subway offers on the evening of May 22, 1911, and the two bodies on May 22, 1911, were prepared to have brief final conferences with President Williams, of the Brooklyn Rapid Transit Company, and President Shonts, of the Interborough Rapid Transit Company. These conferences are to be sought to settle one or two points developed in the talks between the commission and the committee of which Mr. McAneny is chairman. On behalf of the committee it was asserted that suggestions to reopen the negotiations would not be allowed to delay the committee's report, which will contain a definite recommendation of the course which the committee believes the city should follow in the subway matter, together with an analysis of the evidence supporting the recommendation. Statements containing an analysis of the financial aspects of the matter were issued on May 22, 1911, by both sides.

LEGISLATION AFFECTING ELECTRIC RAILWAYS CONNECTICUT

The judiciary committee held a long session on May 17, 1911, to consider the utilities question. The decisions arrived at were not made public but it was understood that a majority will report in favor of two separate commissions. It is said that the report will advocate an increase of the powers of the Railroad Commission, giving it the authority to enforce its recommendations as to rates and service. The committee will also report in favor of another commission, to be appointed by the Governor, to consist of three members at \$3,000 each. It is said that the recommendation will be to give this commission practically the same power as that given to the railroad board as to rates and service, the commission to have the power to deal with all other public service corporations. It is said that the minority will report the so-called business men's measure somewhat modified. It will recommend abolishing the Railroad Commission, and will advocate a new commission of three members to take both railroads and other public service concerns under its control.

DELAWARE

The employers' liability commission to investigate the employers' liability act best suited to the requirements of Delaware, including the regulation of the employment of women and children, has been named as follows: T. Allen

Hilles and Sylvester D. Townsend, Jr., appointed by Governor Pennewill; Arthur Jennings and Thomas J. Flynn, appointed by President Monagan, of the State Senate, and Alfred B. Moore and James E. Hoeffcker, appointed by Speaker Campbell of the House. The commission is to present its recommendations to the next General Assembly.

MASSACHUSETTS

The Senate has rejected House Bill 1360, providing for a determination of the value of shares of stock of consolidated railroads and street railways. Ten bills relating to the construction of additional subways and tunnels in Boston have been referred to the committees on metropolitan affairs and street railways, sitting jointly, together with the subject of future relations of the Boston Elevated Railway and West End Street Railway. A plan is under consideration by which the West End system would be leased to the Boston Elevated Railway for fifty years at a rate of 7½ per cent on its stock. It is estimated that on such a lease at the end of the tenth year the financing of the West End Street Railway can be handled at a saving of \$60,000 per year above what would have to be paid in case of actual consolidation. The extension of the lease provides a way out of the threatened engineering complications of two separate systems, and is a compromise planned to meet the objections of those opposing actual consolidation of the properties. Stone & Webster have estimated that the cost of supplying power to separate systems would be \$500,000 per year greater by 1918 than if the present single control is maintained. The Boston Elevated Railway interests point out that the most economical power plant developments will be possible under the proposed lease. The only opposition to the lease appears to come from the so-called Mead committee of the West End Street Railway stockholders, which demands 8 per cent dividends as a condition of the lease.

The bill to limit the hours of street railway employees to nine hours in eleven hours has been ordered to a third reading in the House. The question of constitutionality has been raised regarding it by Representative Ellis, of Newton, who pointed out that the recent decision of the Massachusetts Supreme Court on the eight-hour bill that the Legislature lacks the power to limit the hours of men in private employment applies equally to the street railway bill. Representative Underhill, of Somerville, condemned the bill as a political measure, stating that street railway employees will awake to its real meaning when they find that it takes \$2 per week out of their individual pockets. Sub-committees have been appointed by the joint committee on railroads and metropolitan affairs to draft bills to grant a certificate of exigency to the Boston & Eastern Electric Railroad and to authorize the New York, New Haven & Hartford Railroad to build a tunnel under Boston Harbor and to acquire the Boston, Revere Beach & Lynn Railroad. The passage of the latter bill will mean the beginning of steam railroad electrification in the Boston district, with the partial abolition of the steam locomotive between Readville and Beverly. It is understood that the committee will oppose the passage of any specific electrification bill, although no report has as yet been made upon any of the measures under consideration. The bill authorizing the Berkshire Street Railway Company to sell electricity to railroad corporations operating trains in the Hoosac Tunnel has been passed to be enacted. The Senate has accepted the reference to the next Legislature of the House bill 769 regulating street railway fares in Weymouth, as advised by the committee on street railways.

OHIO

Some of the more important electric railway measures enacted by the Legislature, which will soon adjourn, follow: Giving cities power to require electric railways to raise their tracks where parallel steam railroads are required to do so; authorizing street and interurban railways to borrow money without regard to capital stock; authorizing lease by councils of subway rights in streets for underground railways; making the receiving company liable for damages to freight and express shipments; making it obligatory upon steam and electric railways to keep their rights of way clear of weeds; requiring street and interurban railways to sprinkle their rights of way within municipalities.

Financial and Corporate

New York Stock and Money Markets

May 22, 1911.

After the marked activity immediately following the Standard Oil decision, transactions on the New York Exchange decreased in volume, although the advanced prices are well sustained. A wide range of securities continues to be traded in. The situation is improved as the future policy of many enterprises can now be planned more definitely and in consequence public confidence is slowly returning. The recent briskness has caused little change in money rates, although greater demand has resulted from the increased trading. Quotations to-day were: Call, 2¼@2½ per cent; ninety days, 2¾@3 per cent.

Other Markets

The elevated issues were in good demand on the Chicago market during the week and prices have improved. Activity has been caused by the probability of the merger. Northwestern was the most active of the elevated offerings in to-day's trading. Passing of the preferred dividend of the Kansas City Railway & Light Company caused a drop in this issue, but a recovery has been made.

Trading in Philadelphia has been irregular. Traction have not been notably active.

Quotations of traction and manufacturing securities as compared with last week follow:

	May 16.	May 22.
American Light & Traction Company (common).....	a292	a292
American Light & Traction Company (preferred).....	a107	a107
American Railways Company.....	a44	a44½
Aurora, Elgin & Chicago Railroad (common).....	44	a40
Aurora, Elgin & Chicago Railroad (preferred).....	86	a86
Boston Elevated Railway.....	a128	a128
Boston Suburban Electric Companies (common).....	a15	a15
Boston Suburban Electric Companies (preferred).....	a75	a75
Boston & Worcester Electric Companies (common).....	a10	10
Boston & Worcester Electric Companies (preferred).....	a49½	a49½
Brooklyn Rapid Transit Company.....	80¾	80¾
Brooklyn Rapid Transit Company, 1st ref. conv. 4s.....	85¾	86¾
Capital Traction Company, Washington.....	128	128
Chicago City Railway.....	a195	188
Chicago & Oak Park Elevated Railroad (common).....	2	2
Chicago & Oak Park Elevated Railroad (preferred).....	6	6
Chicago Railways, ptcptg., ctf. 1.....	a85	a85
Chicago Railways, ptcptg., ctf. 2.....	a21½	a22½
Chicago Railways, ptcptg., ctf. 3.....	a8	a9
Chicago Railways, ptcptg., ctf. 4.....	a5½	a5½
Cincinnati Street Railway.....	a131	*131
Cleveland Railway.....	97	a98
Columbus Railway (common).....	a96	*96
Columbus Railway (preferred).....	a101	a100½
Consolidated Traction of New Jersey.....	a77	a77
Consolidated Traction of N. J., 5 per cent bonds.....	a105	a105
Dayton Street Railway (common).....	a30	*30
Dayton Street Railway (preferred).....	a100	*100
Detroit United Railway.....	a70¾	72
General Electric Company.....	160	160½
Georgia Railway & Electric Company (common).....	a136	136
Georgia Railway & Electric Company (preferred).....	a92	95
Interborough Metropolitan Company (common).....	183¼	183¼
Interborough Metropolitan Company (preferred).....	52¼	53
Interborough Metropolitan Company (4½s).....	79½	79½
Kansas City Railway & Light Company (common).....	a20	a19
Kansas City Railway & Light Company (preferred).....	a66	a25
Manhattan Railway.....	139	137½
Massachusetts Electric Companies (common).....	a19	a20¾
Massachusetts Electric Companies (preferred).....	a89	a89¾
Metropolitan West Side, Chicago (common).....	a24	24
Metropolitan West Side, Chicago (preferred).....	a69	a71
Metropolitan Street Railway, New York.....	*15	*15
Milwaukee Electric Railway & Light (preferred).....	110	*110
North American Company.....	73¾	76
Northern Ohio Light & Traction Company.....	a46	46
Northwestern Elevated Railroad (common).....	23	27
Northwestern Elevated Railroad (preferred).....	63	67
Philadelphia Company, Pittsburgh (common).....	a56¾	a57¼
Philadelphia Company, Pittsburgh (preferred).....	a43	a43¾
Philadelphia Rapid Transit Company.....	a18½	a18¾
Philadelphia Traction Company.....	a83	a83½
Public Service Corporation, 5% col. notes (1913).....	a100¾	a101
Public Service Corporation, ctf. s.....	a107	107
Seattle Electric Company (common).....	a109½	a108½
Seattle Electric Company (preferred).....	100	a100½
South Side Elevated Railroad (Chicago).....	a73	a75
Third Avenue Railroad, New York.....	11¼	12¾
Toledo Railways & Light Company.....	a8	a8
Twin City Rapid Transit, Minneapolis (common).....	a109	a110
Union Traction Company, Philadelphia.....	a47	a46½
United Rys. & Electric Company, Baltimore.....	a18¾	a18¾
United Rys. Inv. Co. (common).....	42	41½
United Rys. Inv. Co. (preferred).....	72¾	72
Washington Ry. & Electric Company (common).....	a34¾	a34¾
Washington Ry. & Electric Company (preferred).....	a87½	a90
West End Street Railway, Boston (common).....	a90	a91
West End Street Railway, Boston (preferred).....	a103½	a103½
Westinghouse Elec. & Mfg. Co.....	72¾	74
Westinghouse Elec. & Mfg. Co. (1st pref.).....	a117	117

a Asked. *Last sale.

Terms of Merger of Richmond, Portsmouth and Norfolk Properties

The terms of the agreement for the merger of the Virginia Railway & Power Company, Richmond, Va., and the Norfolk & Portsmouth Traction Company, Norfolk, Va., to which reference was made in the ELECTRIC RAILWAY JOURNAL of April 29, 1911, page 766, were made public on May 22, 1911. The merger is to go into effect on July 1, 1911, and on that day the corporate existence of the Norfolk & Portsmouth Traction Company is to terminate and all of its property be formally vested with the Virginia Railway & Power Company.

The Virginia Railway & Power Company as at present organized has outstanding \$12,150,500 par value of capital stock, of which \$4,700,000 is preferred and \$7,450,500 common stock. The Norfolk & Portsmouth Traction Company has outstanding \$6,000,000 par value of stock, of which \$3,000,000 is common stock and \$3,000,000 is preferred stock. The capital stock of the merged company is to be \$20,000,000, of which \$8,000,000 is to be preferred stock and \$12,000,000 common stock. Prior to Jan. 1, 1914, the preferred stock is to draw non-cumulative dividends of 5 per cent per annum and after Jan. 1, 1914, the preferred stock is to draw non-cumulative dividends at the rate of 6 per cent per annum.

The present \$4,700,000 of preferred stock of the Virginia Railway & Power Company and the present \$7,450,500 of common stock is to continue outstanding without change except that the certificates for the stock are to be exchanged for new certificates which are to state the capitalization of the merged company. The stock of the Norfolk & Portsmouth Traction Company is to be exchanged for the stock of the Virginia Railway & Power Company on the following basis: In exchange for the present \$3,000,000 of outstanding preferred stock of the Norfolk & Portsmouth Traction Company preferred stock of the Virginia Railway & Power Company is to be issued share for share. In exchange for the present \$3,000,000 of outstanding common stock of the Norfolk & Portsmouth Traction Company common stock of the Virginia Railway & Power Company to the amount of \$4,500,000 is to be issued on the basis of one and one-half shares of the stock of the Virginia Railway & Power Company for one share of the common stock of the Norfolk & Portsmouth Traction Company. The remaining 3000 shares of preferred stock of the Virginia Railway & Power Company and the 495 shares of common stock are to be disposed of at the discretion of the directors.

The board of directors of the company is to consist of fourteen directors and the principal officers of the company are to be a chairman of the board, a president, three vice-presidents, a general counsel, a secretary, a treasurer, two assistant secretaries and two assistant treasurers. The officers of the company are: Frank J. Gould, chairman of the board of directors; William Northrop, Richmond, president; Fritz Sitterding, Richmond, Henry W. Anderson, Richmond, and R. Lancaster Williams, Baltimore, vice-presidents; Henry W. Anderson, general counsel; Guy Phillips, New York, secretary and treasurer; George B. Williams, Richmond, assistant secretary and assistant treasurer; W. J. Kehl, Norfolk, assistant secretary and treasurer; Frank J. Gould, William Northrop, Fritz Sitterding, Henry W. Anderson, R. Lancaster Williams, Percy M. Chandler, Guy Phillips, Nathaniel A. Campbell, George H. Taylor, Frank O. Briggs, F. W. Roebing, Jr., Caldwell Hardy, Fergus Reid and James L. Sellman, directors.

Proposed Merger of New Orleans Railway & Light Company and the American Cities Railway & Light Company

An agreement has been entered into by a number of the large stockholders of the New Orleans Railway & Light Company and Bertron, Griscom & Jenks for the organization of a company to acquire at least two-thirds of the preferred and common stock of the New Orleans Railway & Light Company and the stocks of the following named companies now owned by the American Cities Railway & Light Company: Birmingham Railway, Light & Power Company; Memphis Street Railway, Little Rock Railway & Electric

Company, Knoxville Railway & Light Company, Houston Lighting & Power Company.

The plan set forth in this agreement contemplates that the new company will issue in payment for the preferred stock of the New Orleans Railway & Light Company its 6 per cent cumulative preferred stock and common stock at the rate of \$83 1/3 par value of its preferred stock and \$16 2/3 par value of its common stock for each share of preferred stock of the New Orleans Railway & Light Company, and at the rate of \$35 par value of its said preferred stock and \$25 par value of its common stock for each share of common stock of the New Orleans Railway & Light Company. Should all of the stockholders of the New Orleans Railway & Light Company deposit their stock under this agreement, which will require \$15,333,333 of 6 per cent cumulative preferred stock of the new company and \$6,666,666 par value of common stock of the new company, the new company will have outstanding capitalization as follows: \$10,000,000 eight-year collateral trust 5 per cent bonds, \$21,810,083 of 6 per cent cumulative preferred stock, and \$16,643,416 common stock.

The preferred and common stock issued over and above that reserved for exchange for the preferred and common stock of the New Orleans Railway & Light Company will be issued for the acquisition from the American Cities Railway & Light Company of the above-mentioned subsidiary companies, together with the sum of approximately \$1,500,000, to be used by the new company for working capital. The collateral trust bonds will bear the date July 1, 1911, or thereabouts, maturing eight years from date, and 25 per cent, or \$2,500,000, will be paid off at par at the expiration of five years from date of bonds by lot. The bonds will bear interest at 5 per cent for the first six years and 6 per cent for the seventh and eighth years, and will be secured by pledge of all stocks to be acquired by the new company. The bonds will be redeemable as a whole on any interest payment date at par and interest. The agreement is to be declared effective within forty-five days from May 15, 1911. Under this plan the present preferred stockholders of the New Orleans Railway & Light Company will receive the same dividend return and \$16 2/3 of common stock.

Ford, Bacon & Davis, New York, N. Y., who for a number of years have been in charge of the operation of the American Cities Railway & Light Company properties and who are familiar with the operations of the property of the New Orleans Railway & Light Company, will, it is understood, still continue their large interests in the new company with direct charge of its engineering and operation. The shares of stock of the New Orleans Railway & Light Company held in the United States are to be deposited on or before June 15, 1911, with the Hibernia Bank & Trust Company and the Whitney National Bank, of New Orleans, or at the office of the New York Trust Company, New York City.

Official statements in regard to the merger have been made by S. R. Bertron, of Bertron, Griscom & Jenks, who is a director of the New Orleans Railway & Light Company, and by J. K. Newman, New Orleans, La., who is president of the American Cities Railway & Light Company. Mr. Bertron said:

"It came to my attention through Ford, Bacon & Davis, engineers for the American Cities Railway & Light Company, that Isadore Newman & Son were considering, for private reasons, the sale of their holdings in the American Cities Railway & Light Company, provided a like opportunity should be offered to all other stockholders. Realizing the strength attained by a combination of a number of valuable non-competing properties of this character it occurred to me that it might be desirable to acquire the subsidiary companies owned by the American Cities Railway & Light Company for a merger of interests with the preferred and common stocks of the New Orleans Railway & Light Company. After extended negotiations we arrived at what seems a fair basis, and I came at once to New Orleans to discuss the situation further with the local interests."

Mr. Newman said:

"For reasons of a purely personal character my firm concluded that if a satisfactory offer was made we would dispose of our interest in the American Cities Railway & Light Company, provided the same offer was given to all the other stockholders. This has been known to our asso-

ciates, Ford, Bacon & Davis, who, however, desire to continue their investment in Southern street railway and light companies. They, with Bertron, Griscom & Jenks, conceived the idea of forming a holding company, which would acquire the assets of the American Cities Railway & Light Company and the stocks of the New Orleans Railway & Light Company. With this in view a plan is being prepared, and while no proposition has been made to the American Cities Railway & Light Company, it is the intention of the parties to make an offer, the terms of which have been tentatively discussed and meet with our preliminary approval as individual stockholders."

Elevated Railroad Merger in Chicago

Henry A. Blair returned to Chicago on May 20, 1911, and stated that he had completed arrangements whereby the National City Bank of New York had agreed to furnish the money needed in case his offer to the stockholders of the various elevated railroads is accepted.

It was expected that a meeting of the directors of the Metropolitan West Side Elevated Railway would be held on May 22, 1911, formally to receive Mr. Blair's offer, and a meeting of the directors of the South Side Elevated Railroad for a similar purpose on May 23, 1911. The terms for the Northwestern Elevated Railroad, which cover the loop which it owns, and the lines of the Chicago & Oak Park Elevated Company are acceptable, the promoters of the merger plan being largely stockholders of the Northwestern Elevated Railroad.

It is understood that the \$30,000,000 notes to be issued by the proposed holding corporation will bear 4 1/2 per cent. They are to run for three years, and have been underwritten by Harris, Forbes & Company. The proceeds of these notes will be used to refund the Northwestern Elevated Railroad's 4 per cent bonds when they fall due next September, and for other corporate purposes.

Citizens' Railway & Light Company, Ft. Worth, Tex.—John W. Davis has been appointed receiver of the Citizens' Railway & Light Company by Judge Buck in the Forty-eighth District Court at Ft. Worth, Tex., on application of the Arlington Heights Realty Company.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—John W. Coldsberry, supervising judge of the district at Columbus, Ohio, has denied the request of John G. Webb and others to replace E. B. Kinkead as receiver of the Columbus, Delaware & Marion Railway. Judge Babst, Marion, has not yet rendered a decision on the case before him as to the appointment of a receiver under an old petition filed in his court while another judge, now deceased, was presiding.

Kansas City Railway & Light Company, Kansas City, Mo.—The Kansas City Railway & Light Company has passed the quarterly dividend due on June 1, 1911, on its preferred stock. The last disbursement was 1 1/4 per cent. R. J. Dunham, chairman of the board of directors, said: "The dividend has not been passed because of reduced earnings, but because the company wishes to use its surplus earnings over and above interest charges for other corporate purposes, constructions, improvements, etc. The surplus earnings for the ten months ended March 31, 1911, over and above taxes and interest, were \$793,305.92, and this was after exceptionally large charges to operating expenses for maintenance, exceeding by \$207,000 the maintenance charges of the previous year."

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—John R. Graham, president of the Bangor Railway & Electric Company and the Lewiston, Augusta & Waterville Street Railway has concluded negotiations for the purchase of the property of the Freeport Light & Power Company, at Freeport, Me. The purchase carries with it the rights of the company which is operating in Freeport and Yarmouth, Me. It has been selling power to the Portland & Brunswick Street Railway, which was recently bought by the Lewiston, Augusta & Waterville Street Railway.

Meridian Light & Railway Company, Meridian, Miss.—Henry L. Doherty & Company, New York, N. Y., are offering at 91½ and interest the unsold part of \$150,000 of first mortgage, 5 per cent, 40-year gold bonds, part of the total issue of \$750,000, of which \$42,500 is sinking fund.

New York, New Haven & Hartford Railroad.—Francis T. Maxwell, Rockville, Conn., and Edward T. Milligan, Hartford, Conn., have been elected directors of the New York, New Haven & Hartford Railroad to succeed A. S. May and E. A. Clark, temporary members of the board.

Northern Electric Railway, Chico, Cal.—The Northern Electric Railway has authorized an issue of \$2,000,000 of 6 per cent gold notes to run for two or three years at the option of the company, as secured by pledge of first and consolidated 5 per cent gold bonds in 1907 and the personal guarantee of E. R. Lillenthal, E. J. de Sabla, Jr.; Louis Sloss and W. P. Hammon, who are stockholders of the company.

Ocean Shore Railway, San Francisco, Cal.—The Ocean Shore Railway, which was recently sold to the bondholders, is reported to have passed into the control of Speyer & Company, New York. According to the report the arrangement under which the change was made was completed by S. W. Reynolds, Boston, a representative of Speyer & Company. It is announced that the following improvements will be made: Construction of \$200,000 depot and terminus on Eleventh Street, between Market and Mission Streets; electrification of the system, work to begin as soon as possible; construction of new stations, switches and bridges along the line; extension of the line from Tunitas Glen, San Mateo County, the present southern terminus, to Santa Cruz; operation of four daily passenger trains from San Francisco and from Tunitas Glen, and two daily freight trains to and from this city.

Otsego & Herkimer Railroad, Oneonta, N. Y.—The Public Service Commission of the Second District of New York has authorized the Otsego & Herkimer Railroad to execute and issue a first mortgage upon all the property, rights and franchises of the corporation, to secure the payment of thirty-year 5 per cent bonds, to an aggregate amount hereafter to be determined. The company is authorized to issue its common capital stock to the amount of \$500,000 par value and its thirty-year 5 per cent bonds to the amount of \$400,000 par value, the proceeds to be used to pay and discharge a judgment now owned by the Trust Company of America, recovered by the Rochester Trust Company upon the foreclosure of certain receiver's certificates issued by the receiver of the Oneonta, Cooperstown & Richfield Springs Railroad, which judgment is a lien upon the railroad property; to pay a certain claim of the General Electric Company which is a lien upon the property, and to acquire from Joseph A. Starrett a railroad property now operated by the Otsego & Herkimer Railroad, purchased by Mr. Starrett on foreclosure sale, excepting, however, from the property so purchased by Mr. Starrett the power plant which has been transferred to the Hartwick Power Company. None of the stock and bonds is to be sold or otherwise disposed of at less than par, but may be used at the discretion of the board of directors in making payments of the judgment and liens with either stock or bonds. As stated in the ELECTRIC RAILWAY JOURNAL of May 20, 1911, page 893, the application of the company in this connection has been before the commission for two years owing to the principles involved.

Parkersburg & Ohio Valley Electric Railway, Parkersburg, W. Va.—In the United States Circuit Court at Parkersburg on May 17, 1911, Judge Dayton appointed C. L. Williams receiver of the Parkersburg & Ohio Valley Electric Railway, on motion of J. M. Jackson, who owns \$52,000 of first mortgage bonds of the company.

Philadelphia (Pa.) Railways.—The Philadelphia Railways has been incorporated with a capital stock of \$400,000 to succeed the Southwestern Street Railway, which was sold under foreclosure on April 21, 1911, as noted in the ELECTRIC RAILWAY JOURNAL of April 29, 1911, page 893. The officers of the Philadelphia Railways are: Isaac H. Silverman, president; Alvin W. From, secretary; Benjamin Wolfe, treasurer.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—Lee, Higginson & Company, Boston, Mass., who recently purchased \$150,000 of the first and

refunding mortgage 5 per cent bonds of the Terre Haute, Indianapolis & Eastern Traction Company, due April 1, 1915, are offering the issue for sale at 96 and interest. This makes \$6,300,000 of the issue outstanding.

Western Ohio Railroad, Lima, Ohio.—A statement has been issued by the managers of the first mortgage bond and pooling agreement, requesting holders of the bonds of the Western Ohio Railroad to extend the present deposit agreement, which expires on June 1, 1911, for another year, subject to all of the terms of the old agreement.

Winnipeg (Man.) Electric Railway.—A quarterly dividend of 3 per cent has been declared on the \$6,000,000 of stock of the Winnipeg Electric Railway. The dividend is payable July 1, 1911, and compares with 2½ per cent paid quarterly for several years past.

Dividends Declared

- Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1¼ per cent.
- Brooklyn (N. Y.) Union Elevated Railroad, 2½ per cent, preferred; 2½ per cent, common.
- Grand Rapids (Mich.) Railway, quarterly, 1 per cent, common.
- Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, ¾ of 1 per cent.
- Northern Texas Electric Company, Ft. Worth, Tex., quarterly, 1½ per cent, common.
- Pensacola (Fla.) Electric Company, 3 per cent, preferred.
- Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.
- Winnipeg (Man.) Electric Railway, quarterly, 3 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS
BROCKTON & PLYMOUTH STREET RAILWAY.

Period.	Gross Revenue.	Operating Expenses.	Net Revenue.	Fixed Charges.	Net Income.
1 m., Mar. '11	\$7,303	\$5,909	\$1,394	\$1,564	†\$170
1 " " '10	7,282	5,790	1,493	1,795	†302
12 " " '11	120,067	83,369	36,698	19,489	17,209
12 " " '10	130,144	94,121	36,023	20,822	15,201

CHATTANOOGA RAILWAY & LIGHT COMPANY.

1 m., Apr. '11	\$75,114	*\$43,042	\$32,072	\$20,012	\$12,060
1 " " '10	70,255	*41,806	28,449	18,180	10,269
4 " " '11	290,307	*167,844	122,463	77,836	44,627
4 " " '10	264,904	*161,748	103,156	72,136	31,020

EAST ST. LOUIS & SUBURBAN COMPANY.

1 m., Apr. '11	\$178,507	*\$106,155	\$72,352	\$45,433	\$26,919
1 " " '10	171,640	*100,943	70,697	45,151	25,546
4 " " '11	712,803	*413,419	299,384	181,724	117,660
4 " " '10	735,321	*409,794	325,527	180,702	144,825

GRAND RAPIDS RAILWAY.

1 m., Apr. '11	\$89,967	*\$54,348	\$35,619	\$15,038	\$20,581
1 " " '10	86,632	*48,732	37,900	14,913	22,987
4 " " '11	353,576	*202,754	147,822	60,326	87,496
4 " " '10	337,663	*189,848	147,815	61,015	86,800

JACKSONVILLE ELECTRIC COMPANY.

1 m., Mar. '11	\$51,901	\$28,376	\$23,524	\$10,450	\$13,074
1 " " '10	52,558	26,974	25,584	9,469	16,115
12 " " '11	584,592	319,494	265,098	116,039	149,059
12 " " '10	514,129	275,060	239,069	112,350	126,719

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY.

1 m., Apr. '11	\$38,736	*\$25,150	\$13,586	\$13,340	\$246
1 " " '10	37,883	*24,721	13,162	13,932	†770
10 " " '11	435,013	*276,699	158,314	131,665	26,649
10 " " '10	433,552	*257,402	176,150	145,045	31,105

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY.

1 m., Mar. '11	\$397,340	\$221,315	\$176,025	\$119,946	\$56,529
1 " " '10	377,004	206,141	170,862	111,626	59,236
3 " " '11	1,197,793	641,310	556,482	354,621	201,861
3 " " '10	1,117,684	614,078	503,605	329,487	174,118

MILWAUKEE, LIGHT, HEAT & TRACTION COMPANY.

1 m., Mar. '11	\$119,287	\$39,493	\$79,793	\$68,776	\$11,018
1 " " '10	117,000	34,829	82,171	67,483	14,688
3 " " '11	357,372	111,382	245,990	206,248	39,742
3 " " '10	339,664	102,779	236,885	201,654	35,231

PENSACOLA ELECTRIC COMPANY.

1 m., Mar. '11	\$22,841	\$13,986	\$8,855	\$6,085	\$2,771
1 " " '10	21,536	12,649	8,888	4,913	3,974
12 " " '11	278,677	163,685	114,992	64,074	50,918
12 " " '10	250,741	144,606	106,136	54,041	52,094

PORTLAND RAILWAY, LIGHT & POWER COMPANY.

1 m., Apr. '11	\$526,475	*\$246,045	\$280,430	\$121,231	\$159,199
1 " " '10	400,560	*207,119	233,441	113,589	119,852
4 " " '11	2,032,114	*998,015	1,034,099	491,506	542,593
4 " " '10	1,700,298	*811,216	889,082	448,044	441,038

PUGET SOUND ELECTRIC RAILWAY.

1 m., Mar. '11	\$142,669	\$105,414	\$37,255	\$51,777	†\$15,021
1 " " '10	157,779	125,178	32,601	50,607	†18,006
12 " " '11	1,898,978	1,251,647	647,330	610,610	36,720
12 " " '10	1,912,138	1,290,038	622,100	586,833	35,268

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY.

1 m., Apr. '11	\$84,700	*\$54,159	\$30,541	\$19,693	\$10,848
1 " " '10	77,990	*49,644	28,326	18,250	10,076
4 " " '11	346,542	*208,544	137,998	77,642	60,356
4 " " '10	329,028	*198,389	130,639	72,276	58,363

Traffic and Transportation

San Francisco's No-Seat-No-Fare Ordinance

The no-seat-no-fare ordinance introduced in the Council of San Francisco on April 24, 1911, by Supervisor Walsh and published in the *ELECTRIC RAILWAY JOURNAL* of May 13, 1911, page 856, came up for consideration recently before the Council. Thornwell Mullally, assistant to the president of the United Railroads, protested against the ordinance, and after considerable deliberation the matter went over for further consideration. During the discussion of the ordinance a recommendation was made by Supervisor Murdock that Bion J. Arnold should be engaged to report on street railway conditions in San Francisco with a special view to suggesting changes to alleviate the conditions which prompted Mr. Walsh to introduce his no-seat-no-fare measure. The members of the utility committee of the Council were favorably impressed with Mr. Murdock's resolution, and it was decided to inquire under what terms Mr. Arnold would prepare a report for the Council.

Mr. Mullally referred in his remarks to the unjustness, unreasonableness and consequent illegality of the proposed ordinance. He attempted to show, by citing individual cases, that the service would be hampered rather than improved by the passage of the measure, and that it would work a hardship and inconvenience alike upon the company and the traveling public. Mr. Mullally pointed out that the inconvenience of waiting for a car in which there was a vacant seat would be greater than that of standing in the first car that came along, and added that this imposition would deter many persons from visiting the city. In conclusion, he asked that the board defer action until such time as the company had been able to get all its new cars in operation.

Reduction in School Fares in Shreveport.—The Shreveport (La.) Traction Company has decided to reduce the fare over its lines to school children from 3 cents to 2½ cents.

Accidents in Pennsylvania in March.—Fifteen persons were killed on the street railways in Pennsylvania during March and 309 were injured. Of the number killed two were passengers and two were trespassers.

Indiana Road Considering Fare Increase.—The Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has under consideration a plan to increase its passenger rates from 1½ cents a mile to 2 cents a mile.

Takes Lease on Space for Interurban Station.—The Ohio Electric Railway has leased the east half of the ground floor of the new Peter E. Schwab Building, at Hamilton, Ohio, for an interurban station. The lease runs for five years from June 1, 1911.

Mail Service Extended on Evansville Line.—H. M. Swetnam, chief clerk of the Railway Mail Service, with headquarters at Louisville, Ky., is investigating the question of extending the "closed pouch" service on the Evansville (Ind.) Railways from Rockport to Grand View.

Increase in Wages in Berlin, Ont.—The Berlin & Waterloo Street Railway has increased the wages of its employees 1 cent an hour. The new schedule follows: First year, 15 cents per hour; second year, 17 cents; third year, 19 cents; fourth year, 20 cents.

Auto-Bus Line in Indianapolis.—A company has been organized in Indianapolis with a capital of \$150,000 to put in service an auto-bus line on Meridian Street in Indianapolis. The fare will be placed at 5 cents and the buses will compete with the Pennsylvania and Illinois Street lines of the Indianapolis Traction & Terminal Company. The cars will be run from 6:30 a. m. to 10:30 p. m. The president of the company is James Eaglesfield.

Through Service Between St. Joseph, Mich., and Goshen, Ind.—Through service has been established between St. Joseph, Mich., and Goshen, Ind., over the lines of the Southern Michigan Railway and the Northern Indiana Railway via South Bend. By extending the service to Peru over the Winona Interurban Railway and from Peru to Indianapolis over the lines of the Indiana Union Traction

Company a through route of 225 miles from Indianapolis to St. Joseph could be established.

Special Car from Louisville to Meeting of C. E. R. A.—A special car will probably be run through from Louisville, Ky., to St. Joseph, Mich., at the time of the annual convention of the Central Electric Railway Association, which officers of the Louisville & Southern Indiana Traction Company, Louisville & Northern Railway & Lighting Company and other companies plan to attend. M. J. Insull, president of the Louisville & Northern Railway & Light Company, and H. H. Buckman, master mechanic of that company, and chairman of the standardization committee of the association, plan to attend the meeting.

Toledo & Indiana Railway Employees Plead Guilty to Charge of Larceny.—Lawrence M. Fisher, assistant agent of the Toledo & Indiana Railway at Delta, Ohio; Harry Guthrie, H. A. McCormick and Walter Bush, conductors, were arrested in Toledo recently and taken to Wauseon for trial, where they entered a plea of guilty to the charge of larceny. Bush was fined the costs, but the others were each given a fine of \$100 and sentenced to serve three months in the Fulton County Jail. It is said that the conductors and the assistant agent had an understanding whereby uncanceled tickets were to be returned to the latter and sold again.

Car Rowdy Commits Murder.—To the history of previous cases of rowdiness on street cars with their record of serious maltreatment of employees and passengers there was added on the evening of May 17, 1911, in New York, a case which for open contempt alike of the rules of a street railway and of ordinances and statutes and in its appalling consequences was certainly very terrible. A colored man who was smoking a cigarette on the platform of a car on the Sixth Avenue elevated line of the Interborough Rapid Transit Company ran amuck when remonstrated with first by the conductor and then by a passenger for smoking, and killed two men and injured several persons, one a little girl.

Fare Changes of Western New York & Pennsylvania Traction Company.—The Western New York & Pennsylvania Traction Company, Olean, N. Y., has filed with the Public Service Commission of the Second District of New York, to become effective on June 7, 1911, the following changes in fare: Local one-way fare in both directions between Carrollton and Killbuck, 14 cents, an advance of 7 cents; local round-trip fare between Salamanca and Little Valley, 25 cents, a reduction of 31 cents. Ticket books containing seventy-five coupons of a face value of 7 cents each for local transportation will be sold for \$5 per book, a reduction of 25 cents, and ticket books containing fifteen coupons of a face value of 7 cents each will be sold for \$1 per book, a reduction of 5 cents.

Through Service to Be Established Between Cleveland and Detroit.—Arrangements have been completed by the Lake Shore Electric Railway and the Detroit United Railway for a through service between Cleveland and Detroit by way of Toledo. The tracks of the Detroit, Monroe & Toledo Short Line will be used between Detroit and Toledo and those of the Lake Shore Electric Railway between Toledo and Cleveland. Trains will stop at the Toledo union station, but there will be no change at that point. F. W. Coen, general manager of the Lake Shore Electric Railway, states that trains will be started from Cleveland every two hours. The running time between the terminals will be six hours.

Fare Action Against Westchester Street Railroad.—The Public Service Commission of the Second District of New York has directed its counsel to commence an action in the Supreme Court against the Westchester Street Railroad to prevent by mandamus or injunction the collection of a 10-cent fare for passengers riding on its cars in either direction between the Bronx River in White Plains and any point on its line in Mamaroneck, contrary to the terms of a franchise granted by Mamaroneck on Oct. 25, 1899, to the Tarrytown, White Plains & Mamaroneck Railway and accepted by the company. The obligation of the franchise has devolved upon the Westchester Street Railroad, which took title to and is operating a large part of the lines, property and equipment of the Tarrytown, White Plains & Mamaroneck Railway.

Checking Baggage on the Spokane & Inland Empire Railroad.—The traffic department of the Spokane & Inland Empire Railroad, Spokane, Wash., on May 22, 1911, instituted a system of checking baggage from hotels and residences in Spokane in connection with the Pacific Transfer Company to all points on the electric railway. The announcement of this service made the following statement: "When proper transportation is presented by passenger, either at terminal baggage room or to an agent of the Pacific Transfer Company, duplicate checks will be issued and baggage delivered at our station checked through to destination without further trouble to passenger. This business will be handled under baggage checks, form 'Special,' and excess charges will be covered by C. O. D. checks, to be collected at destination."

Buffalo & Lake Erie Traction Company Fares.—The Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has announced that hereafter it will sell books containing forty-six one-way coupons good for the transportation of pupils between the ages of five years and eighteen years attending school in both directions between Buffalo city line and local stations at the following rates per book: Angola, \$5.50; Athol Springs, \$3.15; Blasdell, \$2.40; Bay View, \$2.90; Clover Bank, \$3.50; Derby, \$4.75; Dunkirk, \$10; Franham, \$6.40; Hamburg-on-Lake, \$3.30; Idlewood, \$4.05; Irving, \$7; Lake View, \$4; North Evans, \$4.50; Silver Creek, \$7.60; Wanakah, \$3.50; Weyer, \$3.75. No school commutation fares have been in effect heretofore on the lines of the company. The coupons in the new books are for use on school days only and must be used forty-five days from the date of the sale.

Complaint About Fare on Rochester & Eastern Rapid Railway.—The Public Service Commission of the Second District of New York has received a complaint from residents of Pittsford, Monroe County, stating that in June, 1910, they addressed a request to the Rochester & Eastern Rapid Railway asking for the restoration of commutation rates on that road and that the company has not taken any action on such request. These rates were withdrawn about three years ago, and complainants claim that the present rates are in excess per mile of those charged commuters on any other road of its class entering Rochester. They also claim that the rate per mile charged by this company is practically the same for long distances as for shorter ones, whereas the other roads give a lower average rate per mile for longer distances. The commission has served the complaint upon the company.

Court Decision in Westwood Fare Case.—The full bench of the Massachusetts Supreme Court has held that the Selectmen of Westwood were entitled to a mandatory injunction against the Dedham & Franklin Street Railway, successor to the Norfolk Western Street Railway, to compel it to comply with the terms of an original grant of location in the town requiring a 5-cent fare for any trip within or from the town to Medfield or Dedham, the termini of the line. The location and terms were accepted before the general street railway statute as to the granting of locations, and the court holds that it is binding even though, with the increased fare in force, the old road has been constantly facing a deficit, though economically operated. The road changed from the 5-cent fare at first in January, 1908, when it charged two 5-cent fares between Westwood and either terminus. In March, 1909, it changed to 10 cents and in June of that year to 6 cents as the unit.

Report in Regard to Service Between Newark and Upper Montclair.—In the determination of a complaint filed by residents of Upper Montclair regarding the service furnished by the Public Service Railway on its Valley road line, the Board of Public Utility Commissioners of New Jersey has handed down a memorandum making several recommendations to the company for the betterment of the service. The board, however, found that it would not be feasible to carry into effect all the suggestions made by the complainants. The board was requested to ascertain if it would not be feasible for the company to run Valley road cars during the rush hours direct between Newark and the terminal point without change at intervals of not more than thirty minutes. Cars are run on a 10-minute schedule during rush hours and on 12 and 15-minute schedules when travel is lighter. In the judgment of the board the number of cars provided is reasonably adequate for present traffic.

Personal Mention

Mr. Richard Darrow has been appointed superintendent of transportation of the Iowa & Illinois Railway, Davenport, Ia.

Mr. J. A. Durham, formerly superintendent of transportation of the Denison & Sherman Railway, Denison, Tex., has been appointed superintendent of transportation of the Citizens' Railway, Waco, Tex.

Mr. Arthur G. Jack, who has been superintendent of the Southern Pennsylvania Traction Company, Chester, Pa., for a number of years, has been appointed general claim agent of the Wilmington & Philadelphia Traction Company.

Mr. S. W. Greenland has been appointed purchasing agent of the Ft. Wayne & Northern Indiana Traction Company, Ft. Wayne, Ind. For the last four years Mr. Greenland has been connected with the Columbus Railway, Light & Power Company, Columbus, Miss., as secretary, treasurer and general manager.

Prof. Henry C. Adams has resigned as head of the Bureau of Statistics and Accounts of the Interstate Commerce Commission, Washington, D. C. In his place the commission has appointed Mr. Charles A. Lutz, now chief examiner of accounts, to take charge of the work in the division of carriers accounts, and Mr. William J. Meyers, now statistician, to take charge of the division of statistics.

Mr. F. J. De Lisle has been appointed superintendent of the interurban lines of the East St. Louis & Suburban Railway, East St. Louis, Ill., and the Alton, Granite & St. Louis Traction Company, the interurban lines of these companies having been consolidated with headquarters at Granite City. Mr. De Lisle has as his assistants Mr. Edward Johnson and Mr. F. A. Campbell, both of whom were connected with the lines which have been merged.

Mr. A. P. Lewis, for the last four years assistant engineer of the Chicago (Ill.) City Railway, has been appointed superintendent of power and shops of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, effective on June 1, 1911. Mr. Lewis was graduated from South Carolina Agricultural and Mechanical College, Clemson, S. C., in 1900 and for one year was in charge of the electrical laboratory and lighting and power plant of the college. In 1902 he became connected with the test department of the General Electric Company at Schenectady, N. Y., and in 1903 was engaged on construction work for the company. From 1904 to 1907 he was connected with the engineering department at the Chicago offices of the General Electric Company. In the fall of 1907 he resigned to join the engineering staff of the Chicago City Railway as an assistant engineer and since that time during the rehabilitation period he has been engaged in erecting substations and other power work of this company.

Mr. C. A. Cahill, whose appointment as chief engineer of power plants of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to succeed Mr. C. J. Davidson, resigned, was announced in the *ELECTRIC RAILWAY JOURNAL* of May 20, 1911, was born in New Hampshire and educated in the common schools and high schools in New England. He served an apprenticeship with a firm in Providence, R. I., to become a machinist, and after completing his work with this company he went West, where he served various engine builders. Mr. Cahill entered upon his street railway career on March 15, 1898, as chief engineer of the Sioux City (Ia.) Traction Company. He became connected with the Milwaukee Electric Railway & Light Company in November, 1900, as assistant chief engineer of power plants, and has been connected with the company continuously since that time, his work extending to the operation and construction of the various power plants and substations of the company.

Mr. John H. Sullivan, manager of the Memphis Demurrage & Storage Association, has been elected president of the Lake View Traction Company, Memphis, Tenn., to succeed Mr. R. F. Tate. Mr. Sullivan was born in Ireland in 1848, and entered railway work in 1862. He has served successively with the Hannibal & St. Joseph Railroad as clerk and chief clerk, as superintendent of the Minneapolis

& Dakota division of the Northern Pacific Railroad; superintendent of the Missouri, Kansas & Texas Railway; superintendent of the Northern Division of the St. Paul, Minneapolis & Manitoba Railway; superintendent of transportation of the Northern Pacific Railway; superintendent of the Arkansas Division of the Kansas City, Springfield & Memphis Railway, and from September, 1886, to December 1, 1900, he was superintendent of the Kansas City, Memphis & Birmingham Railway and the Eastern Division of the Kansas City, Fort Scott & Memphis Railway. In June, 1904, he was appointed manager of the Memphis Car Service Association.

Mr. J. N. Shannahan, vice-president and general manager of the Washington, Baltimore & Annapolis Electric Railway, has resigned from that position to take effect July 1, when he will assume the duties of railway manager of the operating department of J. G. White & Company, Inc., New York. Mr. Shannahan has achieved an enviable reputation as railway manager and has also taken a prominent part in association activities during his connection with electric railway work. He is a native of Troy, N. Y., where he was born in 1872. He was graduated from the Rensselaer Polytechnic Institute in 1894 as civil engineer. After a short connection with the Watervliet Arsenal of the government he entered the service of the New York Central & Hudson River Railroad in the signal department, and on July 1, 1895, was appointed inspector of signals on the western division of that company. In 1899 he accepted the position of chief engineer of the Fonda, Johnstown & Gloversville Railroad and in 1903 was made general superintendent of the company, with jurisdiction over the company's steam and electric properties. At the same time he was general manager of the Edison Electric Light & Power Company at Amsterdam, N. Y. In 1904 he was also elected president of the Adirondack Lakes Traction Company. On July 1, 1907, he severed all of these business connections to become vice-president and general manager of the Washington, Baltimore & Annapolis Electric Railway. While connected with the New York State properties Mr. Shannahan was elected president of the Street Railway Association of the State of New York and occupied this office during the year 1906-1907. During the years of 1907-08 and 1908-09 he served as chairman of the committee on interurban rules of the American Electric Railway Transportation & Traffic Association, and at the last annual meeting was elected first vice-president of that organization.

OBITUARY

Ralph Cranmer, a designing engineer with the Public Service Commission for the First District of New York, died on May 18, 1911. Mr. Cranmer was born in Tuckerton, N. J., on July 27, 1866. He was graduated from Lafayette College with the degree of C. E., in June, 1888. He was one of the first men appointed to the designing department of the Rapid Transit Commission, and when the Public Service Commission began work in July, 1907, he entered its employ as assistant engineer. Last year he was appointed designing engineer. Mr. Cranmer did a great deal of work on the plans for the new subways.

The Public Service Social Club of the Passaic Division of the Public Service Railway expressed appreciation of their veteran superintendent, George Stone, who has just recovered from a severe illness, by tendering him a very sumptuous dinner at Crawford's in Paterson, N. J., on the evening of May 10. Nearly 150 men representing all departments, but mostly composed of motormen and conductors, were in attendance. One of the features of the affair was the presentation of a handsome floral horseshoe to Mr. Stone. Messrs. Bolen, Brown, Graham and Baurhenn represented the general railway offices, while Colonel Rogers and Theodore Bunker represented the gas and electric department. The Trainmen's Social Club of Public Service Railway, gave a smoker at the Camden headquarters on May 12, which was attended by nearly 300 employees. Several good acts of vaudeville together with musical numbers comprised the program. Messrs. Bolen, Brown and Bailey made speeches, as did also several of the employees of the company who have long been in its service.

Construction News

Construction News Notes are classified under each head-alphabetically by States.

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

RECENT INCORPORATIONS

Moodus & East Hampton Electric Railroad, Moodus, Conn.—Incorporated in Connecticut to build an electric railway to connect Moodus, East Hampton and Marlboro Mills. E. W. Crocker, Moodus, is interested. [E. R. J., Jan. 14, '11.]

***Interurban Construction Company, Hastings, Minn.**—Incorporated in Minnesota to build an electric railway from the Twin Cities to Lake City. Capital stock, \$100,000. Incorporators: A. T. Stebins, Rochester; Albert Schaller, Hastings, and Edward Feldhauser, St. Paul.

***Manhattan Bridge Service Company, Albany, N. Y.**—Incorporated in New York to build a 2-mile electric railway from Manhattan Plaza to Fulton Street and Flatbush Avenue extension in Albany. Capital stock, \$25,000.

Willamette & Molalla Valley Railway, Canby, Ore.—Incorporated in Oregon to build a 12½-mile electric railway from the Willamette River up the Molalla Valley to Canby. Capital stock, \$250,000. W. J. Lee, Canby, general manager. [E. R. J., May 6, '11.]

***Philadelphia Railways, Philadelphia, Pa.**—Chartered in Pennsylvania to succeed the Southwestern Street Railway, which was sold under foreclosure on April 21, 1911, as noted in the ELECTRIC RAILWAY JOURNAL of April 29, 1911. Capital stock, \$400,000. Officers: Isaac H. Silverman, president; Benjamin Wolf, treasurer, and Alvin W. From, secretary. Headquarters: 605 Land Title Building, Philadelphia.

***Mineral Heights Traction Company, Greenville, Tex.**—Incorporated in Texas to build an electric railway from Mineral Heights to Greenville, a distance of 2 miles, to connect with the electric railways in Greenville. Work has been begun securing right-of-way. Capital stock, \$17,500. Officers: A. R. Nicholson, president; J. E. Morris, vice-president; J. W. Castleberry, secretary, and A. W. DeFee, treasurer.

***Henrico & Chesterfield Railroad, Richmond, Va.**—Chartered in Virginia to build a 6-mile electric railway from Ridge Church, Henrico County, to Bon Air, Chesterfield County, and cross the Southampton Bridge at the Country Club. Maximum capital stock authorized, \$50,000. Minimum capital stock authorized, \$20,000. Officers: Thomas S. Winston, president; W. O. Burton, vice-president; William C. Schmidt, secretary and treasurer; George Bryan, John B. Badenoch and M. G. Wright, all of Richmond. Headquarters, Richmond.

FRANCHISES

Gadsden, Ala.—The Tidewater Development Company has received from the City Council a franchise to build its railway over certain streets in Gadsden. The line is to extend between Gadsden and Birmingham.

Chico, Cal.—The Northern Electric Railway has received a fifty-year franchise from the Board of City Trustees to build a double-track line over Main Street its entire length within the city limits.

Riverside, Cal.—The Pacific Electric Railway, Los Angeles, has asked the City Council for a franchise to build its tracks over the right-of-way for the Magnolia Avenue extension in Riverside.

Oak Park, Ill.—The Chicago & Oak Park Elevated Railroad, Chicago, has received a franchise from the Village Council to build its tracks north and south through Oak Park.

***Keokuk, Ia.**—The Stone & Webster Company has asked the Council for an electric railway franchise in Keokuk.

***Perry, Ia.**—C. D. Jones and associates have asked the Council for a franchise for an electric railway in Perry.

Shelbyville, Ky.—The Louisville & Interurban Railway has received a ninety-nine-year franchise from the Board of Directors to build its tracks over certain streets in Shelbyville.

Sioux City, Ia.—The Sioux City, Crystal Lake & Homer Railway, Sioux City, has asked the City Council for another franchise to extend its railway through Sioux City.

Houghton, Mich.—The Houghton County Traction Company has received a franchise from the Common Council to improve its tracks on Quincy Street, in Houghton.

Asheville, N. C.—The Asheville Electric Company has asked the Board of Aldermen for a franchise to extend its lines in Asheville.

Amityville, N. Y.—The Babylon Railroad, a subsidiary line of the South Shore Traction Company, has asked the Board of Trustees for a new franchise to operate its railway through Green Street in Amityville.

Corning, N. Y.—The Corning & Painted Post Street Railway, Corning, will ask the Common Council for a franchise to extend its tracks in Corning to North Corning.

Irwin, Pa.—The Westmoreland County Railway, Pittsburgh, has asked the City Council for a franchise to build its tracks over certain streets in Irwin. The company's line now ends at the foot of Pennsylvania Avenue. If given the franchise the company will build an iron bridge across the ravine at a cost of \$20,000. It is expected to extend this line to North Irwin.

Pittsburgh, Pa.—The Pittsburgh Railways has received several franchises from the City Council to extend its tracks on Diamond Street from Smithfield to Wood Street, and to connect its tracks near the end of Butler Street with the tracks on Aspinwall Bridge in Pittsburgh.

Cleburne, Tex.—The Cleburne Street Railway has received a franchise from the City Council to build its tracks on North Main Street, in Cleburne.

Cleburne, Tex.—The Ft. Worth, Cleburne & Dallas Railway has received a franchise from the City Council to build its tracks on Collinson Street and North Main Street, in Cleburne. H. M. Hyatt, Kansas City, Mo., is interested. [E. R. J., Aug. 7, '09.]

Centerville, Utah.—The Utah Light & Railway Company, Salt Lake City, has received a franchise from the County Commissioners to build its tracks from North Salt Lake City through Bountiful to Centerville.

Blaine, Wash.—The Nooksack Valley Traction Company, Bellingham, has asked the City Council for a railway franchise through Blaine. It will connect Bellingham, Sumas, Ferndale, Lyden and Blaine. [E. R. J., April 22, '11.]

Olympia, Wash.—The Olympia Light & Power Company has received a fifty-year franchise from the Council to extend its tracks in the western part of Olympia.

Seattle, Wash.—George W. White and associates have received a fifty-year franchise from the County Commissioners to build a 4-mile line from Seattle to Lake Burien. [E. R. J., April 1, '11.]

Milwaukee, Wis.—The Milwaukee Electric Railway & Light Company has asked the Common Council for a franchise to build a crosstown line on one of the streets from Seventeenth Street to Twenty-first Street, in Milwaukee.

TRACK AND ROADWAY

Alberta Electric Railway, Calgary, Alta.—A bill has passed through the Provincial Parliament granting a charter to this company, which was recently chartered by the Dominion Parliament. Work will be begun at once on the line which is to connect Banff, Medicine Hat, Lethbridge and Calgary. The first section to be built will be from Calgary to Banff. [E. R. J., April 8, '11.]

Little Rock Railway & Electric Company, Little Rock, Ark.—This company is now reconstructing and paving two miles of track, using Lorain Steel Company's section 72-331, in Little Rock.

***Sierra County Railroad, Sacramento, Cal.**—A company has been formed to insure the construction of this proposed railway to connect the towns of Sierra, Wyandotte, Bangor and Nord.

Northern Electric Railway, San Francisco, Cal.—This company advises that its joint railway and highway bridge across the Sacramento River at M Street in Sacramento connecting counties of Sacramento and Yolo is nearing

completion. The contract for electrical machinery has been awarded to the Westinghouse Electric & Manufacturing Company, and the erection contract has been awarded to the Duncanson Harelson Construction Company, Chronical Building, San Francisco. The American Bridge Company has the contract for the steel work and the foundation work is being done by the Missouri Valley Bridge & Iron Company.

Colorado Interurban Railroad, Denver, Col.—At a meeting of the directors of this company on May 13 a \$6,000,000 bond issue was authorized. The company was recently incorporated with \$6,000,000 to build an electric railway from Denver to Greeley with a branch from Fort Lupton to Longmont and ultimately to Estes Park. Construction will begin within ninety days. Officers: Irving Hale, president; Eben N. Reaser, first vice-president; D. E. Young, second vice-president; O. L. Storrs, secretary; E. E. Armour, treasurer, and Charles H. Pierce, general counsel. [E. R. J., May 13, 1911.]

Belleville & Western Railway, Belleville, Ill.—This company advises that it has completed grading and bridging about 7 miles of its line to connect Millstadt, Smithton, Hecker and Red Bend. It expects to extend this railway to Murphysboro, a distance of 70 miles. The company will furnish power for lighting purposes. Capital stock authorized, \$2,500. Capital stock issued, \$2,500. Officers: B. A. Gundlack, Belleville, president and general manager; John D. Vogt, Belleville, vice-president; Victor J. Adams, Coulterville, secretary, and T. W. Hofsemmer, Belleville, treasurer. [E. R. J., March 4, '11.]

Carmi-Fairfield Traction Company, Burnt Prairie, Ill.—This company advises that construction will begin when it has financed its proposition to build its proposed 25-mile electric railway to connect Carmi, Burnt Prairie and Fairfield. Its power house and repair shops will be located at Burnt Prairie. The company will furnish power for lighting purposes. Officers: G. H. Brown, Burnt Prairie, president; J. R. Morrison, Burnt Prairie, vice-president; J. A. Vaughan, Burnt Prairie, secretary, and Mark Wymond, 114 East St. Louis, Chicago, Ill., chief engineer. [E. R. J., Sept. 25, '10.]

Chicago (Ill.) Railways.—The Lorain Steel Company has been awarded the contract for 10,000 tons of girder rails. The contract for 5000 tons of girder rails has been let to the Pennsylvania Steel Company.

Metropolitan West Side Elevated Railway, Chicago, Ill.—A double-track surface extension of the Garfield Park line of this road will be built over the 100-ft. right of way of the Aurora, Elgin & Chicago Railway from Fifty-second Avenue to Desplaines Avenue near the western city limits of Chicago. Joint service by these two roads is now operated over the double-track line of the Aurora, Elgin & Chicago, but two more tracks will be built at once on the same right of way. This connection will require 7 miles of new track, which will be laid with 80-lb. rails and be built for heavy, fast service under third-rail operation. The new work will also require the construction of three new stations, which will be of the island platform type, and the remodeling of several other stations. On completion of the two new tracks the Metropolitan will occupy the two to the north and the Aurora, Elgin & Chicago the two to the south. These tracks, as now, will be fed from the west end by the Aurora, Elgin & Chicago substation at Maywood and from the east end by the Metropolitan rotary-converter and battery station at Forty-sixth Avenue. It is quite probable that the Metropolitan will install 2,000,000 circ.-mil. additional feeder capacity from Forty-sixth Avenue to connect with the working conductor of the new line.

Illinois Light & Traction Company, Streator, Ill.—This company will rebuild about 5 miles of its track in the city of Streator.

Toledo, Defiance & Ft. Wayne Electric Railway, Ft. Wayne, Ind.—This company has begun grading for its proposed electric railway to connect Ft. Wayne, Defiance, Harlan, Hicksville, Maysville and Bryan, Ohio. Five bridges have been constructed and five more will be built. Elmer Zeist, Philadelphia, has the contract for building the large bridges. It is said that financial backing has been secured.

When completed this railway will give a direct interurban line between Ft. Wayne and Cleveland and Sandusky, Ohio.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—Plans are being considered by this company for an extension from Clinton to Fairview Park. It is believed that the line will be built this year.

Southeastern Interurban Railway, Vincennes, Ind.—It is reported that plans are being made by this company for building an electric railway from Vincennes to Jasper and ultimately to West Baden. George B. Hazleton, Vincennes, president. [E. R. J., April 8, '11.]

Louisville (Ky.) Railway.—This company has been conferring with the engineers of Louisville and representatives of a steam line in Louisville with reference to the construction of viaducts or underpasses at Market Street, Bank Street and Portland Avenue where those streets, which carry car lines, are crossed by the Kentucky & Indiana Terminal Railroad, a belt line. The Board of Public Works, Louisville, is endeavoring to eliminate as many grade crossings as possible, and the officials of the roads interested have intimated that they are willing to make the necessary expenditures. The cost of the work outlined will be about \$400,000.

Western Kentucky Electric Railways, Owensboro, Ky.—This company has been organized with a capital of \$2,000,000 to build an electric railway to connect Owensboro, Madison, Calhoun, Utica and Henderson. This means that a line from Evansville to Henderson across the river will be constructed. About \$25,000 of stock has been subscribed and this will be used in having surveys and estimates made. E. F. Wheaton, Owensboro, is interested. [E. R. J., May 13, '11.]

Frederick (Md.) Railroad.—This company has applied to the Public Service Commission for authority to issue \$156,000 of 5 per cent bonds to make improvements and extensions.

***Bath, Me.**—Plans are being considered by citizens of Bath for the construction of an electric railway from Bath to Popham Beach, a distance of 12 miles, to connect at Bath with the Lewiston, Augusta & Waterville Railway and afford a direct electric line access to the ocean from Bath, Brunswick, Lisbon, Lewiston and Auburn.

Aroostook Valley Railroad Company, Presque Isle, Me.—It is announced that construction will begin on the branch of this railway to Caribou as soon as the charter granted by the Legislature becomes effective, which will be June 29.

Minneapolis Northern Suburban Railway, Minneapolis, Minn.—At a recent meeting \$30,000 of stock was subscribed by the citizens of Amoka, and work will be begun soon constructing this line to connect Minneapolis, Amoka, Onaway, Fridley and Little Falls. W. J. Whitcomb, Minneapolis, president, and H. A. Pathey, Minneapolis, vice-president. [E. R. J., May 20, '11.]

East St. Louis, Columbia & Waterloo Railway, St. Louis, Mo.—This company advises that 3000 ft. of track has been constructed in East St. Louis, but owing to complications concerning right-of-way there is an indefinite delay in the work. The line will be 22 miles long and will connect St. Louis, East St. Louis, Columbia, Dupo, Prairie du Pont, Bixley and Waterloo. The power will be purchased from the East St. Louis & Suburban Railway. Headquarters: 610 Laeclde Building, St. Louis, Mo. Capital stock authorized, \$750,000; capital stock issued, \$10,000; bonds authorized, \$750,000. Officers: E. H. Courades, 314 Fourth Street, St. Louis, president; E. F. Schoenig, Columbia, Ill., vice-president; W. F. Gould, secretary; G. C. Boyne, treasurer, and Baxter L. Brown, 610 Laeclde Building, St. Louis, Mo., chief engineer. [E. R. J., Jan. 8, '10.]

Jersey Central Traction Company, Keyport, N. J.—Plans are being considered by this company for building an extension from Red Bank to Long Branch via Little Silver, Port-au-Peck and Branchport.

Corning & Painted Post Street Railway, Corning, N. Y.—This company plans to spend about \$400,000 in the near future on improvements to its line. The tracks will be extended in Corning, and Main Street will be double tracked.

Elmira Water, Light & Railroad Company, Elmira, N. Y.

—This company will rebuild 1 mile of track in Watkins and Montour Falls, replacing 60-lb. rails with 75-lb. rails, during the next few weeks.

Hornell (N. Y.) Traction Company.—This company will rebuild several of its lines in Hornell.

Rochester (N. Y.) Traction Company.—The Carnegie Steel Company has sold to this company about 20,000 steel ties.

Geneva & Auburn Railway, Seneca Falls, N. Y.—About \$45,000 will be spent by this company extending its tracks and reconstructing some of its lines with 80-lb. rails in Seneca Falls. Work has been begun.

Fargo & Moorland Street Railway, Fargo, N. D.—This company will place contracts during the next four weeks for building a steel lift bridge 60 ft. long with approaches 150 ft. x 400 ft. Plans will be ready about June 1.

Grand Forks (N. D.) Street Railway.—During the next five weeks this company will award contracts for building about a mile of new track in Grand Forks. J. Roycraft, general manager.

Cleveland (Ohio) Electric Railways.—The Carnegie Steel Company has received an order from this company for 20,000 steel ties.

Columbus (Ohio) Traction Company.—This company has ordered 20,000 steel ties from the Carnegie Steel Company.

Sand Springs Interurban Railway, Tulsa, Okla.—It is reported that this company has completed and placed in operation its 6-mile electric railway from Sand Springs to Tulsa. Right of way has been secured and work will begin immediately on an extension to Collinsville to connect with the Missouri Pacific's Iron Mountain division. Charles Page, president. [E. R. J., May 13, '11.]

Lehigh Valley Transit Company, Allentown, Pa.—Construction has been begun by this company on its 2½-mile extension to Perkasio. Three large bridges will be built, a trestle from Perkasio Park and a tunnel for cars only under the railroad at about Walnut Street, Perkasio.

Cleveland & Erie Railway, Girard, Pa.—This company is ballasting with gravel 6 miles of its track between Erie city limits and Swanville.

***Myton, Utah.**—Plans are being considered for building an 80-mile electric railway to connect Colton, Theodore, Myton and Roosevelt.

Utah Light & Railway Company, Salt Lake City, Utah.—Work has been begun by this company on an extension of its West Temple Street line in Salt Lake City.

Buckhannon, Weston & Glenville Electric Railway, Buckhannon, Va.—This company advises that it is only partially organized. Surveys have not yet been made. The following officers have been elected: L. H. Morrison, president; J. G. Hall, vice-president, and Harvey Gaston, secretary. [E. R. J., Sept. 17, '10.]

Chehalis & Cowlitz Railroad, Chehalis, Wash.—This company advises that it will build this year about 20 miles of its railway to extend through farming, timber and coal territory south and east of Chehalis. The company is yet undecided as to the use of electricity or steam as motive power. It will purchase power if electricity is used. Capital stock, authorized, \$300,000. Bonds, authorized, \$300,000. Officers: H. C. Coffman, Chehalis, president and secretary; George A. Robinson, vice-president, and R. F. Smithwick, chief engineer. [E. R. J., May 13, '11.]

Washington-Oregon Corporation, Vancouver, Wash.—This company has just placed an order for approximately 75 tons of steel to be used in Vancouver on Main Street from Twelfth Street to Twenty-sixth Street, which is to be improved by bitulithic pavement.

Chicago & Wisconsin Valley Railroad, Madison, Wis.—Plans are being considered by this company for an extension to Rothschild. Allen T. Russell, Chicago, general manager. [E. R. J., Feb. 11, '11.]

Wausau (Wis.) Street Railway.—Over \$50,000 will be expended by this company during the summer in improvements. Among the disbursements will be the double-tracking of Main Street in Wausau, building a large loop and erecting a new amusement pavilion at Rothschild.

SHOPS AND BUILDINGS

Oakland, Antioch & Eastern Railway, Oakland, Cal.—It is said that this company plans to purchase property at Fortieth Avenue and Shafter Avenue, in Oakland, on which it will build a terminal depot.

Vallejo & Northern Railway, Vallejo, Cal.—This company is considering plans to build a depot and warehouses in Vallejo.

Connecticut Company, New Haven, Conn.—This company has completed and placed in service its new carhouse on King's Avenue, in Middletown.

Metropolitan West Side Elevated Railway, Chicago, Ill.—This company is considering plans for the construction of three new stations which will be of the island platform type, and the remodeling of several other stations in Chicago.

Ft. Wayne & Northern Indiana Traction Company, Ft. Wayne, Ind.—This company will build a new car house at once in Ft. Wayne. Other improvements are being planned on which work is to be begun soon.

Tri-City Railway & Light Company, Davenport, Ia.—It is reported that this company will begin at once the construction of its new carhouse and repair shops on Fifth Avenue and Thirty-sixth Street, in Davenport.

Ft. Dodge, Des Moines & Southern Railroad, Ft. Dodge, Ia.—It is reported that this company will soon build a new interurban station in Ft. Dodge.

Vicksburg (Miss.) Traction Company.—This company is now building a new carhouse east of the old one in Vicksburg.

Grand Forks (N. D.) Street Railway.—During the next five weeks this company expects to build a new carhouse in Grand Forks.

Electric Package Company, Cleveland, Ohio.—Willard Hirsh, architect, has awarded a contract for the construction of a new reinforced concrete and brick building for this company to the George B. McMillan Company. The building will be located just east of the present depot and will be 287 ft. long. The basement will be used for the accommodation of express and auto truck delivery and approach being made from either end of the building. It is to be completed within three months.

POWER HOUSES AND SUBSTATIONS

Little Rock Railway & Electric Company, Little Rock, Ark.—This company expects to install during the next few weeks a new intake and condensing system. D. A. Hegarty, Little Rock, general manager.

Connecticut Company, New Haven, Conn.—Work has been begun by this company on 39-ft. additions to its Buckland and Rockville substations, and as soon as the necessary machinery is installed the power for both the local and interurban lines will be furnished by the Commerce Street power house in Hartford. A 300-kw converter will be placed in the addition to the Buckland substation, while a 400-kw turbine has already been set up in the Commerce Street power house.

Interborough Rapid Transit Company, New York, N. Y.—This company has purchased the entire block bounded by 147th Street and 148th Street, Lenox Avenue and the Harlem River, in New York. This site abuts the property already belonging to this company, where its power house and yards for the storage of cars are located.

Washington Water Power Company, Spokane, Wash.—This company has ordered from the General Electric Company two three-phase generators of the horizontal type with a capacity of 13,000 kva. Four of these generators will eventually be installed at this plant. They are to be driven by I. P. Morris horizontal twin turbines, operating under a head of 170 ft.

Washington-Oregon Corporation, Vancouver, Wash.—This company has purchased one 400-kw motor generator set from the Westinghouse Electric & Manufacturing Company, and three 200-kw transformers, 11,000-2300-volt, from the General Electric Company.

Sheboygan Light, Power & Railway Company, Sheboygan, Wis.—The contract for furnishing and installing a 1500-hp turbine for this company has been awarded to General Electric Company.

Manufactures & Supplies

ROLLING STOCK

Grand Forks (N. D.) Street Railway is considering the purchase of two cars.

Maysville (Ky.) Public Service Company is said to be in the market for several convertible cars.

Tide Water Power Company, Wilmington, N. C., has built three 50-ft. suburban cars at its shops.

Pensacola (Fla.) Electric Company expects to purchase soon four single-truck, double-end, semi-convertible cars.

Columbia Railway, Gas & Electric Company, Columbia, S. C., will order six cars through J. G. White & Company, New York, N. Y.

Jersey Central Traction Company, Keyport, N. J., has ordered ten No. 27-G-E-I trucks, without wheels, from The J. G. Brill Company.

Memphis (Tenn.) Street Railway has ordered two 4000-gal. pneumatic sprinklers from the McGuire-Cummings Manufacturing Company.

Public Service Railway, Newark, N. J., has ordered two Simplex self-clearing trail dump cars from the Simplex Self-Clearing Car Company.

Boston (Mass.) Elevated Railway has ordered forty double Westinghouse-300 motor equipments for the subway cars now being built by the Standard Steel Car Company.

Walla Walla (Wash.) Valley Railway has ordered two Brill 27-EI trucks with rolled-steel wheels and four Brill 27-GI trucks without wheels from the Danville Car Company.

Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich., has placed an order for two double-truck cars with the McGuire-Cummings Manufacturing Company.

New York, New Haven & Hartford Railroad, New Haven, Conn., is reported to have ordered fifteen electric locomotives from the Westinghouse Electric & Manufacturing Company.

Sand Spring Interurban Railway, Tulsa, Okla., has just received a 70-ft. gasoline motor car from the McKeen Motor Car Company, and has ordered a second car of the same type.

Chicago, Aurora & DeKalb Railroad, Aurora, Ill., has purchased one express and baggage car from the McGuire-Cummings Manufacturing Company, equipped with Allis-Chalmers motors and Taylor triple M.C.B. electric trucks.

British Columbia Electric Railway, Vancouver, B. C., has ordered from the Westinghouse Electric & Manufacturing Company two 45-ton locomotives with quadruple equipments of No. 301 interpole railway motors and automatic unit switch control.

Oakland (Cal.) Traction Company has specified the following details for the sixty California-type, double-end open and closed prepayment cars being built by the St. Louis Car Company:

Seating capacity	48	Car trimmings	bronze
Weight (car body) ..	16,000 lb.	Control	double G.E.-K36
Bolster centers, length ..	23 ft.	Curtain fixtures ...	C. S. Co.
Length of body	35 ft. 2 in.	Curtain material ..	Pansasote
Over vestibule	47 ft. 6 in.	Fenders	Eclipse
Width over sills	8 ft. 10 in.	Gears and pinions	G.E.
Over all	9 ft. 1½ in.	Gongs	New Departure
Height, rail to sills	30 in.	Hand brakes	St. L.
Sill to trolley base ..	9 ft. 3 in.	Headlights	Mosher
Body	wood	Journal boxes	Brill
Interior trim	mahogany	Motors	G.E. 210-E2
Headlining	3-ply mahogany	Paint	Lowe, S.-W. P.
Roof	turtle back	Registers	Ohmer
Air brakes	G.E.	Sanders	St. L.
Axles	Brill	Trucks	Brill 39-E
Bumpers	8-in. channel	Ventilators	Star
Cables	G.E.	Wheels	21 in. & 33 in.

Ohio Electric Railway, Cincinnati, Ohio, which was noted in the ELECTRIC RAILWAY JOURNAL of March 11, 1911, as having ordered nine combination passenger, smoking and

baggage cars from the Cincinnati Car Company, has specified the following details for these cars:

Seating capacity.....58	Couplers	Tomlinson
Bolster centers....38 ft. 6 in.	Curtain fix...Forsythe No. 88	
Length of body...60 ft. 2 in.	Curtain material...Pantasote	
Width over sills...8 ft. 8½ in.	Fenders.....loco. pilot	
Over all	Gongs...two 14-in. foot gongs	
Height, rail to sills....45 in.	Hand brakes	Peacock
Sill to trolley base...9 ft. 6 in.	Heaters	Peter Smith
Body	Headlights,	
Interior trim	G.E. Arc. U. S. Inc	
Headlining...poplar veneer	Motors	inside
Roof	Sanders	De France
Underframe	Sash fixtures	Dayton
Air brakes.....West. Aut.	Seats	H. & K.
Bumpers,	Seating material,	
Hedley anti-climber	plush & leather	
Car trimmings.....bronze	Step treads	Mason
Control,	Trolley catchers...Knutson	
unit switch, hand operated	Trucks.....Taylor M.C.B.	

TRADE NOTES

Lang Retrieving Trolley Company, Petaluma, Cal., has moved its headquarters to the Exchange Bank Building, Santa Rosa, Cal.

Adams & Westlake Company, Chicago, Ill., is reported to have purchased a site for a plant which it proposes to build at Philadelphia, Pa.

Forsyth Brothers Company, Chicago, Ill., has moved its general offices from 213 Institute Place, Chicago, to the McCormick Building.

Niles-Bement-Pond Company, New York, N. Y., has removed its warehouse from 30-31 West Street to Hudson Street and Van Dam Street, New York.

C. O. Mailloux and C. E. Knox, New York, N. Y., consulting engineers, have removed their offices to the West Street Building, 90 West Street, New York.

National Railway Instruction Bureau, East St. Louis, Ill., has been incorporated to train transportation employees. The incorporators are: Edward A. Wessel, Alphons A. Wessel and Parks E. Ashlock.

Eureka Steel Company, Pittsburgh, Pa., which has just placed its new plant in operation, is planning to increase its capital from \$25,000 to \$250,000, and will build an additional open-hearth furnace, a blooming mill and a bar mill.

Lafayette Electric & Manufacturing Company, Lafayette, Ind., has acquired by purchase the plant and equipment of the Sterling Electric Works, Lafayette, Ind., and will continue the manufacture and sale of Sterling telephones for train dispatching and other railway electrical supplies.

Transportation Utilities Company, New York, N. Y., which was organized recently to represent directly the Acme Supply Company and the General Railway Supply Company, Chicago, Ill., has appointed Rueben C. Hallett to the sales staff of the company, with headquarters at 30 Church Street, New York.

Southern Railway Supply Company, St. Louis, Mo., has opened a branch office at 1219 Long Building, Kansas City, Mo., and another at Nashville, Tenn. C. E. Achoff, formerly the southeastern representative of the Matthews Carrier Company, is manager of the Kansas City office, and J. H. Early is manager of the Nashville branch.

Philadelphia Locomotive Works, Philadelphia, Pa., has prepared a petition for a charter to be presented to Governor Tener on June 7. The applicants for the charter are Rudolph Ellis, president of the Fidelity Trust Company; Charles S. W. Packard, Eckley B. Coxe, Jr., Alfred C. Harrison and Herman Dercum. It is reported that this is the first step in the plan for reorganizing the Baldwin Locomotive Works.

Falkenau Electrical Construction Company, Chicago, Ill., has received the general contract from the Merchants' Light & Power Company, Ogden, Utah, for the complete installation and construction of the lighting and power system in Ogden. H. A. Strauss, consulting engineer, has prepared plans and specifications for this system and is now engaged in making the necessary purchases at the Chicago office in the Stock Exchange Building.

Edward H. Chapin, vice-president of the National Car Wheel Company, Pittsburgh, Pa., will move his private office at 90 West Street, New York, N. Y., on June 1, 1911, to Rochester, N. Y. There will be no change in the uptown office of the company, which will be maintained at 556 West Thirty-fourth Street, New York, as formerly. The Chapin family were long identified with the Rochester Car Wheel Works, now the Rochester works of the National Car Wheel Company, so that it is very natural for Mr. Chapin to make his headquarters at this branch of the company's works. It also enables him to reach any portion of a very wide territory by a night's ride. He will continue to look out for the interests of his customers in the neighborhood of New York City as well as in central New York and elsewhere by frequent visits.

Kerr Turbine Company, Wellsville, N. Y., has just been reorganized and \$125,000 new capital added. The stock interests of the company are now controlled by F. P. Merrill, Hornell, N. Y., and P. B. Hanks, Wellsville, who, as trustees, have directed the affairs of the company for the past two and a half years. Mr. Kerr is no longer with the company, his position as chief engineer now being filled by J. L. Moore, formerly a designer with the Westinghouse Electric & Manufacturing Company and later in the engineering department of the Atchison, Topeka & Santa Fé Railroad. The present plant will be materially enlarged and a new machine shop is already in course of erection. It is the intention of the new company to incorporate into the Kerr turbine changes in design based upon two years' experiments and which, it is claimed, will improve the steam economy on all sizes from 15 per cent to 20 per cent.

Oshkosh Manufacturing Company, Oshkosh, Wis., has been formed to succeed the Oshkosh Logging Tool Company, the A. Sanford Logging Tool Company and the Oshkosh Tool Manufacturing Company. The A. Sanford Tool Company began business in a small shop in 1853, and at that time it had the field virtually to itself. Shortly afterward Elmer Leach became connected with the company, but resigned in 1885 to organize with C. Nygaard, the present general superintendent of the plant, the Oshkosh Logging Tool Company. While the A. Sanford Logging Tool Company made almost entirely labor-saving tools and devices for lumbermen, the Oshkosh Logging Tool Company made more of a specialty of time, money and labor-saving devices for telephone, telegraph, railroad lines and contractors. The company recently completed a new factory, which is equipped with special machinery, some of which was designed by the company's own men.

Pullman Company, Chicago, Ill., at a meeting of the board of directors on May 18, 1911, elected as chairman of the board Robert Todd Lincoln, who resigned as president the same day. John Sumner Runnells, vice-president and general manager of the company, was elected president. Charles S. Sweet, who has been assistant to Mr. Lincoln, was elected assistant to Mr. Runnells. Mr. Lincoln, who is retiring from active office on account of ill health, is sixty-eight years old. He was born Aug. 1, 1843, at Springfield, Ill. During the Civil War he served as captain on the staff of General Grant, and was admitted to the bar in 1867 at Chicago. From 1881 to 1885 he was Secretary of War in the cabinets of Presidents Garfield and Arthur, and from 1889 to 1893 was United States Minister to Great Britain. During the life of George M. Pullman, founder of the company, Mr. Lincoln was his special counsel, and on Mr. Pullman's death in 1897 he was made president. Mr. Runnells has been general counsel of the Pullman Company since 1887, and has been vice-president since 1905. He is also senior member of the law firm of Runnells, Burry & Johnstone, and is a director of the Merchants' Loan & Trust Company, the Pullman Trust & Savings Bank, and the Roseland Savings Bank. He was born in Effingham, N. H., July 30, 1844, and was graduated from Amherst College in 1865, and after studying law at Dover, N. H., removed to Iowa and became private secretary to the Governor of that State.

ADVERTISING LITERATURE

Electric Railway Equipment Company, Cincinnati, Ohio, is mailing Bulletin A, which illustrates its various designs of ornamental street lamp posts, mast arms and brackets.

Trussed Concrete Steel Company, Detroit, Mich., has issued the sixth edition of its Hy-Rib handbook for 1911. It contains more than thirty pages of additional illustrations, details and specifications over all previous issues. The book is subdivided for convenience of the reader into various sections, such as that of general data on Hy-Rib, applications to floors and roofs, to walls and sidings, partitions, ceilings and furring; building construction in general, special tools and clips for Hy-Rib, etc.

American Steel & Wire Company, Chicago, Ill., has published a 200-page cloth-bound book in four parts, entitled "Rail Bonds and Appliances." This publication is probably the most elaborate ever issued on this important subject. Part I treats of the functions of rail bonds, the conditions under which they should be used and the appliances required to install them. Many tables are included relating to such subjects as contact resistances of stud terminals, resistances and conductivities of steel rails, resistances of bonded joints, voltage drop, etc. Among other interesting features in this section is a suggestion that the size of bonds should be graduated, the larger ones being placed near the power house just as the overhead feeder system is varied in accordance with the amount of current carried. Part II is devoted exclusively to rail bonds of all types as applied to the head, web and flange of rails. Part III treats in detail such bonding tools and appliances as drills, compressors, bond testers and hand tools. Part IV is a miscellany which comprises notes on electricity, a large number of wire and wiring formulas, overhead line and underground cable specialties, tables on and profiles of T-rails; also miscellaneous engineering data on measures, weights and volumes, metric conversion tables, etc.

NEW PUBLICATIONS

Municipal Franchises, Vol. II—Transportation Franchises, Taxation and Control of Public Utilities, by Delos F. Wilcox, Ph. D., chief of the Bureau of Franchises, Public Service Commission, First District, New York. Engineering News Publishing Company, New York, 1911. Price, \$5.

Of the 885 pages in this volume, 592 are taken up with a discussion of street and interurban railway franchises. These 592 pages contain an introduction presenting the author's views of the principles upon which a franchise should be based, an outline of what he calls a model franchise, and then extended abstracts with comments of existing franchises in various cities. The Chicago and Cleveland franchises represent in his opinion the high water mark thus far attained in franchise granting in the United States, although he believes that they possess some weaknesses, and from the author's remarks on the Philadelphia franchise we should believe that he considered it the other extreme.

Dr. Wilcox says that at first thought perpetual franchise and crowded cars seem especially good for investors, but he believes that in the long run "the ultimate interests of the public, of the employees and of the investors seem to converge upon the principle that the money wisely used in the construction and development of street railway systems should receive a constant and a fair return from the enterprise, but nothing more." In his chapter on a model street railway franchise, he admits that a model franchise is about as difficult to draft as an average man is hard to find, but he lays down certain general principles which he believes should be followed. One of these is the adoption of the monopoly feature, but the grant should be subject to the right of the city to require readjustment of tracks and change in grade or extensions, under some limitation, such as that the reasonableness of the extension orders are to be determined by a competent body, so that the company will be protected against unreasonable exactions. There should be provision for the joint use of city tracks by interurban lines. The franchise should be indeterminate, because perpetual franchises "lie outside the pale of reasonable controversy," and the short term franchise "has had bad results." There should be some provision, however, by which the physical property of the company shall be purchased either by the city or by another company authorized by the city to take it over in case the franchise is revoked. Indeterminate franchises without such provision are in existence and are called "tenures during good behavior," but Dr. Wilcox says that the penalty

for forfeiture without compensation "is so drastic that the behavior has to become very bad indeed before any community will punish it." In case of such purchase a company should have a bonus of from 10 to 20 per cent on the actual value of the physical property if the purchase is affected soon after the date of grant, but the amount of the bonus should gradually diminish until it disappears entirely, say, fifteen or twenty years from the date of the grant. The city should reserve the right to exercise control over equipment and service, and under the new dispensation the seating capacity of the cars, at least outside the rush hours, should equal the number of persons desiring to ride. The city should have power to require the cars to be clean and properly ventilated, heated and lighted and provided with approved safety appliances. The final control of the operation should be with the city and it should have power to require such change in the operation by the railway company as will best preserve the interests of the entire public. If paving and cleaning the streets are required, the work should be done by the city and any cost to be levied against the company should be in the form of special tax, but the company can very properly be required to sprinkle the tracks and should care for the shoveling of snow from its tracks. The city should be indemnified for damages resulting from the exercise by the company of its franchises, but the company should not be allowed to settle damage claims out of court. A uniform fare should be charged and cars should be so routed as to avoid the necessity of transferring as much as possible, as this is expensive to the company and inconvenient to the passengers. If tickets are sold at a less rate than the cash fare, they should be purchasable in small amounts from conductors. Reduced fares during the rush hours are not desirable and free service should be abolished except to employees of the company. The city should pass on mail contracts and on any freight business undertaken by the company. All affairs of the company should be open to inspection by the city or to groups of citizens who can give good reason for their action. In the ideal franchise the capitalization should be only the actual original investment in the property, plus new capital for additions and betterments. There should be no allowance for good will or development expenses, because it is a monopoly service which is involved. In renewal franchises where no satisfactory figures of original investments are available, a special valuation should be made based on cost of reproduction, less depreciation. In disposing of the net earnings, the author sees no excuse for a higher rate of return than 5 per cent or 6 per cent on the capital actually invested in the business. He thinks that probably 5 per cent is high enough. The company should not expect the city to guarantee this rate, but it should have assurance that the city will refrain from exacting such compensation or fixing such rates as will make it impossible for the company to earn this return. These briefly are the main points in the model franchise proposed by Dr. Wilcox.

Following chapters relate to street railway franchises in New York, Chicago, Cleveland; to franchises that are perpetual, indeterminate, exclusive, granted for compensation or for specified low fares; to franchises for elevated railways, subways and interurban railways; to franchises for bridges, railroad terminals, ferries and omnibuses. In Part IV the taxation and control of public utilities are discussed in eight chapters, of which, one is on municipal ownership. The appendix contains the Minneapolis gas settlement ordinances which have been passed since the publication of Vol. I.

Three-Phase Transmission. By W. Brew. New York: D. Van Nostrand Company. 178 pages, including index; illustrated. Price \$2.

The author of this work is an Englishman who is familiar, however, with American high-tension practice. His calculations and other data are therefore available for the American engineer in large measure. After a brief introduction on the financial aspect of power transmission, Mr. Brew considers in turn the subject of transmission losses, working pressure, devices for the mechanical and electrical control of trunk mains, impedance, pressure rise and harmonics, earthing and triple-frequency current, lightning protection, poles and fittings, etc. A part of the appendix is devoted to line calculations and comparisons of a.c. transmission systems.