Electric Railway Journal

A CONSOLIDATION OF

Street Railway Journal and Electric Railway Review

VOL. XXXV. NEW YORK, SATURDAY, MAY 7, 1910 No. 19

PUBLISHED WEEKLY BY THE

McGraw Publishing Company

239 WEST THIRTY-NINTH STREET, NEW YORK

JAMES H. MCGRAW, President.
HUGH M. WILSON, 1st Vice-President. A. E. CLIFFORD, 2d Vice-President.
CURTIS E. WHITTLESEY, Secretary and Treasurer.
TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK.

HENRY W. BLAKE, Editor.
L. E. GOULD, Western Editor.
Associate Editors:
RODNEY HITT, FREDERIC NICHOLAS, WALTER JACKSON.
News Editors:
G. J. MACMURRAY, FRANK J. ARMEIT.

CHICAGO OFFICE.....590 Old Colony Building
CLEVELAND OFFICE.....1015 Schofield Building
PHILADELPHIA OFFICE.....Real Estate Trust Building
EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

TERMS OF SUBSCRIPTION:

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

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

NOTICE TO ADVERTISERS.

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to Tuesday noon of the week of issue.

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

Of this issue of the ELECTRIC RAILWAY JOURNAL, 8500 *copies are printed.*

NEW YORK, SATURDAY, MAY 7, 1910.

CONTENTS.

The Columbus Strike

The wearisome story of a strike to enforce recognition of the union is repeated this week at Columbus. As in other cases several questions have been interjected as side issues, but the evidence at hand indicates that the demand already mentioned is the foundation of the trouble in Columbus. We cannot believe that any strike based on this issue was ever initiated with the heartfelt support of a majority or that of even a large proportion of the employees of a company. The direct beneficiaries of union recognition can be only the agitators who thereby wish to strengthen the power which they exercise over both company and employees, while the latter exchange liberty of action for the tyranny of an irresponsible outside dictator or set of dictators. The management at Columbus has been noteworthy for introducing profit sharing, pensions and other plans for the benefit of the employees, and the length and extent of the present strike will be a guide to other companies—at least in a sense—of the value placed upon schemes of this kind by the men.

A Forgotten Individual

During a recent street railway fare hearing in New York City, a speaker, who said that he represented the East Side, spoke scornfully of the plea of the railway company that its existing fares were too low and remarked that the prosperous appearance of the representatives of the company at the hearing did not harmonize with the claims made of the adverse financial condition of the company. The slur is unworthy of notice, except that it represents an idea in the minds of a great many people that because a railway company can and does pay to some of its employees salaries which are higher than those received by certain patrons of the line, the railway company can afford to carry passengers at lower fares. If those who object to these street railway expenses carried their investigations further, however, they would find that the loss occasioned by charging insufficient fare falls not on the operating officers, who must be paid for the services which they render, but on the unfortunate stockholders of the corporation. Talent in operating railway properties must be hired at its market price, whether the company is in receipt of a large net income or is in the hands of the receivers, and the fact that the recompense which certain individuals are paid, and which they earn, might be considered large on the East Side of New York is no indication that the company is not receiving full benefit for the money which it is expending. The stockholders in a solvent railway company, and the bondholders in one which is insolvent, are the persons who are affected by increases or reductions of fares, but in the minds of the public their existence is forgotten almost as completely as if they belonged to an extinct race like that which inhabited North America before the arrival of the red men.

Patent Rights

Electric railroading is so recent that many of the important features of the equipment are covered by patents and operating companies have to consider the patent situation to an extent not common in other industries. As they are rarely in a position to establish or disprove the validity of the claims made by different inventors they constantly run the danger of paying royalty directly or indirectly for the use of an absolutely worthless patent and of being caught between the upper and the nether mill-stone of the commercial rivalry of manufacturers for purchasing from one a device claimed to be covered by the patent of the other. Probably because the patent situation is as it is, some railway companies have adopted the plan of paying little attention to patent rights of any kind. The temptation is often strong in a person's own business to select the good features of one device, and combine them with those of another, on the theory that such a use of a patented principle without the permission of the patentee is quite different than when a device is manufactured for sale. But the legal status is the same and the user is just as liable for damages for infringement in either case. The prosperity of the country and its manufacturing preeminence have undoubtedly been due, in large part, to the encouragement afforded inventors under the patent law, and while there has been some criticism from inventors that recent legal decisions have tended to narrow patent claims, the courts have never refused to act promptly in any palpably evident violation of the law. Hence the necessity of carefulness in the shop and power station and on the line as regards the use without permission of patented principles is evident.

Revision of Interurban Rules

Perhaps no subject connected with electric railway operating methods has attracted greater attention from State authorities and associations during the past winter than that of standardizing the interurban rules. The matter has been considered in conferences between the Railroad Commissions of Ohio and Indiana and committees of railway managers in those States, and in Illinois the chairman of the Railroad Commission has been reported as considering the possibility of taking similar action. Several of the street railway associations have also had committee reports on the subject. That of the Iowa committee was presented at its last annual meeting and the Street Railway Association of the State of New York is to consider the adoption of a code next month. For these reasons special interest attaches to the meeting of the committee on interurban rules of the American Street & Interurban Railway Transportation & Traffic Association which will be held at Fort Wayne, Ind., on June 8, when possible changes to the code adopted at the Denver convention will be taken up. The committee is composed of earnest, conscientious managers whose aim is to compile the best possible set of interurban rules which will meet the approval of the majority of the members of the association. They realize many of the shortcomings of the present code and will welcome the opinions of other managers whose experience has been along different lines from their own. This meeting and those which the committee no doubt will hold later during the summer, afford an opportunity for all those who are not satisfied with the rules as adopted at Denver to suggest any modifications which in their opinion would be improvements. The discussions which have already been held are evidences of the importance which is attached to the subject and we trust that the meeting at Fort Wayne will be of the greatest profit to the industry.

TESTS OF ELECTRIC HEADLIGHTS

Considerable interest has been awakened in regard to the practical value of electric headlights for steam locomotives by a recent paper on this subject presented by Professor Benjamin, of Purdue University, before the Western Railway Club. Taken by themselves the tests, of which the author gave a description, bring out facts of a somewhat disquieting character. Electric headlights were given a trial on steam locomotives some 20 years ago, but in their original form they did not prove very successful. Since that time they have been improved with apparently much better results. As a substitute for the ordinary oil headlight the arc lamp gives, of course, a much more brilliant source and can be focused into a long concentrated beam capable of lighting up straight track for a very long distance ahead, but its utility has been under suspicion by railroad men, on account of the dazzling effect of the enormous brilliancy. An electric searchlight on the front of a locomotive, when directed along the track, must shine fairly in the eyes of the engineer upon a locomotive approaching it, and experience has shown that its blinding effect is considerable. It has not been altogether clear, however, that this is not in some measure compensated by ability to see distant signals and distant obstructions on the track.

The experiments of Prof. Benjamin show beyond a reasonable doubt that the great intensity of the beam from the electric headlight, so far from helping in the recognition of ordinary signals and obstructions, is actually harmful under some circumstances, and particularly in cases where there is an opposing headlight. Under such conditions the iris must of necessity contract to a comparatively small aperture, thus hindering the recognition of objects just outside the brilliant beam and in point of fact even hindering the recognition of objects within the beam on account of the glare. The general character of these results might have been predicted from previous experience, but one observation was systematically recorded which was hardly to be anticipated and has a serious bearing on the subject.

It was found that the brilliancy of the beam from the electric headlight was so great as to produce by reflected light false signals from lanterns which had been extinguished, and particularly false safety signals. There was apparently no interference of any appreciable extent with red danger lights by the beam, but an extinguished lantern having a green roundel permitted enough reflection of the headlight beam from the rear surface of the roundel to give the appearance of a green safety light, where no light existed. This singular effect appeared most strikingly at moderate distances. For example, in one test run in which a green light had been extinguished no light appeared up to a distance of 1,000 ft. At 600 ft. four of the eleven observers saw a green light in the extinguished lantern, which persisted for one observer up to 400 ft. This effect is due to the intensity of the beam and also to the large proportion of greenish and bluish light in the arc as compared with an oil lamp. The green lights suffered to an exceptional degree, but the red danger lights, fortu-

nately, were less seriously affected. No corresponding reflections were observed when an oil headlight was used.

This is a rather serious indictment of the electric headlight and for the conditions of the tests there is little defense to be made. The discussion, however, put the electric device in a better light, so to speak, or to use still another simile, which is not so apt, it is not so black as it was painted. Several railroad managers expressed the belief that while signals could not be read so easily with an electric headlight as with one which burned oil, the electrical device was far preferable for disclosing obstructions on the track. It was also noted that in the Southern and Southwestern States, where single tracks are the rule, and the speeds are low, electric headlights were extensively used, whereas, the contrary was the case on the trunk lines of the East and Middle West. On single track the immense range of visibility of an electric headlight turned along the line makes it also particularly valuable as a warning to other trains.

Broadly speaking, the conditions of the single-track, slow-speed line apply on electric lines with the addition of the factor of braking distance. For this and similar purposes, every moving vehicle may be considered as carrying ahead of it a dangerous space equal to the distance in which the vehicle can be stopped by an emergency application of the brakes. If this braking distance is 300 ft., and two cars or trains find themselves approaching on the same track at a distance within 600 ft. an accident is inevitable, or if a single car picks up an obstacle within 300 ft., or fails to see a danger signal until within this distance, an accident again is due. Now from the relatively small weight of an electric car, in spite of its sometimes high speed, the dangerous space is considerably less than with an ordinary steam train, and, in fact, most of the difficulties found with the electric headlights in Prof. Benjamin's tests pertain only to distances considerably greater than the dangerous space of any ordinary electric car. For instance, at and below 400 ft. the recognition of signals, with or without electric headlights, was, generally speaking, entirely satisfactory. The objections, therefore, do not apply with the same force as to the heavier and faster steam trains. On the other hand the gain from brilliant light along the track is greater in the case of the electric car, on account, again, of the shorter dangerous space. Finally, the value of the electric headlight for warning passers-by of the coming fast electric car is much greater than that of the oil headlight, owing to the more brilliant and conspicuous beam, and under the conditions of operation of electric cars this warning value is of considerable importance.

From the facts already outlined it seems to us, therefore, that the experiments conducted by Professor Benjamin, valuable as they are, cannot be considered at all conclusive against the use of electric headlights on suburban and interurban electric lines, although they should serve as a warning to look carefully into the subject with a view of applying remedial measures. If necessary it would be a very simple thing to change the color or intensity of an electric headlight so as greatly to modify the glare without sacrificing the usefulness of so convenient an illuminant. Certainly so far as illumination is concerned, we feel confident that interurban electric railway managers would be very loth to substitute an oil headlight for the electric arc lamp carried in the front of their interurban cars, for practical experience has shown that the arc headlight has prevented many an accident.

WHY FARES SHOULD NOT BE LOWERED

Papers were presented before the Iowa Street & Interurban Railway Association at its meeting in Sioux City, on April 21 to 23, giving summaries of the reasons why fares should not be lowered. L. D. Mathes, of Dubuque, submitted the point of view of the city system on this important subject and H. W. Garner, of Oskaloosa, that of the interurban line.

The advantage of dividing this subject so that the position of each type of railway should be discussed independently is obvious. The issues involved are different. On the city roads the uniform rate of fare prevailing is, in most cases, a heritage from the first company that secured a franchise in the community. The theory on which the uniform fare is still charged is comparable more nearly to the postage stamp unit of revenue demanded by the Government than to any other business method known. But with interurban lines the rates of fare are compiled usually on a systematic mileage basis. In brief, it may be stated that the gross rate of fare on city properties is ordinarily inflexible and inexorable except at remote periods of franchise renewal, while the interurban rate is susceptible of regulation except where it is limited by unusual franchise or legislative restrictions. The problem of the city rate of fare, therefore, is the more acute.

The summary of the reasons given by Mr. Mathes includes more than the usual arguments. It recognizes that the case of the railway companies which are suffering from fare limitations does not rest entirely on the disquieting changes in the purchasing power of the 5-cent piece. It calls attention to the two potent arguments comprised in the many exactions levied by municipalities and in the distress which short term franchises cause security holders.

Of these arguments iteration has made common to the public those which are rooted in the changes in the purchasing power of the street railway 5-cent piece. Sinister results may arise from constant agitation for a reduction from a 5-cent fare, and from the increases in cost of every class of labor and nearly all classes of materials, that promise greater, not less, operating expenses in the future. Whatever the results are in individual instances, it is probable that since most city companies have a fixed gross rate of fare, they will not be able to secure relief during existing franchises unless they can find some means to lessen municipal exactions. It should be remembered also that the burden of an "expansion of the free transfer system," which Mr. Mathes mentions, is one which the companies have increased by contributory negligence. The indulgent attitude of the railways on the subject of transfers in the past is now passing, however, and it is succeeded by more business-like methods designed to prevent abuse of the privilege so far as possible. Improvement in this direction should be attained by all companies if possible.

An argument against the short term franchise is a logical, though a very infrequent, accompaniment of a discussion on the subject of fares. If companies are prohibited by the terms of their grants from earning sufficient profits to amortize their capital investment the value of the property should be recognized and a renewal of franchise should be given. Either a definite provision should be made for the security of the capital investment or the rates of fare should be large enough to permit a reasonable interest and a return of the principal to investors in the property.

What is really desirable is a salutary object lesson, which

will impress the public more than either logic or argument. Such a lesson is fortunately afforded by the present widespread increases in the rates of steam railroads, which show that the burdens of necessary higher expenses must be overcome by larger revenues.

THE IMPORTANCE OF ENGINEERING DETAILS IN DAMAGE SUITS

Recent observation of the conduct of a number of electric railway damage suits in the lower courts suggest the importance of matters of engineering detail in many such cases. It is a great mistake to assume that because the average jury has little conception of volts and amperes any one of a company's engineers can safely be called into court to testify in an accident case without thorough study of the equipment conditions surrounding the situation. It is impossible to foresee the line of attack which cross questioning of company witnesses will take, and the only safe plan is for the company to put on the stand its most experienced technically trained men, whenever any fundamental principles of importance are liable to be brought into the case. To many engineers court work before an ordinary jury is a wearisome duty, but it is more and more coming to be clear that expert knowledge must be enlisted in order successfully to ward off the attacks of claimants served by lawyers having a somewhat acute knowledge of the physical systems of modern transportation companies.

In many accident cases the most exhaustive questioning centers about the possibilities of equipment performance under assumed conditions. An inexperienced man cannot handle such a situation intelligently and with satisfaction to the company. In a case where a passenger sues on account of the sudden starting of a car, for instance, the motorman and the conductor's testimony should not be permitted to include a discussion of hypothetical cases such as to what might have happened if the equipment had been in an assumed state or position. The testimony of such employees is valuable in so far as it exhibits the general and specific conditions of the equipment at the time of the accident, but it is the proper province of the company's shop foreman to testify as to the detailed condition of the rolling stock parts at a given time, and the duty of the master mechanic himself to discuss the broad principles of brake action under stated circumstances. If the assumption is made that a step on a rheostat burned out, the electrical engineer and not the car-service employee is the safest man to handle the possible phenomena before the jury. A station master may properly testify as to the character of the platform illumination at a given time, but should not be considered competent to discuss under cross-examination the results of voltage drop on feeders leading to the station-lighting circuits or the causes of such drop.

Under severe cross-examination it frequently becomes necessary to explain technical matters in very simple language for the benefit of the jury. While the abilities of different employees vary widely in this respect, as a rule it is better to rely upon the company's experts in facing most hypothetical questions and in stating in clear form, the fundamental principles at issue. The use of models of cars, elevated structures, stations and other physical features of the system come into valuable play here. Electrical systems are tied so closely together in operation that it is well for the company to offer testimony by employees familiar with the interaction of the different parts when the case is closely contested. It is also desirable to remember that most juries require that a company shall demonstrate its contentions to the limit of common sense; hence it pays to bring officials with expert knowledge into many cases in order to submit a complete and sound defense. It is needless to review the value of original shop and power house records under such circumstances. It is practically impossible for any company to maintain all the routine information that may be called for in a damage suit in connection with the minor details of the equipment, but experience shows that separate records of the history of large units of apparatus are often most valuable.

EMPLOYERS' LIABILITY

In connection with welfare work among employees, a subject that has engaged the serious attention of electric railway managements for several years, the problem of rendering adequate compensation to injured employees and their families has been given special study. Many solutions have been suggested and several have been tried, chiefly along the lines of mutual benefit associations supported jointly by contributions from the company and from its men. But while these various plans have in greater or less degree brought the needed relief in ordinary cases of sickness or death they have not altogether met situations arising when a company's responsibility and legal liability for injuries resulting from accidents have been brought into question.

In common with other large employers of labor, electric railway companies are coming to recognize that a very considerable portion of the money expended in compensating injured employees has missed the mark, because, instead of assisting to relieve suffering and necessity, it has been woefully wasted in legal and other unprofitable expenses. According to statistics recently published several important industrial concerns have discovered that scarcely 50 per cent of the total sum paid as compensation for damages to injured employees actually reaches the employees or their families.

There is general agreement that this whole matter of employees' damages and employers' liability must be readjusted and established on a more equitable and fundamentally correct basis. The object sought should be to insure to injured employees, irrespective of legal complications, prompt, definite and adequate relief; to protect employers against exorbitant and extravagant demands, and to relieve both employee and employer of the large and wholly unnecessary burden imposed by the legal and medical fraternities who come between the companies and their men at a time when the relations should be the most intimate and direct.

Special interest attaches therefore to the voluntary relief plans established by the United States Steel Corporation and the International Harvester Company. These plans went into effect May 1 of this year and under them injured employees and the families of those killed in the performance of their duties will receive wholly adequate compensation, without regard to the legal liability of the companies, based upon the earning capacity of the man and his tenure of office. In the case of the United States Steel Corporation a distinction is made between single and married men. Thus, single men who have been with the company for five years or less receive during temporary disability, or for 52 weeks, 35 per cent of their wages, with an additional 2 per cent for each year of service over five years, while married men receive more and are also

allowed 5 per cent additional for each child under 16 years. The Harvester Company makes no distinction between married or single men. It is not necessary here to give in detail all of the provisions of these relief plans, but they are significant as being the most ambitious attempts here to duplicate in industrial enterprises the chief features of the German, English and French pension schemes. Of these, the methods applied to German electric railways have been described in this paper.

ELECTRIC LOCOMOTIVE DESIGN

The two experimental electric freight locomotives of the New York, New Haven & Hartford Railroad, which are illustrated elsewhere in this issue, are of essentially different design mechanically and electrically, but both embody certain principles of construction which point to the possible future development of a distinctive type of heavy electric tractor which will be modified only slightly for different requirements of speed and hauling capacity. The geared locomotive is built with articulated trucks and a single cab while the side rod locomotive consists of two entirely separate short units coupled together. In both machines, however, the motors are entirely spring borne and are mounted well above the axles thus raising the center of gravity. The rigid wheelbase is short and guiding pony wheels are placed in front of the driving wheels at each end. These features of similarity in the two designs are to be found also in most of the recent electric locomotives built in Europe because they are essential to smooth and safe running. They are not new or revolutionary, but have been adopted from steam locomotive practice just as the side rod drive with quartered cranks has been employed. Motors and control apparatus have replaced the boiler on top of the locomotive frame. From an electrical standpoint, of course, the location of the motors above the axles facilitates ventilation, inspection and repairs and permits of better design unincumbered by limitations of space. This, however, is of secondary importance compared with the improvement in running obtained with a high center of gravity and by relieving the axles of all dead load.

The value of guiding trucks was fully demonstrated by the improvement in the running of the New Haven passenger locomotives which followed the addition of a pony axle and wheels, in front of the driving wheels. The New York Central locomotives which have a long wheelbase were also improved by the substitution of a swiveling four-wheel truck at each end for the radial pony truck first used. It is impossible to analyze completely all of the complex forces exerted by a locomotive running at high speed, but it is evident that the drawbar pull at the rear end produces severe nosing effects which are not found in a pivoted truck under a single car. This nosing effect is greater in a locomotive with a long rigid frame than in an articulated design and requires the use of a radial pony truck or swiveling four-wheel truck carrying a considerable vertical load to counteract it. The electric locomotive of the future must sacrifice a good proportion of available tractive weight to this end. This sacrifice, however, is more apparent than real. To build a frame and running gear strong enough to transmit the tractive effort developed by large motors, all of the parts must be made very heavy. On account of their uniform torque the driving wheels of an electric locomotive do not require as great an adhesive weight to develop a given tractive effort as do those of steam locomotives and the excess weight necessary for strength can be shifted to the guiding trucks, where it accomplishes a useful purpose.

Without having the designer's calculations at hand it would appear that the side rod locomotive has a higher center of gravity than the geared locomotive. The side rod motors are mounted with the center of their shafts 91 in. above the rails while the geared motors are only 63¾ in. above the rails, but owing to the larger diameter of wheels of the geared locomotive its frame and all of the auxiliary electrical apparatus are raised higher. The height of the center of gravity of both locomotives is probably nearly equal to that of an average steam locomotive; it is certainly greater than that of the New Haven passenger locomotives or the New York Central electric locomotives in which the motors surround the axles.

In Europe the side rod drive has been generally adopted in recent designs, but the ingenious double pinion drive of the New Haven geared locomotive is an entirely different solution of the problem of connecting motors mounted on top of the frames to the driving axles than any previously attempted. It has the advantage that it provides the necessary vertical play without the complication of a jack shaft and connecting rods, but its application is somewhat limited. The width of the motors is confined to the distance between the hubs of the wheels, less twice the width of the gears and the necessary clearances and they must be mounted directly over the driving axles. With side rod connections the motors can be raised to any practicable height, can be made as wide as the full distance between frames and can be located at any point on the frames with respect to the driving wheels. In Dr. Gleichmann's review of European progress in heavy electric traction, abstracted in the ELECTRIC RAILWAY JOURNAL of April 9, 1910, page 667, a number of side rod locomotives were illustrated in which the motors were mounted almost directly over the driving wheels between the driving wheels and also directly over the four-wheel guiding trucks at the extreme ends of the locomotive. Any desired distribution of weight on the frames can thus be obtained. The side and connecting rods can be perfectly counterbalanced and with quartered cranks uniform torque is transmitted from the motors to the wheels. The relative efficiency of geared and side rod drives depends on the condition of the gears and the rod bearings. With bearings of suitable size, well lubricated, the transmission loss due to friction is probably small in comparison with the energy output of the motors.

It speaks well for the builders of the electric equipment of the New Haven geared locomotive to say that the locomotive was put into service immediately upon its receipt by the railroad company and ran more than 2000 miles without developing a fault in the motors or the control. The experience gained in the operation of the electric passenger locomotives over a period of about two years was used to good advantage in avoiding the little mistakes which cause the most trouble. Stationary motors for both direct and alternating current are now being built in very large sizes, and with small restrictions as to space and weight the design of powerful locomotive motors to be mounted above the frames involves few new or difficult problems. They can be constructed to meet almost any conditions of speed and hauling capacity. The best method of converting the power of the motors into drawbar pull and the construction of a vehicle which can be run on rails at high speed with perfect safety are the future problems of electric locomotive design and these are within the province of the mechanical engineer, rather than of the electrical engineer.

SHOPS OF THE LONDON UNDERGROUND ELECTRIC RAILWAYS

The Underground Electric Railways Company, London, operates three tube railways and one subway line, each having its own shops which were in existence when the several companies were separately managed. Since the consolidation, however, Albert H. Stanley, general manager of the company, has found it feasible to have each shop do all the work of a certain character, thereby securing the advantages of specialization on the largest scale permitted by the conditions. Thus all the motor winding and air brake repairs for the three tube lines are done at the Golder's Green shops of the Charing Cross, Euston & Hampstead Railway, and the switch and contactor work is done at the Lillie Bridge shops of the Great Northern, Piccadilly & Brompton Railway. This practice is greatly assisted by the fact that the same equipments are used on all the tube roads and even the Metropolitan & District Railway employs the same motors and trucks.

FEATURES OF THE TUBE SHOPS

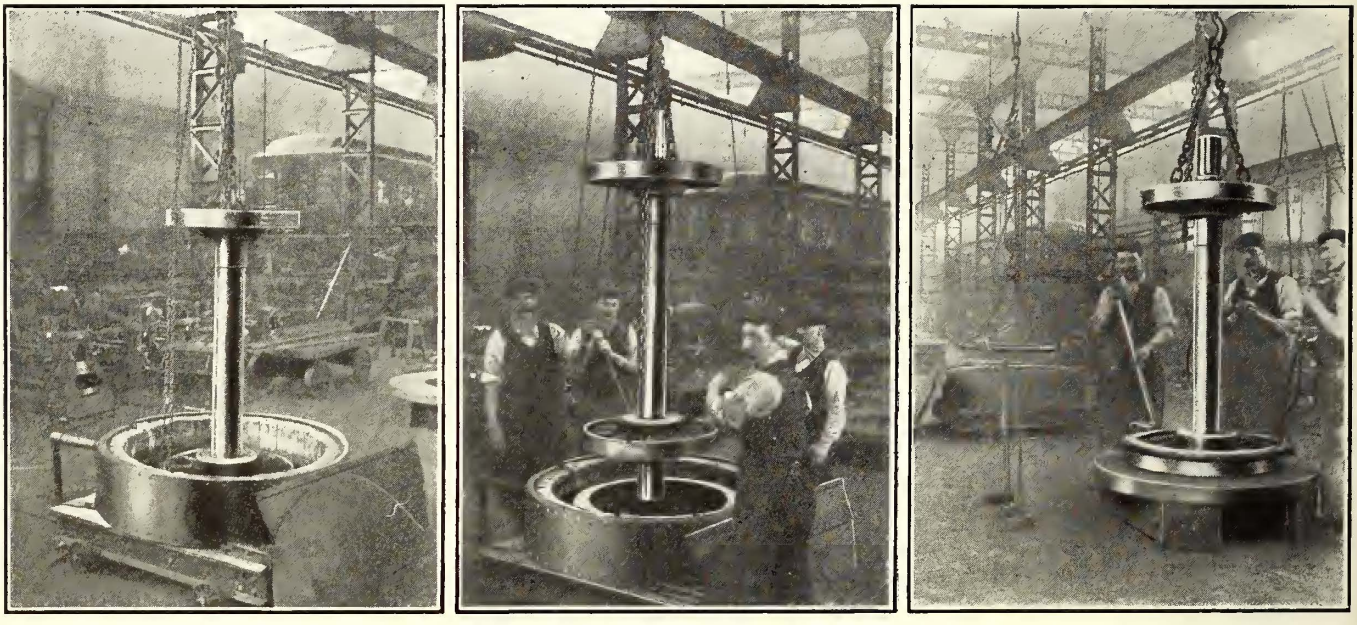
The Golder's Green shops are of brick construction with corrugated metal and glass roofs, built as four parallel bays. The buildings are 600 ft. long overall and contain 15 tracks. The first bay contains two concrete pits, and a section which embraces offices and club room at the front, storerooms in the center and a machine shop. Next comes the paint shop with three tracks without pits. The roof of the painting bay is entirely of glass to insure maximum lighting. Each of the two remaining sections has five tracks with inspection pits. The entrances to all bays are guarded by rolling steel shutters. No pit lamps are installed anywhere, as only extension lamps are found necessary although much night work is done. In common with the other shops, the conductor rails are cut off outside and the cars move about inside from overhead trolley carriages which are provided with flexible conductors and plug-ins. The buildings are heated by steam on the direct system. The paint and oil stores are kept in isolated brick buildings. The machine shop is conveniently arranged alongside the truck overhauling tracks. The latter are provided with two 10-ton Musker cranes which lift and replace car bodies by means of slings. The machine tool equipment is largely from American manufacturers, such as the Niles-Bement-Pond Company, Gould & Eberhardt and the American Mills Supplies Company. All tools and belts are carefully guarded by railing and wire screens wherever needful.

The Lillie Bridge shops of the Piccadilly line consist of a single six-track brick building with glass and metal roof as at Golder's Green. This structure is 78 ft. 6 in. wide and fully 1312 ft. long, pits being installed all the way. The machine tool equipment is at the rear of the tracks and in touch with two 12-ton Higginbottam & Mannock cranes which span part of the overhauling tracks at the rear. The offices and stores are in a nearby building. The shops of the Baker Street & Waterloo Railway, the smallest of the three tubes, are located at London Road and St. George Circus. They do not offer any special features.

SOME MECHANICAL AND ELECTRICAL PRACTICES IN TUBE SHOPS

The tube cars are inspected nightly and overhauled about every 30,000 miles. The GE-69 motor is standard throughout. All wheels are steel-tired, the motor wheels being 36 in. in diameter and the trailers 31⅛ in. in diameter. The former wheels are applied with 60 tons pressure on 6⅛-in. axles and the latter with 30 tons pressure on 3⅞-in. axles. The gears and pinions are made of steel billets which are cut at the shops of the Metropolitan & District Railways, and are giving satisfactory results. The standard carbon brush is the National No. 15, the life of which varies from 4000 to 20,000 miles.

Lubrication is now carried on under a contract with the Galena Signal Oil Company. During the first six months of 1909, the cost per 1000 miles on each tube line was as follows: Bakerloo 6.42 cents, Piccadilly 4.98 cents and Charing Cross 5.88 cents. These very low costs include armature and journal bearings, motor suspensions, gear cases, compressors, draft rigging, side rubbing plates and center bearings. The oil drained from the armature and motor suspension bearings is filtered and used on other bearings. The armature and axle bearings are packed with oil-soaked wool. The journal boxes have hinged covers and wooden dust shields.



London Underground Railways—Removing and Replacing Steel Tires on Car Wheels

An unusual feature of the collector shoes is the use of leather instead of metal link hangers, so that only the rubbing piece and leads are alive. These links were made from old conveyor belting and have given good service for over two years. The holes in these hangers are provided with steel stiffening bushings to prevent the pinching of the belt pin.

Every motorman is provided with a device for short-circuiting the line in emergencies such as fires under the car. This consists of a wooden-handled iron beam which is provided at one end with a channel cap to fit over one rail and a contact piece at the other end to complete the circuit via the second rail. When the live and return (fourth) rails are thus spanned, the substation circuit breakers are blown and the affected section is dead.

METROPOLITAN DISTRICT SHOPS

The shops of the Metropolitan District Railway, at Ealing Common, comprise a three-bay brick structure 800 ft. long with combination glass and metal roofs. One bay contains the offices, storerooms, machine shop and overhauling section and the others are used for painting and inspection. Among the American tools installed is a commutator slotter of the Device Improvement Company. The original tool-steel slotting pieces have been replaced by hack-saw segments which give more satisfactory results.

The standard motor wheels on this line are 36 in. diameter and the trailer wheels 30 in. diameter. All wheels are steel-tired. The average mileage of the motor wheel tires is 150,000 miles and the estimated life of trailer wheel tires is 230,000 miles. The material for the motor truck tires is of the best quality of acid open-hearth steel, owing to the severe service on this railway with its many curves and heavy traffic. In purchasing motor truck tires one specimen is selected from each cast for the following tests under the railway's engineer, which must be made without reheating or other manipulation.

The tire must be placed in a running position with the tread resting on a block of metal of not less than 5 tons weight, supported on a rigid concrete or other solid foundation, and must withstand without fracture, blows from a falling weight of 2240 lb. The weight must be allowed to fall freely on to the tread from heights of 10 ft., 15 ft., 20 ft. and upward until the tire deflects to at least one-tenth of its internal diameter. In any case, where the required deflection has been very nearly reached, the height of the final blow may be reduced at the discretion of the railway's representative. A test piece machined cold from a tire subjected to the foregoing falling weight test must show a tensile breaking strength of not less than 50 tons per sq. in., with a minimum elongation of 13 per cent and not more than 55 tons per sq. in., with a minimum elongation of 11 per cent. Tires showing flaws of any kind after being delivered and machined must be replaced.

Wheel tires are considered unfit for service and sent to the shops for re-turning, under the following conditions, as indicated according to the numbered outlines in the accompanying illustration.

(1) When the inside of the flanges becomes approximately at right angles to the tread and forms a definite corner on the tire at the point marked "X."

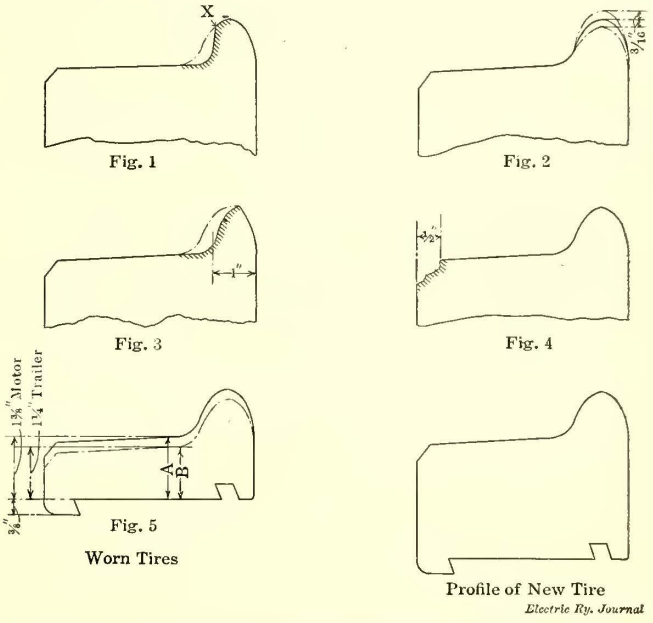
(2) When the flange becomes more than either 3/16 in. above or 3/16 in. below the standard gauge of new tire.

(3) When the flange at the base is less than an inch wide.

(4) When the outer edge of the tread is worn or broken away more than ½ in.

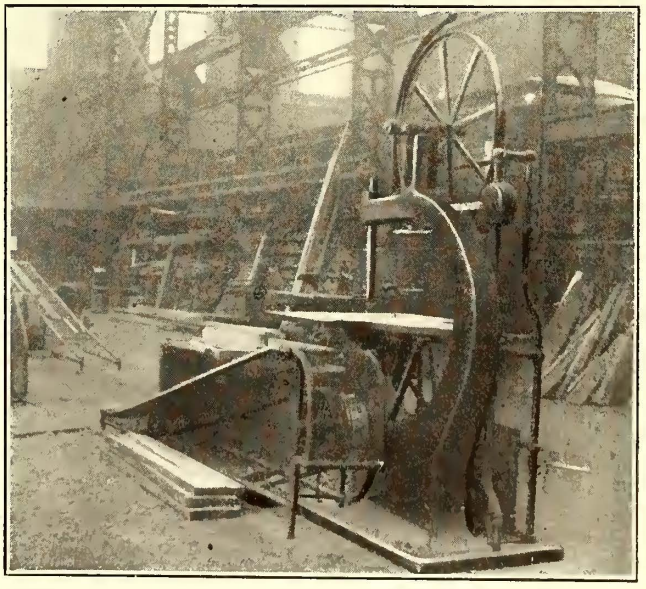
(5) When the thickness becomes (a) on motor tires less than 1⅜ in. on tread; (b) on trailer tires less than 1¼ in. on tread.

Wheels are re-turned at the rate of about 3½ pairs a day per lathe. This usually averages at the rate of about 19 pairs of wheels for every 23 shillings labor cost on the day system which prevails throughout these shops. The average cut never exceeds ½ in. The process of re-tiring a single wheel involves several steps, the times for which follow: Cutting the rings out, 75 minutes; taking old tires off, 30 minutes; heating new tire for shrinking and installing, 45 minutes; putting in new rings and riveting, 15 minutes; final truing up as for re-turned wheels. The two men required to take the tires off and the three men required to put new ones on, each receive on the average 29 shillings, 4 pence, for about five and a half 9½-hour days, viz., 53 hours per week. The man who bores out the new tires and cuts the recess into which the ring fits is rated at 39 shillings a week. The tires are shrunk off and on in a brick-lined iron circular tub which is mounted on a truck for easy removal when not needed. The lower circumference



London Underground Railways—Profiles on Shop Print Covering Allowable Wearing Limits

London Underground Railways—Motorman's Short-Circuiting Beam



London Underground Railways—Screen Over Machinery Belting to Avoid Accidents

MECHANICAL ENGINEERING DEPARTMENT

EXAMINER'S REPORT

Depot..... *Date*.....

Car No.	Train No.	Defect	Action Taken	Time

London Underground Railways—Inspector's Report (10 in. High x 8 in. Wide)

.....RECORD DATE.....

No..... TYPE..... MAKERS.....

Date Sent In	Date Sent Out	Car No.	Memo. of Work Done	

London Underground Railways—Card Record (11 3/4 in. High x 8 1/4 in. Wide)

DAILY REPORT OF TRAIN-WORKING

TRAIN SERVICE SCHEDULE NO..... .....THE.....DAY OF.....19.....

Class of Failure, Etc.	Time Occurring	Place	No. of Car Lift or Signal	Delay in Minutes	Particulars of Failures and Delays
Rolling Stock					
Signals					
Lifts					
Current Supply					
Miscellaneous					
		Total Delay			

Other variations in Train Service Schedule and reasons therefor:—

No. of Cars in Service: No of Cars required by Schedule

Motors..... Motors.....

Trailers..... Trailers.....

Total..... Total.....

No. of Lifts in Service, Maximum.... Minimum.....

Accident Report		Time	Place	Particulars
Passengers	Name			
Staff				

.....*Superintendent*

N.B.—When full particulars cannot be given on this form, ordinary foolscap memoranda to be attached, and the form used as a summary only.

London Underground Railways—Daily Report of All Train Operation, Elevators, Etc. (13 in. High x 8 1/4 in Wide)

RECORD OF CAR OVERHAUL

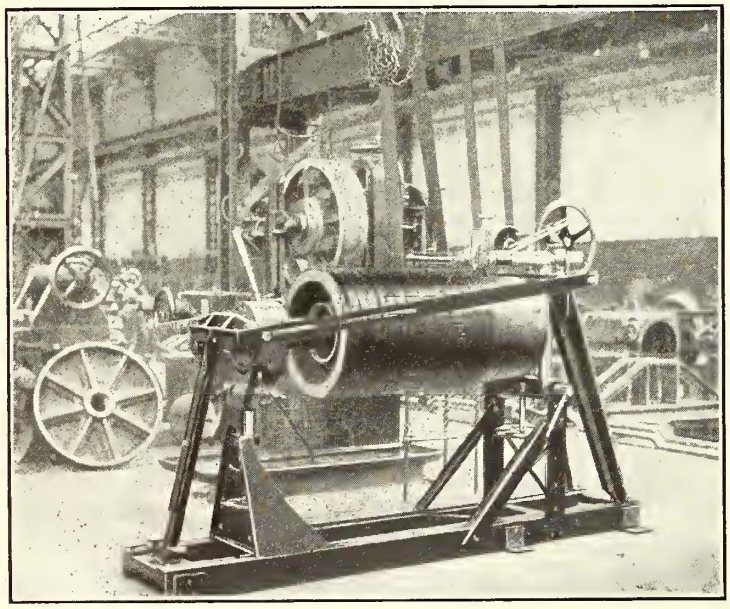
.....Depot Car No.....Date in Shops.....19...Date out Shops.....19.....

DESCRIPTION OF WORK DONE			
Wheels	Nos.		
Axles	Nos.		
Trucks	Nos.		
Motors (No. 1)	No.		
Motors (No. 2)	No.		
Motors (Compressor)	No.		
Armatures	No.		
Draft and Buffing Gear			
Underframes			
Bodies, Doors, Gates and Locks			
Shoe Gear			
Electrical Equipment			
Air Brakes (Including Compressors)			
Lighting			
Emergency Outfit			
General Remarks			

I hereby certify that the above Car has been thoroughly overhauled, and is now fit to run in Passenger Service.

Date.....19..... *Signed*.....*Shop Foreman*

London Underground Railways—Record Sheet for Car Overhaul (13 in. High x 8 in. Wide)



London Underground Railways—An American Commutator Slotter

London Underground Railways—Flexible Overhead Connection for Moving Cars in Shed

of the tub contains a pipe with burners for a mixture of illuminating gas and air at 70 lb. pressure. On the average about 200 cu. ft. of gas are required to take a tire off and about 300 cu. ft. to shrink it on. The gas costs 2 shillings 9 pence (42 cents) per 1000 cu. ft. and has 550 b.t.u. per cubic foot.

Thermit is used in the Ealing shops for many purposes, even for broken gears which are filled with the mixture and machined afterward. A mixture of 6 lb. of thermit and 3 oz. of ferromanganese is used now for lining up and strengthening motor nose-pieces. Formerly manganese steel pieces were dovetailed for this purpose but they would not stay in. For the ordinary welding of cast-steel frames, the welding mixture

DAILY REPORT OF TROUBLES ON CARS NOS.....

*Train No.....Depot..... Date.....*190.....

Apparatus	Trouble	Car No.	Reported by No.	Action Taken
Electrical				
Brakes				
Trucks				
Car Body				
Other Troubles				

MOTORMEN having no Car troubles to report must write their numbers below before leaving the train.

No..... No..... No..... No..... No..... No.....

INSTRUCTIONS—Motormen, Conductors, Terminal Men, etc., must, on discovering anything wrong with a Car, record same in "Trouble" column above, opposite the particular apparatus found out of order. Always give Car No. and your own No. Only report here troubles relating to the portion of the train composed of Cars numbered at the head of this Card, and report regarding the other portion of the train on card provided at that end. Write clearly and keep the Card clean.

London Underground Railways—Motormen's Daily Card Report (5 in. High x 8 in. Wide)

SENT TO SHOPS FOR

CAR NO. DATE SENT IN / DATE SENT OUT

SECTION	FOREMAN'S SIGNATURE (When O. K.)	REMARKS
Elec. Equip. on Car Body		
Motors and Armatures		
Trucks and Brakes		
Wood Working		
Doors		

London Underground Railways—Linen Tag (2 1/2 in. High x 5 1/4 in. Wide) on Car in for Some Kind of Heavy Repairs

MECHANICAL ENGINEERING DEPARTMENT A

RECORD OF WORK COMPLETED BY ELECTRICAL SECTION

Car No..... In Shops for.....

Date sent in..... Date sent out.....

[*W. & S. Ltd.*]

Motor taken out.....	No.....	No.....
Armature taken out.....	No.....	No.....
Motor put under.....	No.....	No.....
Armature put in.....	No.....	No.....
Compressor taken down	No.....	Compressor put up. No.....

Summary of Repairs completed to Motors and Armatures put under also Car Body Equipment.

Date.....19..... .....*Foreman*

MECHANICAL ENGINEERING DEPARTMENT B

RECORD OF WORK COMPLETED BY TRUCKS SECTION

Car No..... In Shops for.....

Date sent in..... Date sent out.....

[*W. & S., Ltd.*]

PARTICULARS	EAST END		WEST END	
	Number	Number	Number	Number
Trucks taken out.....				
Trucks put under.....				
Axles taken out.....				
Axles put under.....				

Summary of Repairs completed to Trucks put under, and Repairs made on Car Body Equipment.

Date.....19..... .....*Foreman*

MECHANICAL ENGINEERING DEPARTMENT C

WHEEL AND TIRE CHANGING REPORT FOR WEEK ENDING.....190.....

Axle No.	Wheel Nos. Pressed Off	Reason	Wheel Nos. Pressed On	Tire Nos. Scrapped	Tire Nos. Put On

Date.....190..... .....*Foreman*

MECHANICAL ENGINEERING DEPARTMENT D

TIRE TURNERS' REPORT for Week ending.....190.....

Axle No.	Reason for Turning	MEASUREMENT		Tire Loss Calipered	Remarks
		Before Turning	After Turning		

Date.....190..... .....*Foreman*

MECHANICAL ENGINEERING DEPARTMENT E

RECORD OF WORK COMPLETED BY PAINT SECTION

Car No..... In Shops for.....

Date sent in..... Date sent out.....

Summary of Repairs completed:—

.....

.....

Date.....190..... .....*Foreman*

MECHANICAL ENGINEERING DEPARTMENT F

REPORT OF WORK DONE TO COMPRESSORS FOR WEEK ENDING.....190.....

Compressor No.	SUMMARY OF REPAIRS COMPLETED TO	
	Compressor	Motor

Date.....190..... .....*Foreman*

London Underground Railways—Forms A, B, C, D, E and F, (each 8 in. High x 10 in. Wide) Covering Different Classes of Overhauling

consists of 28 lb. of thermit, 13 oz. of manganese steel and 8 lb. of scrap steel, such as old washers. In general, the company has found that thermit welding gives excellent results for all cast steel work, but is not so serviceable for Bessemer steel or cast iron.

INSPECTION AND OVERHAUL RECORDS

Every motorman, on taking a train out in the morning, is furnished with an 8-in. x 6 in. card to cover reports on such troubles as may arise during the service. Unless the defects set down are serious, the card remains on the train for the records of succeeding motormen until the cars are turned in at night by the last men in charge. It will be observed, however, that the motorman who reports a defect on this card must give his number so that the responsibility for trouble is not divided. These cards are examined by the night inspectors whose report on the defects corrected is made out on a separate blank for the local foreman. Cars in for inspection are designated by a linen tag on which there are provided spaces for individual signed records of the repairs on electrical equipment, trucks, doors and bodies. The reports on all cars inspected are assembled on the foreman's daily form, this record also including washing, lubrication, brake adjustments, lighting circuit inspection and car-body examination.

When a car is in for its regular overhaul or for heavy repairs, it is marked during its stay in the shops by a linen tag similar to that used in the inspection work. When the car has been made fit for service again, the record of everything done for that purpose is submitted by the shop foreman on the sheet reproduced. This report covers the work done or replacements made on the wheels, axles, trucks, motors, armatures, electrical equipment, air brakes, car underframe and the emergency outfit. This foreman's record is based on a series of shop detail forms numbered 306-A, B, C, D, E and F, and emanating from the foremen of the respective shop sections which handle the different classes of work indicated on the records as follows: "Form "A" includes all necessary changes or replacements on car and compressor motors; form "B" includes trucks and axles supplemented by forms "C" and "D" which cover wheel and tire changing and tire turning for weekly periods; form "E" includes painting touch-ups, and form "F" deals with compressors.

Ruled white cards 11¾ in. x 8¼ in. in size, of the design illustrated, are used to serve equally well for the permanent records of car body changes including the control, trucks, motors and armatures. The wheel, tire and axle records are kept partly on an 8 in. x 5 in. card and partly on the enclosing ruled envelope, as illustrated.

Wheel No. ..... Tire No. .....
Maker ..... Maker .....
Class ..... Dia. ..... Class .....
Date Received ..... Scrapped .....

Into Service			Out of Service		Measurement		Tire Loss Calipered	Remarks
Car No.	Axle No.	Date	Date	Reason	Before Turning	After Turning		

London Underground Railways—Wheel Record Card (5 in. High x 8 in. Wide)

DOUBLE-GEARED MOTOR IN ENGLAND

In an article contributed to the April 7 issue of the *Tramway and Railway World* Albert A. Blackburn describes a rigid double-geared motor drive applied to a Brill 21-E truck. This truck was 16 ft. long, had a wheelbase of 6 ft. 6 in. and carried 30¾-in. steel-tire wheels on 4-in. axles. The motors were of the Westinghouse No. 200 35-hp type, and the motor armatures were fitted with pinions at both ends of the shaft. At the time of Mr. Blackburn's report the truck had been in service for two years and had run 74,800 miles. The first inspection was made after the car had been in service six months, and it was then found that all wheel flanges were wearing exactly alike, both in shape and thickness; the circumference of all the wheels was also the same. The teeth of the gears and pinions, wheels and bearings, were found to have worn evenly. The same consistency in wear has appeared in the later inspections. The life of the armature bearings has been increased because the wear at both ends is equal, thereby avoiding undue wear at the commutator end. It has been found that the brake shoes on this truck wear longer than on trucks with the usual single reduction gear. The test car does not take any more current than other cars of the same general type.

SHOP FOREMAN'S DAILY REPORT

The particulars given below are a correct record of all work done on Cars at .....Depot .....day.....day of.....19....

STATE BELOW THE CAR NUMBER AND NATURE OF REPAIR WORK DONE

Cleaning and Washing		Trucks	
Oiling and Greasing		Shoe Gear	
Brake Adjustments		Valves	
Brake Blocking		Lighting	
Gate and Door Adjustment		Electrical Equipment	
Motors		Advertisements	
Governors		Other Work Done	
Compressors			
Controllers			
Car Bodies			

Signed .....*Shop Foreman*

Date .....19.....

London Underground Railways—Shop Foreman's Daily Report (13 in. High x 16 in. Wide)

Axle No ..... Class ..... Diameter ..... Maker .....
Date Received ..... Date into Service ..... Date Scrapped ..... Reason .....

Into Service			Out of Service		Wheel Nos.	Remark
Car No.	Truck No.	Date	Date	Reason		

London Underground Railways—Axle Record on Envelope (5 1/2 in. High x 8 1/2 in. Wide) Containing Wheel Record

Owing to the increasing popularity of the automatic ticket delivery machines which have been placed in tube and district stations, London, Eng., the management of the Bakerloo, Piccadilly and Hampstead lines has ordered 25 more, making 50 in all. Recently 76,000 tickets were issued by the machines in one week.

DEPARTMENT OF MAINTENANCE OF WAY AND BUILDINGS—METROPOLITAN STREET RAILWAY COMPANY

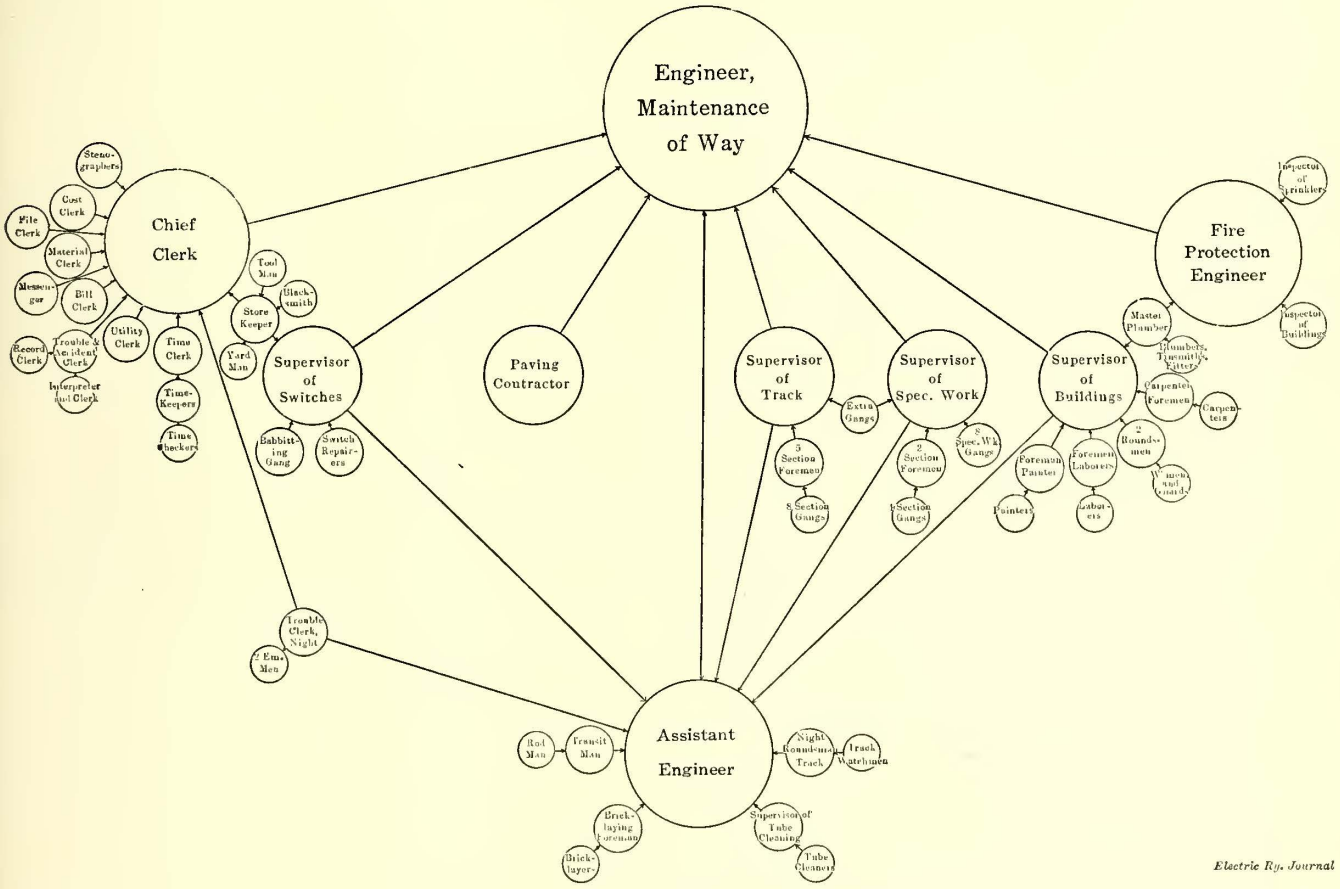
With the exception of the channel rails which form an essential part of the system of power transmission of the Metropolitan Street Railway system, the maintenance of the track structure and the adjacent pavement is supervised by the engineer of maintenance of way, who also has charge of the maintenance of all of the buildings used in operation.

SCOPE OF WAY DEPARTMENT

The jurisdiction of the department of maintenance of way includes all work of an ordinary maintenance character, such as repairing loose and broken rails and joints; repairing pavement in the railway area; cleaning the conduit on electric lines; cleaning and repairing switches on electric and horse lines; greasing curves; replacing broken insulators, manhole and special vault covers; cleaning all manholes, handholes and special pits; inspecting and guarding track structures in places where excavations are made under or adjacent to them in connection with subway construction, water and gas main installation, etc., and all such rail renewal, special work renewal, special work modification and rearrangement, additional feeder and conduit manhole construction, regrading and reconstruction as are found necessary or advisable from time to time. This department does no work on cables or power feeders, but installs the necessary ducts in which the electrical department carries its cables and feeders. It also makes repairs to these ducts and manholes and does other street work for the electrical department as required. A very important function of the department of maintenance of way is the removal of snow from the surface of the street and from the conduit. This particular subject was discussed at length in the article published in the ELECTRIC RAILWAY JOURNAL for April 23, 1910.

This department also has under its jurisdiction such ordinary maintenance work as carpentry, painting, plumbing, roof ing, tinsmithing, sidewalk repairs, etc., and all matters affecting the subject of prevention of and protection against fire, maintenance of fire-fighting apparatus, cleanliness in housekeeping and the maintenance of watchman service. Upon the maintenance of way department, more than upon any other single department of the system, has devolved the task of eliminating structural fire hazards in the properties used in the operation of the road, and of reducing the so-called "moral hazard" through frequent inspections, thereby correcting practices among employees, which, if unchecked, would be likely to result in fires. The activities of the department in this connection were covered by the article on Fire Protection and Insurance which appeared in the issue of April 16, 1910, of the ELECTRIC RAILWAY JOURNAL. The department also attends to all new construction in the properties of the system.

An organization chart is presented illustrating the assignment of work to the various sub-departments. This chart is largely self-explanatory. A short statement might be made, however, in regard to the "trouble clerk," whose office is open during the entire 24 hours of the day. The duties of this clerk consist chiefly in receiving telephone messages relating to emergency conditions which require action on the part of the department of maintenance of way. The information comes from a number of sources, but very largely from the report clerk of the transportation department, to whom hurry calls are telephoned by transportation employees and officials who may be at the scene of trouble. The trouble clerk of the maintenance of way department communicates directly by telephone with the foreman who should handle the necessary inspection or repairs. The existence of any unusual condition which affects or may affect the track structure is thus brought promptly to the attention of the maintenance of way department. Some of the occurrences which the trouble clerk must act upon are the choking up of catch-basins and consequent threatened flood of the conduit; the digging of excavations in the vicinity of the tracks; the discovery of broken insulator



Metropolitan Track—Organization Diagram of the Maintenance of Way Department

covers and manhole covers; the existence of loose or broken tram or slot rails, defective pavement; closing up of the slot on the surface of the street due to extreme heat or cold, car derailments, switch troubles, water leaks, gas leaks, obstructions in conduit, etc.

OPENINGS TO CONDUITS, MANHOLES, ETC.

To afford access to the sub-surface structure of the conduit electric system there are openings in the surface of the street every few feet. These openings are protected by iron insulator covers and manhole covers, according to the character of the opening. It is by no means an infrequent occurrence for these covers to be broken by vehicular traffic. There are approximately 95,000 such covers in or adjacent to the Metropolitan tracks of which about 6,500 are broken annually, principally during cold weather. If an insulator cover is not properly installed it is apt to be tilted up by a passing truck, and even a comparatively slight displacement of a cover will cause it to project high enough to be struck by the next car, with disastrous consequences to the cover and often to the car equipment. These insulator covers are located on either side of the slot rail at 15-ft. intervals.

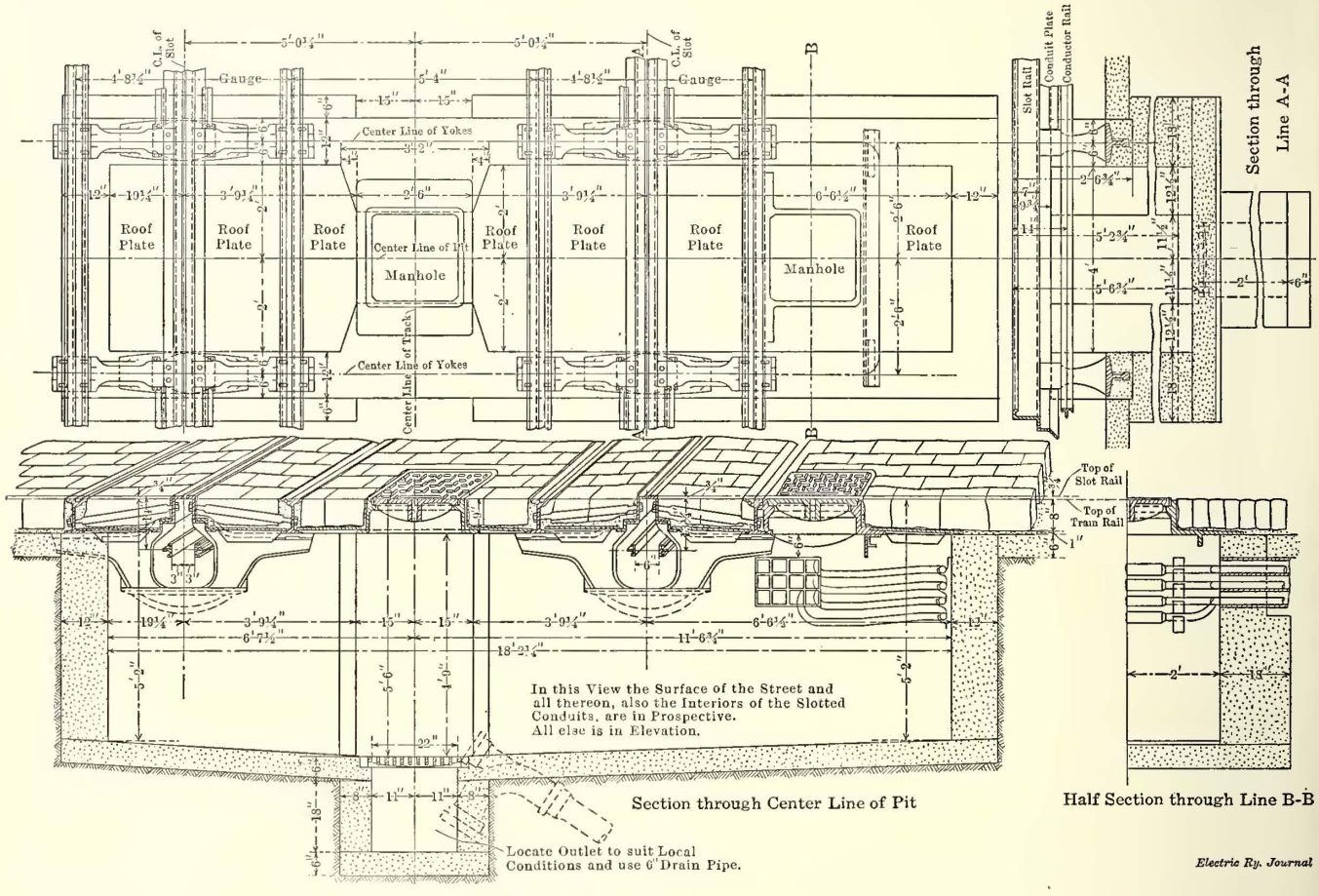
The construction of a typical feeder manhole is illustrated in the diagram on this page. These feeder manholes are constructed beneath the tracks and are spaced approximately 420 ft. apart. Between every two feeder manholes there are three cleaning manholes which are of substantially the same type of construction as the feeder manholes, although differing somewhat in dimensions. They are about 5 ft. deep, 4 ft. wide and 14 ft. long. These are inside measurements, the manholes being enclosed in a 12-in. concrete wall.

CONDUIT TRACK MAINTENANCE PROBLEMS

Track maintenance in New York is greatly complicated because the sub-surface of the thoroughfares on which the tracks are laid is honeycombed with an intricate network of gas mains, water mains, telephone ducts, Edison power and light ducts, mail tubes, steam heating pipes and sewers. The Interborough Rapid Transit Company's subway passes under many of the streets through which the Metropolitan Company's cars are operated. Whenever one of the various public service corporations or other interest using these subterranean structures has occasion to repair or extend them, the track structure, manholes and the ducts in which the Metropolitan's feeders are located are likely to be more or less affected. The difficulty of maintaining an uninterrupted car service with safety during such periods of excavation and chaos is often extremely great. The work performed by the municipality in the construction of the underground terminal at the Manhattan entrance to the Williamsburg Bridge and the construction of the subway connecting the Williamsburg Bridge and the Brooklyn Bridge presented certain peculiarly difficult problems of this nature.

One feature of the maintenance of a conduit electric system which demands constant watchfulness is the necessity of keeping the aperture between the slot rails not less than 5/8-in. wide nor more than 3/4-in. wide. Any greater width is almost certain to produce accidents through the catching of wheels of vehicles in the slot, resulting in personal injury, damage to property and blocking of the cars. On the other hand, if the slot is narrower than 5/8-in., the contact plows of cars are almost equally certain to become wedged and the force of the plow impact against the walls of the slot is so great at times as to wrench the plow from its fastenings, buckle the heavy plow bars and sometimes seriously disable the car trucks themselves.

The great changes in temperature which occur in New York City produce, of course, a corresponding expansion or contraction in the tie rods and thus widen or narrow the slot. During the winter especially one of the most frequent sources of trouble is the simultaneous occurrence of tight slots at many points of the system, requiring immediate attention to prevent serious consequences. The same complications ensue during

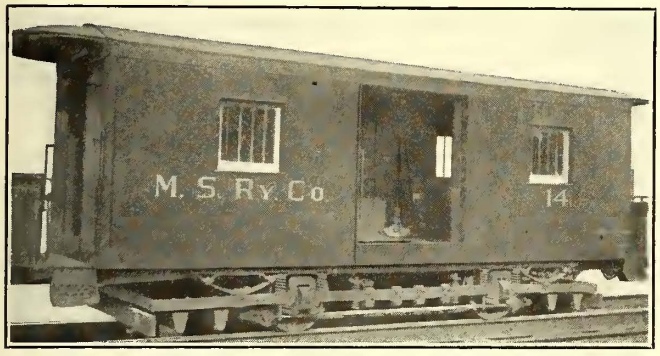


Metropolitan Track—Feeder Manhole Pit

excessively warm weather although they are more infrequent at such times than in the winter.

CONDUIT CLEANING

The work of conduit track maintenance on the Metropolitan system is aggravated because of the necessity of keeping the underground conduit free from the rubbish which falls through the slot in the surface of the street. This slot, as above stated, is about ¾-in. wide. The conduit itself is elliptical in form, the inside width being 16 in. and the height 24 in. This means

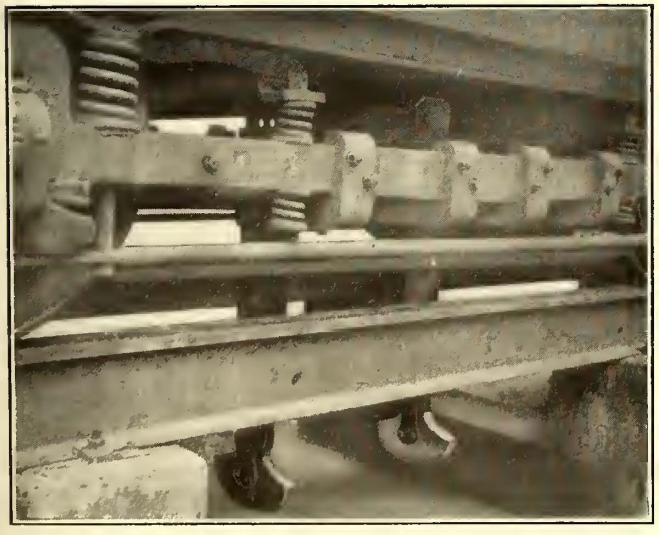


Metropolitan Track—Scraper Car

that an underground chamber of this cross section and equivalent in length to the distance between New York and Albany must be cleaned daily. As illustrating the magnitude of this work, it is interesting to state that in the course of a year there are removed from the conduit of the Metropolitan system about 400,000 cu. ft. of rubbish and dirt other than snow. This amount of rubbish would fill 373 ordinary dirt cars, which would make a train over 2¾ miles long.

SCRAPING CARS

For cleaning the conduit, the Metropolitan formerly used small trailer cars, each with a scraping device with a contour corresponding to the shape of the conduit. This small car was



Metropolitan Track—View of Scrapers

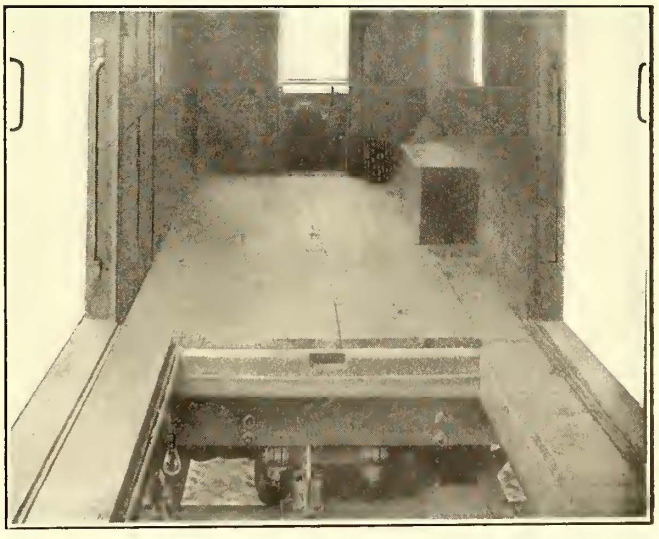
either dragged over the road by horses or was attached to the rear of an ordinary passenger electric car. Because of its relatively light weight, the trailer was very unsatisfactory. It was frequently derailed, and when the dirt, ice, snow and other material accumulated in front of the scraping device in the conduit in too large a mass, as often happened, the cleaning device would be forced upward and would become jammed against the roof of the conduit, displacing the channel rails.

These trailer cars were superseded by the present power scraping cars, shown in the accompanying illustrations. Each car is equipped with two scrapers and two contact plows so that the cars may be operated very slowly over special work without danger of becoming stalled on "breakers," that is, those points at track intersections where there are breaks in the conductor rails. The dirt in the conduit is pushed by these scraping cars into the nearest cleaning manhole, from which it must be removed by tube-cleaning gangs. These manholes are 105 ft. apart. The improved scraping car affords more protection than the old form to the men in winter. At that time the operation of the old trailer scraper cars was attended with considerable difficulty and necessitated the employment of twice as many men for crews as the power scrapers because the work was arduous, the exposure was severe and the equipment was crude.

The use of these power scraper cars has resulted in a saving of from $5,000 to $10,000 per year, depending upon the severity of the winters. This means that the scraper-car equipment has very nearly paid for itself, since the power scrapers were introduced. Furthermore, since the power scrapers have been used, the Metropolitan lines have never been tied up by snowstorms, although this was experienced on several occasions in the past when the trailer scrapers were used.

PAVEMENT MAINTENANCE

Upon the Metropolitan Street Railway Company rests the obligation to maintain the pavement within, between and for 2 ft. outside of its tracks. The total expense of this item amounts to several hundred thousand dollars per year and the condition of affairs will readily be appreciated from the fact that so large a portion of the streets on Manhattan Island are paved with asphalt over which a heavy street traffic passes daily. Until quite recently practically all asphalt pavement laid by the city was installed under a maintenance guarantee contract, by the terms of which the paving company bound itself not only to lay the asphalt pavement but to maintain it for a stated period of years. The asphalt companies always contended that any repairs required on a street still under maintenance contract must be made by the company which originally laid the pavement and at the original contract price. In this conten-



Metropolitan Track—Scraper Attachments Under Trap Door

tion they were always upheld by the city authorities, and the bureau of highways would not issue any permits for opening the street or making cuts in the asphalt pavement on any street until the Metropolitan Company first stipulated that the required restoration would be made by the company holding the maintenance contract for that street, at the original contract price. In practice it would frequently be necessary to disturb asphalt pavement, originally laid under a 15-year contract, the maintenance period on which had nearly expired, having but one or two years more to run. Yet, for such restoration, it was necessary to pay the original contract price, often as high as $3.50

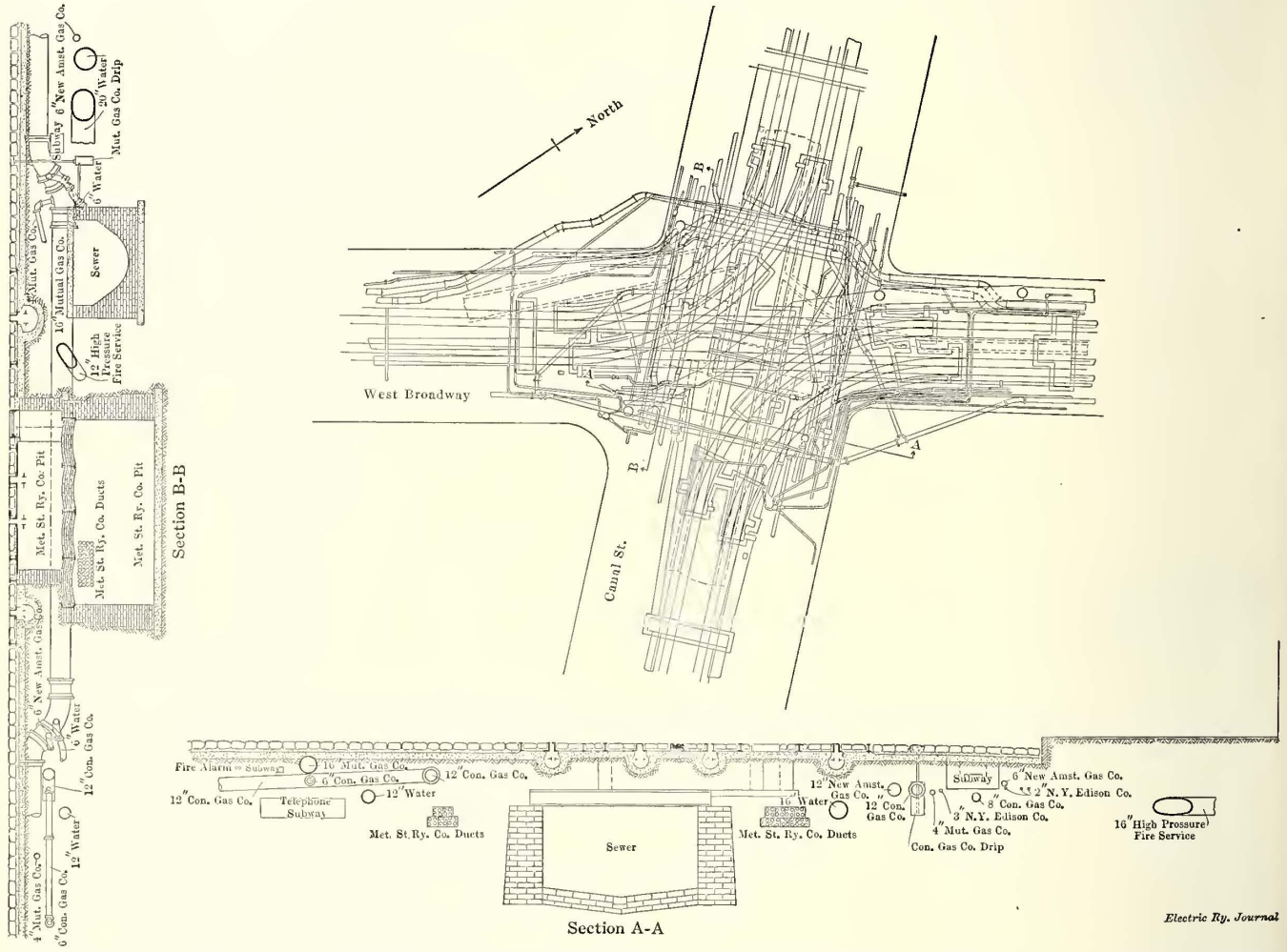
per square yard. This plan was manifestly unfair, but no success followed any attempts to get the asphalt pavement companies to quote a fairer and more reasonable price for such work until the matter was taken up by the present management. The policy was then adopted of having the necessary repairs made by the asphalt company which would do the work in the best and most workmanlike manner and for the lowest price regardless of what asphalt company might hold the maintenance contract for such pavement. As a result of this new policy the saving to the Metropolitan for the year ended Nov. 30, 1909, was approximately $25,000.

It was formerly the practice of the municipality, when repaving a street with asphalt or asphalt block pavement, to pave the entire roadway from curb line to curb line, including the space in and between the tracks, and to bill the Metropolitan Company later for the cost of the pavement laid within the railway area. This custom was decidedly objectionable, since instead of paying the regular contract price. This course resulted in a further saving of approximately $4,000 during the calendar year ended Nov. 30, 1909. Thus the total amount saved during the year mentioned was approximately $104,000.

The amounts of $75,000 and $4,000 refer merely to the saving in first cost. So far as maintenance is concerned, the economy effected by the retention of the granite block pavement, instead of substituting asphalt in the territory affected by the operations during the year ended November 30, 1909, will amount to approximately $8,000 annually. As this principle is followed out further, the resulting annual maintenance charge will, of course, be materially decreased, but in the absence of definite information as to the future plans of the city in repaving thoroughfares no exact figures can be given.

PAVEMENT

A careful study has been made of the relative merits of the various types of pavement, as viewed from the standpoint of



Metropolitan Track—Plan and Sections at West Broadway and Canal Street Showing the Maze of Subsurface Conduits and Transmissions

it increased the maintenance charges, because maintenance of track on asphalted streets costs more than on granite paved streets, and because granite block pavement has been found in New York superior to asphalt or asphalt blocks in and between tracks. An arrangement has recently been made, however, between the company and the city authorities by the terms of which the Metropolitan agreed, on condition that it be allowed to retain the granite block pavement in the railway area, that it would bear the expense of paving the 2-ft. strip on either side of the tracks with the same character of pavement as the city authorities might lay on the balance of the roadway. By this arrangement, during the calendar year ended Nov. 30, 1909, a saving of approximately $75,000 was effected. Furthermore, the Metropolitan provides the concrete paving base in restoring pavement which it has been necessary to remove, the railway company. The pavement in the railway area on Manhattan Island, to which reference has been made above, is usually one of three types, namely, sheet asphalt, wooden block and granite, the block and granite paving being laid with tar joints, and tar and gravel joints, respectively. The experience of the maintenance of way department on the relative costs of these different kinds of paving may be interesting.

If the assumption is made that all rails will be relaid twice in 20 years, the average cost per year per yard for a period of 20 years of the different pavements per square yard per year would be: Sheet asphalt, $.554; wooden block, $.4545; granite, $.2715.

The asphalt pavement, aside from being the most expensive, is distinctly the most undesirable pavement to place in the railway area because the vibration of the rails tends to loosen

the adjacent asphalt, and the wheels of passing vehicles accelerate the process of deterioration, by causing the pavement to crumble away. In winter, when the pavement becomes coated with ice, and during damp weather, when the atmospheric conditions are such as to make the asphalt extremely slippery, considerable delay is caused to the movement of cars by the falling of horses upon the tracks. The latter objection applies also to the wooden block pavement. Again, because of the better footing afforded by the granite block pavement, there is less tendency on the part of truck-drivers to drive their horses on the railway area, than when the adjacent roadway is paved with asphalt or wooden block. Efforts are made in New York by the Traffic Squad of the Police Department to prevent this use of the tracks, but it has not been entirely stopped.

The repairs to wooden-block or granite-block pavement may be made by the employees of the railway company, whereas asphalt repairs must be made by some asphalt company which has the necessary apparatus for performing this work; consequently, defects cannot be as promptly eliminated in the case of asphalt pavement as with wooden block or granite pavement.

The fact that asphalt can only be restored by an asphalt company materially delays the restoration of the street to its normal condition when repairs are being made to tracks because, with wooden-block or granite-block pavement, the whole operation can be performed by the railway employees, whereas, in the case of asphalt pavement, the holes must be left in the street until the asphalt company can replace the pavement.

The process of replacing broken rails is much easier when granite-block pavement is used than where wooden block or asphalt pavement is employed, one reason being that the base for block and asphalt pavements is of concrete which must be disturbed whenever a rail is taken out.

For these reasons, whenever the Metropolitan management renews rails on streets where the pavement in and between tracks was formerly asphalt, it substitutes granite blocks for the asphalt, with, of course, the consent of the city authorities in each case.

The area between tracks on Broadway between Canal Street and Chambers Street, is paved with track block, the dimensions of which are 7 in. x 3 in. to 4 in. x 5½ in. to 6 in. This pavement must be renewed every four years. On West Broadway, from Chambers Street to Canal Street, the area between tracks is paved with specification blocks, which are 12 in. x 3½ in. to 4½ in. x 7½ in. to 8½ in. It is necessary to renew this pavement every five years. The larger block is more expensive in first cost than the smaller but a workman can lay more yards of pavement in a given time with large block than with small block, and, for a given area, the large block obviously requires less tar and gravel for joints than does the small block.

For a period of five years the cost of maintaining pavement on West Broadway has amounted to $2.52 per square yard, or at the rate of $0.504 per year. On Broadway, the cost has been $2.98 for a period of four years, or $0.745 per year per square yard; in other words the small block pavement is approximately 50 per cent more expensive to maintain than is the larger block. It should be stated, in this connection, that the traffic on West Broadway is, if anything, more severe on the pavement than that on Broadway. These figures point to the desirability of using the larger block and this plan is being followed wherever 9-in. rails are laid.

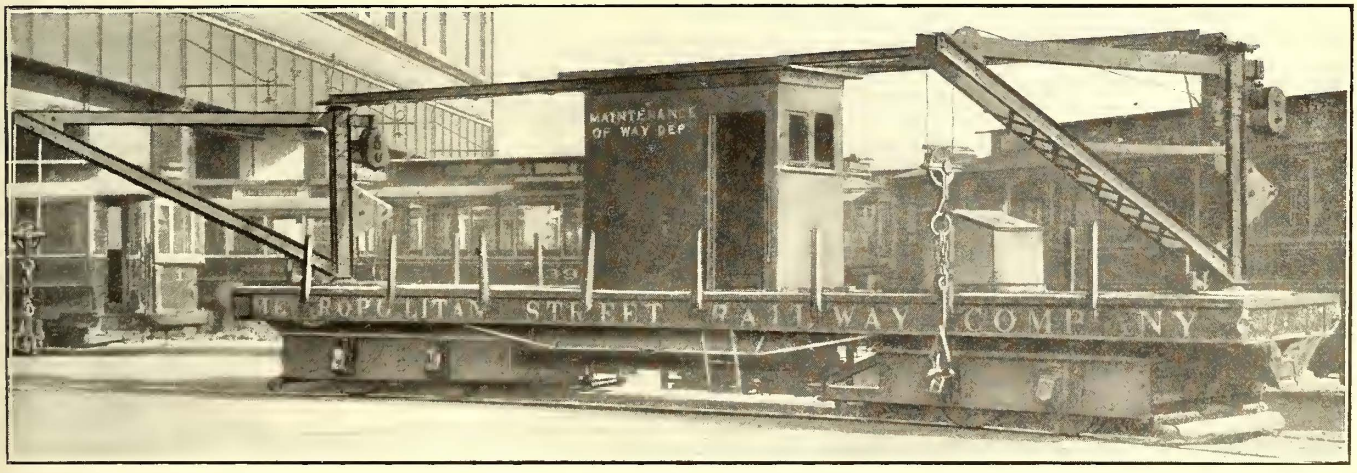
In the case of the 7-in. construction, arrangements are being made to increase the size of the block whenever it is necessary to repair the pavement.

Of course, the figures given for these two thoroughfares are very much higher than the average for granite block pavement on Manhattan Island, because of the very heavy traffic on the streets involved.

TRACK RENEWALS

During the last two years rail has been renewed on 28.20 miles of single electric track and 6.88 miles of single horse car track. During the same period nearly 90 pieces of special work have been modified or renewed. Several of these pieces of special work were altered to permit of the operation of pay-as-you-enter cars on the Fourth & Madison Avenue line and on the Broadway-Columbus & Lenox Avenue line and considerable difficulty was encountered in spreading the tracks because of the interference of various sub-surface structures. For instance, on Forty-second Street between Park and Vanderbilt Avenues, the roof of the subway station was only 30 in. below the surface of the street and extreme care was necessary to avoid damaging the waterproofing of the station. In other cases, the work of modification required the shifting of gas mains, ducts and other structures, all of which had to be done without any unreasonable delay to traffic. The special work layout scheme has now been changed so that where existing tracks are 10 ft. ½ in. or over centers it will not be necessary to spread them to permit of the operation of the pay-as-you-enter cars. This layout will not only cost less to install, but the cost of maintenance has also been materially decreased. Such revised layouts have been installed at Fourteenth Street and Avenue A, Twenty-third Street and Eleventh Avenue, Twenty-third Street and Lexington Avenue and Broadway and University Place.

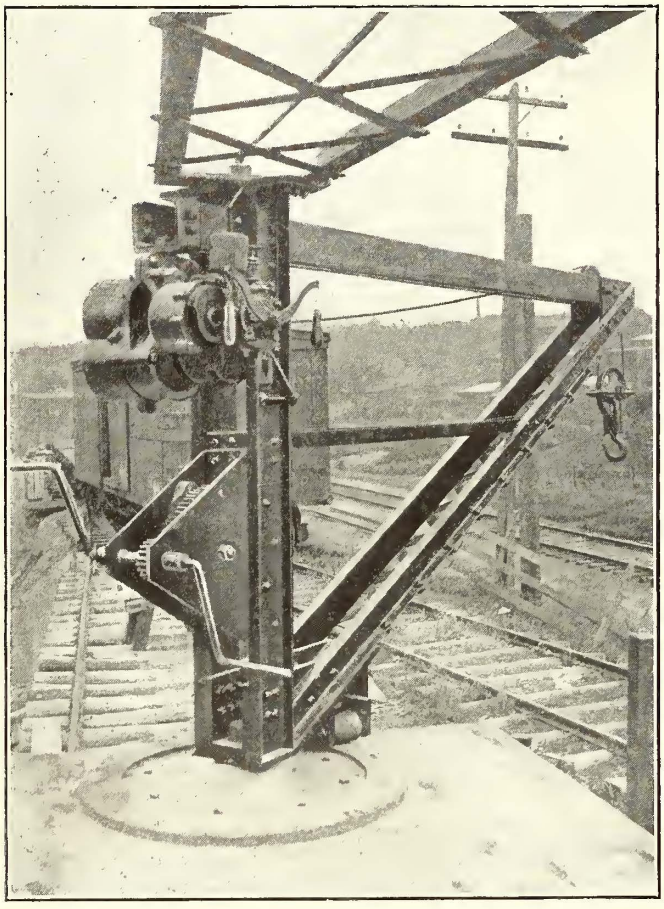
Where track has been relaid the construction has been standardized. Some of the track was originally constructed from 10 to 15 years ago and since that time the art of track construction has advanced materially. Certain of the track relaid formerly was used in connection with the operation of the roads by cable and embodied certain features not necessary or desirable in the conduit electric system. This is particularly true with reference to the tubing in the conduit as well as to



Metropolitan Track—Construction Car Equipped with Two Cranes

the type of slot rail used. In renewing rail on Broadway, wherever the old cable slot rail existed, it was replaced by the standard "Broadway" slot rail, Lorain Section No. 70/274, and the existing sheet iron conduit lining (cable construction), which was found to be badly rusted, was cut out. Further details of the track reconstruction will be found in the Electric Railway Journal for Dec. 26, 1908. During other track renewal work the company has also laid a line of ducts on Lexington Avenue between 116th and 131st Streets, about 1000 ft. of new ducts on Lenox Avenue and a line of ducts on Fifty-ninth Street, between First Avenue and Second Avenue. The management has also installed during the past two years a total of 60 new feeder manholes and 10 new cleaning manholes in various locations.

Work is now under way of relaying about 18 miles of single



Metropolitan Track—Crane on Construction Car

electric track and renewing the necessary special work involved. Three and one-half miles of horse-car track are also being relaid. At the completion of this work about 40 per cent of the total electric track of the Metropolitan system will have been relaid within three years.

The renewal and installation of special work has been very materially facilitated by using a special construction car which renders it possible to install the special track work more promptly and with less interference with car and other street traffic; at the same time the expense of labor incident to such installation is decreased by about 10 per cent.

CONSTRUCTION CAR

The halftones on this and the previous page show the form and construction of this car. It is approximately 41 ft. over the draw-heads, 8 ft. 9 in. wide overall, with a 4-ft. wheelbase and 26-ft. truck centers. The car is equipped with four motors and has two contact plows. The cranes at either end are operated by a 24-in. air hoist and each crane has a lifting capacity of five tons. This car has been very useful in the handling of equipment such as trucks, motors, etc., and bids fair to pay for itself in a comparatively short time.

SPECIAL WORK

An important improvement has been made in the design of special track work. It was the former practice to construct vaults beneath the special work, and from the roof plates suspend the insulators which support the channel rails. These vaults were approximately 15 ft square and 3 ft. 6 in. deep, although the dimensions varied somewhat according to local conditions. When repairs were made to the channel rails, it was necessary for the workmen to descend into these vaults and perform their task in very cramped quarters. The operation was more or less dangerous and unsatisfactory for many other reasons, because it was necessary not only to clean out the vaults constantly, but they had to have special sewer connections and the company had to provide for any other subterranean structures which were disturbed by the construction of the vaults.

All new special work is so constructed that the handholes are cast into the special work itself, so that there is easy access from above to the insulators supporting the channel rails. This plan does away with the necessity of any vault whatsoever, makes it practicable to maintain the special work in much more satisfactory condition, because of its greater rigidity, and lessens the noise caused by the passing of cars over the special work since the old vault construction formerly acted as a sounding-board. Briefly, the new type of special work lessens the initial outlay, requires less expense for maintenance and its life is from 20 to 40 per cent more than that of the old type of construction.

All of the special work on the Metropolitan system is now made with removable hard centers of manganese steel at all tram-rail intersections, but this construction is not considered necessary at the intersection of the slot rail with the tram rail. This feature of special work construction renders it possible for the Metropolitan to renew the hard centers when they become worn. This work is done by the Metropolitan's own employees, of whom there is a special gang organized for this particular work.

Improvements have been made in the design of switch mechanism and steel yokes. The switch has been materially improved in that the entire top is now of manganese steel and the tongue has an improved fastening with an adjustable check piece with which wear in the tongue pin is taken up. The slot switch boxes are now furnished with a removable top, allowing the renewal of slot leaves without disturbing any pavement. The value of the latter improvement in the design of these boxes was amply demonstrated recently, when a wearing plate from a car contact plow became wedged back of the crossover slot leaf, so that the next car which was sent back over the crossover badly bent this leaf. With the old style slot switch box it would have required at least half an hour to have removed this bent slide, but with the new style of box the defective slide was removed and a new one was installed in about five minutes.

The switch mechanism levers have been made somewhat heavier at bearing points, allowing the holes to be bushed when worn. In addition to this the fork ends of the levers, where the wear is very heavy, have been made renewable, the effect being to increase the life of the special work and switch mechanism. The top angles of steel yokes have been made ¾-in. thick, instead of ½-in. as formerly. As nearly as can be estimated, this change has increased the life of the yoke approximately 33 per cent.

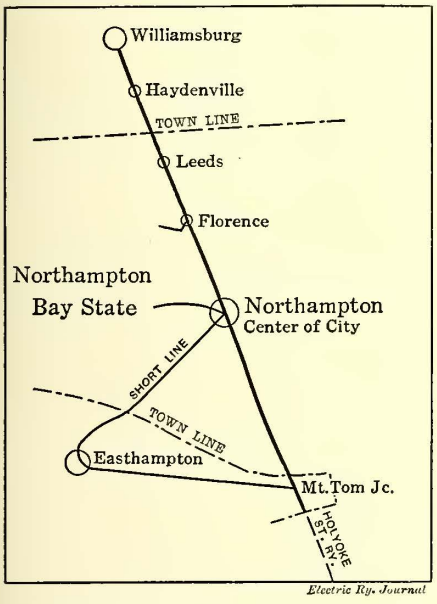
NEXT ARTICLE

In the next article on the Metropolitan system track standards and the general rules of the maintenance of way department will be discussed.

The freight and express committee of the American Street & Interurban Railway Transportation & Traffic Association did not meet in Cleveland, Ohio, on Monday, May 2, as was planned. It is expected, however, that the committee will hold a meeting in Cleveland within a few days.

HEARING BY MASSACHUSETTS RAILROAD COMMISSION UPON NORTHAMPTON FARES

The Massachusetts Railroad Commission gave a public hearing on April 21 upon the petition of the Northampton Street Railway Company for authority to place in effect a new schedule of fares. This is the latest of the requests for permission to increase fares in Massachusetts, and special interest attaches to the manner in which the case was presented, owing to the attention which this movement in Massachusetts has attracted in all parts of the country. Counsel Edward S. Shaw opened the case for the company, stating that the proposed change amounted in general to an increase in charges, but that it was purely a business question. The laws were based on a theory of a partnership between the company and the public. Improved and efficient facilities were required by the public. On the other hand, the company required a reasonable net revenue from the public in return for the service rendered. The present management of the road had made a careful study of the financial condition of the property, and had determined that an increase of income was absolutely necessary. The revenue could only be obtained in such a company by some raise in the rates of fare, since a conservative and careful management had done what it could to conduct the service along economical and yet efficient lines. The proposed schedule appealed to the management as fair and equitable.



Map Showing Northampton and Surrounding Towns

Henry M. Tyler, president of the company, reiterated the idea of a partnership existing between the road and its patrons. He said that it was a matter of public importance that a transportation company should be able to get a fair return upon the money invested in the property. The company had gradually been led to the present position that additional revenue was necessary to its prosperity. Year by year there had been a decided increase in the cost of material and other expenses, and consequently more and more difficulty in getting a fair return and giving the public the necessary service.

TABULATION OF PRESENT FARES.

	Mileage half-trip.	Length of ride obtainable with transfer, miles.	Fare.
Williamsburg through Leeds..	4.00	....	5 cents
Williamsburg to railroad station in Northampton.....	8.79	18.03	10 cents, with transfer; tickets, 12 for $1, without transfer
Haydenville to R. R. station, Northampton	6.89	16.13	10 cents, with transfer; tickets, 16 for $1, without transfer
Leeds to R. R. station, Northampton	5.36	14.60	5 cents
Florence to Mt. Tom Junct'n.	5.99	12.29	5 cents
Bay State to Bridge St.....	2.93	9.73	5 cents
Burt's Corner in Easthampton to Northampton.....	7.41	12.76	5 cents
Maloney's X'g to Northampton via Mt. Tom Junction.	9.24	14.60	5 cents

L. D. Pellissier, treasurer of the company, then presented detailed figures showing its operations from 1893 to 1909. They were printed and in two tables. The first gave statistics of the company's outstanding securities earnings, dividends, surplus and deficit, passengers carried, car miles run, miles of track owned, equipment, number of men employed, wages, rate of fare, etc. It showed a steady decrease in net earnings and net divisible income, with increase in traffic, car miles, wages paid and expenses. The second table gave the operating expenses in detail. Mr. Pellissier also submitted the accompanying tabulations of the present and proposed rates of fares.

Mr. Pellissier explained that the company desired to discontinue the sale of reduced rate tickets between Williamsburg and Northampton and between Northampton and Haydenville, in each direction. It also wished to establish a fare limit at Mt. Tom Junction, and to re-establish the old fare limit at the Easthampton-Northampton boundary line, near Meadow Park. He explained these proposed changes in detail.

Continuing, he said that the company began operating by electricity in 1893. At that time the capital stock was $150,000, and 4¼ miles of track were in operation, extending from Northampton to Florence, and a branch line to Bay State. In 1894 a line was extended from Florence to Williamsburg, about 6 miles; in 1895 a line was built from Northampton to Easthampton, 5 miles; and in 1898 the State Street and Bridge Street extensions were built. The rate to Williamsburg from Northampton was two 5-cent fares, a distance of nearly 9 miles; the rate from Northampton to Easthampton was two 5-cent fares, the distance being 5 miles. In October, 1899, the rate of fare on the Easthampton line was reduced from 10 to 5 cents. Up to 1900 16.5 miles of track were in operation and the investment reached $385,000. The capital stock was $300,000 and the floating debt and bonds amounted to $85,000. Mr. Pellissier stated that as the investment up to this time was small and the cost of operation low, the company earned good returns. During the years 1900 and 1901 a line was built from Northampton to Mt. Tom Junction and from Mt. Tom Junction to Easthampton Center, adding 8 miles of track. This construction, with requisite cars and power house equipment necessitated an additional investment of $275,000; and although the company gave the public better facilities and longer rides, the same rate of fare was charged as before. In 1902 the people of Williamsburg demanded a reduction of fare on that line, with the result that books of tickets were sold at the rate of 12 rides for $1, and also at the rate of 16 rides for $1 between Northampton and Haydenville, on the same line. The effect of these concessions was emphasized in the statement of operations, net earnings dropping off 22 per cent. in a single year.

TABULATION OF PROPOSED FARES.

	Mileage half-trip.	Length of ride obtainable with transfer, miles.	
Williamsburg through Leeds..	4.00	....	5 cents
Williamsburg to R. R. station, Northampton	8.79	11.73	10 cents, no reduced tickets
Haydenville to R. R. station, Northampton	6.89	9.83	10 cents, no reduced tickets
Leeds to R. R. station, Northampton	5.36	8.30	5 cents
Florence to Mt. Tom Junct'n.	5.36	5.99	5 cents
Bay State to Bridge St.....	2.93	5.37	5 cents
Mt. Tom Junction via Easthampton, Burt's Cor., fare limit abolished.....	9.69	15.05	10 cents, with transfer; 4 tickets for 25 cents, without transfer
Northampton - Easthampton town line to Mt. Tom Junction via Easthampton.....	7.05		5 cents
Northampton - Easthampton town line to Northampton via Mt. Tom Junction.....	9.24	14.60	10 cents, with transfer; 4 tickets for 25 cents, without transfer

Fare limit at Maloney's crossing abolished.

For the year ending Sept. 30, 1909, the gross receipts w $175,277, the greatest in the history of the road. The opera expenses were $160,720, which was usually large owing to payment of $26,125 for damages. The fixed charges fo year were $29,022, making a total expenditure of $1 creating a deficit of $14,465. Assuming $6,125 to be

yearly damage account, that being less than 3.5 per cent. of the gross receipts, which is less than the average in the State, the operating expenses would be reduced $20,000, making $140,720 a normal operating expense for the year, and a total expense for the year of $169,742, leaving the net divisible income $5,535. Had not the stockholders put in $110,000, thereby reducing the investment account by over $5,000, there would have been no return on the investment.

In conclusion Mr. Pellissier contended that most of the property had been in service 18 years, and incident to increase in age, replacements and renewals must be made in the immediate future. Five double truck cars were needed to replace those unfit for service; 5 miles of track must be renewed, and several boilers in the power station must be removed and new ones installed. This meant an expenditure of $70,000, most of which must be paid for out of earnings. With the reduction in the rates of fare on the Easthampton and Williamsburg divisions, the greater cost of operation and the increase in fixed charges, the margin of profit had become less from year to year, and now the company could barely pay expenses. In resuming the original rates of fare by withdrawing the sale of reduced rate tickets on the Williamsburg line, and re-establishing the old fare limit between Easthampton and Northampton, and making two 5-cent fare collections as formerly, and selling tickets, four rides for 25 cents, and in books of 25 for $1.50, without transfer privileges, the company expects to secure an additional revenue of about $9,000. The hearing was closed and the board took the case under advisement. It is expected that the board will render its decision at an early date.

POSSIBILITIES FOR ELECTRIC TRACTION IN JAPAN

In the opinion of an observant traveler who visited Japan recently, there is a large future in that country for electric railways as supplemental to the Government steam railroad system. This opinion is confirmed by interviews with a number of Japanese who are well informed on the situation. For a number of years, interrupted only by the exigencies of war, the national government has been taking over the steam railroads belonging to private corporations and has been building connecting links to complete the system. The Imperial Government railways now consist of 5248 miles of road. There are only 445 miles of road in the country under private ownership. These lines are widely scattered and have been built to serve private interests, such as mining propositions, rather than public needs. Ten years ago, Japan owned but 979 miles of the 3172 miles then in operation.

One reason for believing that the future roads will be largely electric is that Japan has many water-powers which are going to waste, and these powers could economically be used to operate electric feeders for the steam lines into districts which are not reached by them. These lines should be cheaply constructed for, apart from the rail, material is plenty and labor is cheap. Japan, for instance, is sending ties to both the United States and China. The Government now operates about 25 miles of trolley lines about Yokohama Bay and is extending these lines. The trolley cars use the same stations as the steam railroads in many places and connections are made between the two systems of transportation.

Another reason why electric roads are well suited to supply the needs in Japan is that the chief function of the steam railroads now is the transportation of passengers. According to the last report of the Imperial Government railways, the receipts from passengers were $18,786,865 and from freight were $14,651,808. The passenger business more than doubled during the year. There is provision for three classes of passengers, and an analysis of the earnings shows that the third-class passengers were carried at the rate of a little more than 0.7 cent per mile and that the average fare paid by each passenger of this class was about 15 cents. Certainly this is interurban traffic and the kind of business which can be best handled by electric lines.

THROUGH RUNNING AGREEMENTS IN ENGLAND

A very important factor in the development of British tramway undertakings, particularly in London and its environs, is the arrangements for leasing other lines and operating through routes over connecting lines. The value of through running as regards convenience to the public has become so well recognized that in recent years Parliament has approved the insertion in tramway bills of clauses authorizing through running facilities, and, failing agreement, a settlement by arbitration of all questions arising therefrom. As these agreements are similar to those made in the United States between city and interurban railways, it may be of interest to publish the following abstract of a schedule prepared for the Metropolitan (London) Association of Electric Tramway Managers by T. B. Goodyer, its honorary secretary, and also manager of the Croydon Corporation Tramways.

The Bexley District Council Tramways run over the London County Council Tramways from Wickham Lane Corner to Beresford Square, Woolwich, a distance of 1½ miles and pay 6d. (12 cents) per car-mile. This payment is subject to revision by arbitration at the end of two years. Bexley retains all fares collected in the London County Council area. The service began on July 25, 1908, and is to continue for about 15 years, when part of the Bexley system can be bought by the London County Council.

A similar agreement between the Croydon Corporation Tramways and the South Metropolitan Tramways Company provides that each authority shall receive its own local fares, and proportion of through and overlapping fares. All excess mileage is to be paid for at the rate of 3d. (6 cents) per car-mile. Each system uses about 2 miles of track belonging to the other. The Croydon corporation also has a system of through tickets with the London County Council, between Purley and London and intermediate points, on the basis that the amounts to be apportioned between the authorities shall be in accordance with the fare stages traversed in the area of such authority.

The East Ham Corporation Tramways has two agreements of this kind. In Barking, where 3450 ft. of track is used, East Ham retains the fares and pays Barking 2.25d (4.5 cents) per car-mile for the first 83,000 miles per annum, plus an amount of £641 ($3,118.40), being interest and sinking fund on capital expended. This latter sum is equivalent to 1.85 d. (3.7 cents) per car-mile. For all mileage over 83,000, a sum of 2.5 d. (5 cents) per car-mile only is paid. In Ilford 1640 ft. of track is used. Ilford receives from East Ham 6 d. (12 cents) per car-mile for all cars run over this section. Ilford supplies current and maintains the track and East Ham retains the fares. The 6 d. (12 cents) per car-mile is made up as follows:

	Pence.	Cents.
Power	1.90	3.8
Rates and taxes	.40	.8
Maintenance of track and overhead	.40	.8
Capital repayments on track and overhead	1.25	2.5
Contingencies	.25	.5
Estimated proportion of profits	1.80	3.6
	6.00	12.0

The West Ham Corporation Tramways operate in the East Ham area a distance of 4080 ft. West Ham pays to East Ham all receipts and receives back 4.937 d. (9.874 cents) for working expenses. At the close of the year, all receipts over 10 d. (20 cents) per car-mile, a figure representing the earnings on the section prior to through running, are divided, one-third going to West Ham and two-thirds to East Ham. East Ham cars are operated in the West Ham area from Green Street to Iron Bridge, a distance of 1 mile 4635 ft. Both authorities run through cars, and each receives all money paid for fares in its own area, and its proportion of through fares. Either authority running more than its share of mileage is paid for same at the rate of 1.15 d. (2.3 cents) per car-mile.

The West Ham, Leyton and Walthamstow tramways operate jointly a line in West Ham, 4257 ft.; in Leyton, 2 miles 1902 ft., and in Walthamstow, 3 miles 681 ft. At present the arrangement is only in the experimental stage and the cars run only on Saturday after 1 p. m. and all day on Sunday. The basis of

arrangement is that the receipts are pooled and divided according to the length of route in each district. So far the results obtained are of a most encouraging character. The three areas are considered as of equal revenue-earning capacity. Each party is responsible for accidents or damages caused by its own cars in whatever district they occur unless the accident is due to some defect in track or overhead equipment. No change is made in motormen or conductors.

A STREET CAR RIDE THE CHEAPEST SERVICE OR COMMODITY WE BUY

BY GEORGE H. DAVIS, OF FORD, BACON & DAVIS

A large part of the present antagonism against street car services of the United States is psychological. Cars are in the use of, sight of, hearing of or way of everybody every day. Consequently, nearly every one has a real or fancied grievance against the owners and their operators. There are services, however, where the value of a nickel is not given and punitive measures are fully justified; but, in view of the present costs of other services and things this is not a frequent occurrence.

All classes are patrons of car companies—the wealthiest family of the city and the poorest laborer working intermittently at $1.50 for ten hours. The wealthy can use their automobiles, the well-to-do hire taxicabs and the poor can walk. A good family automobile service, including the employment of an expert driver with maintenance of equipment, purchase of supplies, depreciation, taxes, insurance, damages, interest on the investment and other indirect items, costs not less than 50 cents per car mile—$15 per day for an average run of 30 miles, or $450 per month. If a man rides daily in his machine from his residence to his office or shop, a round distance of 10 miles, it has cost $5 carfare. If he makes the trip by taxicab his fare has cost 50 cents for the first mile and 40 cents for each additional mile.

The excessive amount of time consumed by carriage conveyance prohibits its use except by those whose time is unemployed or of very moderate market value. In the case of a day laborer working for 15 cents per hour and living 3 miles from his work, if he walks, consuming 40 minutes, his transportation has cost him 10 cents instead of 5 cents on a street car.

Another important item included in the 5 cents is accident insurance. If the company does not transport a passenger safely it has to pay all damages to him, while if he rides in his automobile or walks, he has to pay his own damages.

A street or steam car is the only conveyance in which a passenger can employ his time in reading business documents or other matter to practically as great advantage as in his office or home. This alone saves daily many high-priced men 200 times the insignificant carfare paid the street railway company and, as stated before, it saves even the unskilled laborer an amount equal to his car fare.

So much has been said in depreciation of street car service, both as to cost and quality, that many people actually believe that they are being grossly cheated every time they pay for a ride. Compare in a few points other than cost, the various available means of artificial city transportation; the automobile, carriage, omnibus and street car. The street car company furnishes with transportation electric light sufficient for reading. An automobile can be electrically lighted with storage battery if the cost is not a consideration. All city public conveyances such as taxicabs and carriages are without light. These conveyances are also without artificial heat. In regard to speed, with a given standard of safety to passengers, pedestrians and vehicles, street cars maintain a higher average rate than any city conveyance, private or public. This is possible because the cars are operated on a fixed trackage, the location of which other occupants of the street know and avoid.

There is the readiness-to-serve charge which is included in the nickel. In modern city operation, cars are at the constant disposal of patrons night and day. It would be expensive to maintain a carriage or automobile at a shop, office or residence for 18 to 24 hours and for 365 days. If the hours of a street car service could be reduced one-half, say from nine to 12 hours in the twenty-four, all the expenditures of the company except taxes, interest, depreciation and salaries of general officers could be correspondingly reduced. For a city of 100,000 population this would amount to at least $400,000 per annum; and for the entire country, $100,000,000. This is what the street railways pay to be ready to serve the people.

Steam railway passenger rates are extremely low comparing the service they render with that which is sold by merchants, manufacturers and others. The average receipts of all the steam roads of the United States reporting for the year 1907 was over 2 cents per passenger mile. Assuming that the average ride per passenger on street cars is 3 miles, this would give a fare rate to the street railway company of 6 cents,

AVERAGE DISTRIBUTION OF LIVING EXPENSES WITH INCOME OF $827.19, FROM BULLETIN NO. 71, BUREAU OF LABOR.

	1901		Per cent of Total
Fresh beef	$50.05	349.7 lbs.	
Salt "	5.26	48.6 "	
Fresh hog products	14.02	114.2 "	
Salt " "	13.89	110.5 "	
Other meat	9.78	77.7 "	
Poultry	9.49	67.7 "	
Fish	8.01	79.9 "	
Eggs	16.79	85.2 doz.	
Milk	21.32	354.5 qts.	
Butter	28.76	117.1 lbs.	
Cheese	2.62	16.0 "	
Lard	9.35	84.4 "	
Tea	5.30	10.6 "	
Coffee	10.74	46.8 "	
Sugar	15.76	268.5 "	
Molasses	1.69	3.6 gal.	
Flour and meal	16.76	680.8 lbs.	
Bread	12.44	252.7 loaves	
Rice	2.05	25.1 lbs.	
Potatoes	12.93	14.7 "	
Other vegetables	18.85		
Fruit	16.52		
Vinegar, pickles, etc.	4.12		
Other food	20.40		
Total food	$326.90		42.54
Rent	99.49		12.95
Mortgage:			
Principal	8.15		1.06
Interest	3.98		.52
Fuel	32.23		4.19
Lighting	8.15		1.06
Clothing:			
Husband	33.73		4.39
Wife	26.03		3.39
Children	48.08		6.26
Taxes	5.79		.75
Insurance:			
Property	1.53		.20
Life	19.44		2.53
Organizations:			
Labor	3.87		.50
Other	5.18		.67
Religious purposes	7.62		.99
Charity	2.39		.31
Furniture and utensils	26.31		3.42
Books and newspapers	8.35		1.09
Amusements and vacation	12.28		1.60
Intoxicating liquors	12.44		1.62
Tobacco	10.93		1.42
Sickness and death	20.54		2.67
Other purposes	45.13		5.87
	$768.54		100.00

while, as a matter of fact, including transfers and excluding interurban operation, it is less than 4 cents. In other words, the steam railways get 50 per cent more for their passenger service than the street railways, and their principal profits are realized in their freight service. This would mean, per year, to the street railways of the United States, based upon census returns of 1907, about $200,000,000 additional receipts applicable to dividends and surplus. This item is approximately four times all the dividends on all the stocks of all the street railways of the United States in 1907. The exact dividends amounted to $53,589,399.

Much is being said at present regarding the increased cost of living. In the time of Crœsus a fat ox sold for $1; a sheep for $0.20 and a bushel of wheat for $0.12. Various estimates on this subject have been made by political economists based upon the publications of the Department of Commerce and Labor and by economic and trade publications. According to tabulations in *Dun's Review*, for the period Jan. 1, 1897, to Jan. 1, 1907, the increase in the cost of commodi-

ties has been 42.6 per cent. On the other hand street car earnings per passenger have constantly decreased in the city service of the United States. In a typical city, for example Boston, earnings per passenger, including transfers, in 1898 were 4.27 cents and in 1908 3.15 cents, a reduction in 10 years of 1.12 cents, or 26.21 per cent. Operating costs per passenger including labor and material increased by nearly one-half in this period, while earnings per passenger have decreased by more than one-quarter. In other words, with only three-quarters of the earnings per unit the cost of the service is, in 1908, one and one-half times as much as in 1898.

What the public wants is not lower fares, but the maintenance of the present high standard of service, which will be impossible much longer even at present rates. Patrons not only have the right, but it is their duty, to specify through governmental channels the kind of service desired. They must, though, in fairness, pay for what they get. There is probably no electric railway company that would object to doubling the cars in the service or making them all Pullman coaches if it received full compensation with a profit of from 15 per cent to 30 per cent as is realized in other industries.

Based upon information furnished by 2567 workingmen's families having, in 1901, an average income of $827.19, as reported by the Bureau of Labor, Bulletin No. 71, the average costs per annum per family of 5.31 persons of the principal articles are as given in the table on page 825.

It is assumed that street car fares are included in the item of $45.13, expenditures for "Other purposes." Of this amount at least half must have been spent miscellaneously for things other than transportation thus leaving about 3 per cent of total expenditures, or $23.05 per annum, for car fares. That this assumption is in excess of actual expenditures for carfare is clearly indicated in a 1909 publication by the Charities Publication Committee by Robert Coit Chapin, "The Standard of Living Among Workingmen's Families in New York City." For example, Table No. 15, page 70, in general is as follows:

Income per annum (385 families)	Expenditures for car fare per annum Average	Per cent of total expenditures
$400 to $499	$11.94	2.6
500 " 599	9.80	1.8
600 " 699	11.31	1.7
700 " 799	10.53	1.5
800 " 899	15.86	2.0
900 " 999	13.79	1.5
1000 " 1099	18.46	1.8
1100 " 1199	20.74	1.9
1200 " 1299	27.61	2.2
1300 " 1399	14.72	1.1
1500 " 1599	18.27	1.2

The expenditure of $23.05 is approximately the same as spent for fruit, vinegar and pickles ($20.64); only one-fifth of that for meat and eggs ($119.28); about one-half that for beef ($55.31) and less than was spent for liquors and tobacco ($23.37).

As previously shown, based upon an average ride of 3 miles which, in a car, only requires 20 minutes as against 40 minutes on foot, the saving of time alone to the laborer getting $0.15 per hour is $0.05 per ride which is equal to his fare and transfer. If he employs his riding time in business reading he saves its value of $23.05 per year also. The expenditure of $768.54, as detailed, was for 1901 which, with an increase of approximately 38 per cent in costs in nine years would amount to $1,060.58, of which $23.05 for carfares would be less than 2.2 per cent. In the above, only the incomes and expenditures of 2567 workingmen have been considered. Street cars are, however, used by and operated for millionaires and persons of intermediate wealth and incomes to whom street car expenditures are so small in percentage of their total expenditures as to be almost negligible.

The Federal government has made no investigation to bring out the facts regarding the incomes of capitalists, nor how their incomes are derived. It is difficult, therefore, to estimate the annual income per capita of the urban population of the United States (to which this inquiry is directed), or of the general population which would be of interest in connection with other census facts and estimates.

Incomes are derived from two sources: (a) wages (including salaries, fees, retainers and all pay for services), and (b) interests and dividends (being rent paid for money and profits on capital invested).

There is no country in the world in which capital is worked so intensely as in the United States. In estimates made by the census office as reported in "Wealth, Debt and Taxation," Table No. 7, the capital or wealth of the country is assumed to be for 1900, $88,517,306,775; and for 1904, $107,104,192,410; classified as follows:

	1900	1904
Real property taxed	$46,324,839,234	$55,510,228,057
" " exempt	6,212,788,930	6,831,244,570
Live stock	3,306,473,278	4,073,791,736
Farm implements	749,775,970	844,989,863
Manufacturing machinery	2,541,046,639	3,297,754,180
Gold and silver coin and bullion	1,677,379,825	1,998,603,303
Railroads	9,035,732,000	11,244,752,000
Street railways	1,576,197,160	2,219,966,000
Telegraph systems	211,650,000	227,400,000
Telephone "	400,324,000	585,840,000
Pullman cars	98,836,600	123,000,000
Shipping and canals	537,849,478	846,489,804
Private water works	267,752,468	275,000,000
Private electric light plants	402,618,653	562,851,105
Agricultural products	1,455,069,323	1,899,379,652
Manufactured "	6,087,151,108	7,409,291,668
Imported merchandise	424,970,592	495,543,685
Mining products	326,851,517	408,066,787
Clothing and personal ornaments	2,000,000,000	2,500,000,000
Furniture, carriages, etc	4,880,000,000	5,750,000,000
Total	$88,517,306,775	$107,104,192,410

Based upon previous rates of increase the capital of the country now amounts to more than $144,000,000,000, or $1,600 per capita for a population of 90,000,000.

It has been previously estimated by Logan G. McPherson in his article, "The Farmer, the Manufacturer and the Railroad," published by the *North American Review*, that capital invested in agriculture earns about 9.8 per cent; in transportation 4.4 per cent; and in manufacturing 15.1 per cent. In this no account is taken of the profits derived from contracting, banking, mercantile, professional and miscellaneous businesses and capital thus engaged. At present, applying past rates of increase, there is probably an amount of capital exceeding $50,000,000,000 invested in real property other than agricultural lands, gold and silver coin and bullion, exceeding $3,000,000,000; street railways, light plants, telegraph and telephone systems, water works, canals, agricultural, mining and manufactured products, merchandise and miscellaneous, exceeding $24,000,000,000, a total of $77,000,000,000, upon which, at least, an average return of 6 per cent per annum is realized, which is only ordinary interest.

Based upon reports of the Interstate Commerce Commission Department of Agriculture and special census reports, and allowing for normal increases, the extent of capital invested in active farming at present is in excess of $35,000,000,000; in railroads, $15,000,000,000; and in manufacturing $17,000,000,000, a total of $67,000,000,000. The income derived from the entire capital or wealth of the country may be summarized as follows:

Agriculture	$35,000,000,000	@	9.8%	$3,430,000,000
Railroads	15,000,000,000	@	4.4%	660,000,000
Manufacturing	17,000,000,000	@	15.1%	2,567,000,000
Other capital	77,000,000,000	@	6.0%	4,620,000,000
Total	$144,000,000,000	@	7.83%	$11,277,000,000

Exclusive of salaries, wages and other sources of income and assuming the population of the country at present as above, this would be equivalent to an annual income per capita of $125.30, or $626.50 per family of five.

The average annual wages for all railroad employees were in 1907, about $640. Employees in manufacturing occupations, men, women and children, received in 1905, about $540. The wages for men alone, according to Census Bulletin No. 93, were $11.16 per week, or $580.32 per year.

Regarding wages in agricultural pursuits, there is no accurate information available. Agricultural wages are paid in cash, food products, fuel and housing. It is estimated that wages of men paid in cash would not be less than $20 per month, or $240 per year and in other items at least an equivalent amount, or a total of $480.

The Census Report of 1909 regarding occupations gives in

classified detail the number of persons then engaged in each, the main groups being as follows:

Agricultural pursuits	10,438,219
Professional service	1,264,737
Domestic and personal service	5,691,746
Trade and transportation	4,778,233
Manufacturing and mechanical pursuits	7,112,987
Total	29,285,922

Applying the same increase as to the general population, the present number is more than 35,000,000. In general, with the exception of those engaged in professional service (which group is comparatively small), and without taking into consideration incomes derived through ownership of property, the country's present wage income would appear to be in excess of $21,000,000,000 which, with an income on account of property ownership of $11,277,000,000, a total of $32,277,000,000, would give an annual income per capita of $358.63, or $1,793.15 per family of five persons, nearly $1,800, or $150 per month.

Owing to the constant change of values, persons possessing great fortunes can only estimate their extent or the net income derived from their investment. In "Consumption of Wealth, Individual and Collective" by Hitchcock, it is stated, based upon census figures of 1890, that 1 per cent of the families of the nation receive 25 per cent of the income. There is, no doubt, in the United States, a group of individuals each having an annual income of, or at least each becomes richer annually by, an amount in excess of $50,000,000. One per cent of the entire population is 900,000 and 25 per cent of the total annual income of $32,277,000,000 is $8,069,250,000. This is at the rate of $8,965.83 per capita and leaves for the remaining population of 89,100,000, an income of $24,207,750,000; $271.70 per capita, or $1,358.50 per family of five. If the wealthy were eliminated and the companies had to rely upon 99 per cent of the population with an expenditure of as much as $27.16 instead of $23.05 per family or 2 per cent of the average income as shown, this service would then not only be the cheapest thing we buy, but would be one of the smallest of our expenditures.

CONSTITUTIONALITY OF CORPORATION TAX LAW

An account was published in the ELECTRIC RAILWAY JOURNAL for Feb. 12, 1910, of the suit before the United States Supreme Court of Wyckoff Vanderhoef, a stockholder in the Coney Island & Brooklyn Railroad Company against the company asking that the company and its officers and directors be restrained from paying the Federal corporation tax. Mr. Vanderhoef claimed that the law was unconstitutional, and as he was the holder of 10 shares of stock in the company he would be injured if the payment was made. Mr. Vanderhoef's counsel are Messrs. Linderbury, Pierson and Cox, of Alexander & Green, of New York. The attorneys for the company are Messrs. Dykman and Goddard, of Dykman, Oeland & Kuhn, of Brooklyn. Briefs for the appellees, the company, and appellant, Mr. Vanderhoef, have been filed with the court. A short statement of the most important claims made in each is presented herewith.

BRIEF IN FAVOR OF THE TAX

The first point made by Messrs. Dykman and Goddard, counsel for the appellees, is that the tax in question does not involve an unconstitutional interference with the sovereign powers and functions of the States. The tax must be paid by joint stock companies and associations, as well as corporations, showing that it was not the intention of Congress to tax merely corporate franchises, that is, the rights derived by the corporation directly from the States, although even if the corporate franchises of a State corporation were taxed, the act would not be an interference with the sovereign powers and functions of the State as there is nothing in the Constitution of the United States to prevent Congress from laying a tax of that kind. All restrictions imposed by the Constitution, arising from the dual nature of the system of government in this country, are confined to matters which have to do with the strictly governmental powers and functions of the several States. Counsel refer to the tax on State bank notes, the oleomargarine tax and the inheritance tax as among those which cannot be distinguished in principle from the present case, so far as interference with the sovereign rights of the several States are concerned.

The second point made is that the tax in question, even if in some respects an income tax, is not a direct tax within the meaning of the Constitution. The claim is made that the tax is invalid because it is an income tax. But this is not sufficient. It should be shown to be an income tax similar in nature to the tax held unconstitutional in the Income Tax Cases, that is, a direct tax. The fact that the corporation holds real estate and derives part of its profit from these holdings does not make the tax a direct tax any more than an inheritance tax which the Supreme Court has held need not be apportioned among the several States, even where the inheritance is measured by the value of real estate. Again, corporations are entirely the creation of law, and their right to hold real and personal property is entirely unlike that of persons. The tax should therefore be considered an excise tax on the privilege of doing business by corporations and joint stock companies.

The third point made in the brief of the appellees is that the tax imposed by the act is "uniform" and does not deprive any corporation or association of its property without due process of the law. The only provision of the Federal Constitution, aside from the exception of exports, which limits the absolute right of Congress to lay and collect taxes, duties, imposts and excises for the purposes mentioned in Article 1, section A, of the Constitution is that the duties, imposts and excises shall be uniform throughout the United States. The tax is uniform as it applies with the same force and effect in every State in the Union. To argue that the tax is invalid, because it taxes property without due process of the law and that the want of due process is because the tax is invalid is to argue in a circle. If the tax is valid, there is no want of due process of law. If it is invalid, it must be for some defect in the tax as a tax, but the only possible defect would arise from want of geographical uniformity which is not claimed. Uniformity does not mean equality, because if the tax were equally distributed geographically it could not be uniformly distributed. Nor is it the province of the judiciary to inquire whether the excise is reasonable in amount, or in respect to the property to which it is applied. Those are matters in which the legislative determination is final.

The fourth point made in the brief is that a tax upon the franchises or business of State railroads or public service corporations is not an interference with governmental functions or instrumentalities of the States, and is valid. If there was any doubt upon this subject, it was settled by the decision of the United States Supreme Court that if a State choose, as some of the Southern States have done, to enter into the business of selling liquors, its agents and property employed in this business were subject to Federal taxation. And the Supreme Court at that time clearly drew the distinction between properly governmental functions of States and their quasi-private functions. In the same way, if a State should engage in other business, subject to taxation, such as that of importing foreign goods, the imports would be subject to the national law.

The final point made by the counsel for the Coney Island & Brooklyn Railroad was that even if the tax should be held unconstitutional in some respects, the main purpose of the Act, being clearly within the powers of Congress, should be upheld. In this respect, the case is entirely dissimilar from the Income Tax Cases where it was held that the income derived from real estate and invested personal property and State or municipal bonds was so vitally of the essence of the Act that the tax could not be sustained as an excise tax on income derived solely from business or occupation and therefore, that the whole must fall. But in the present act Congress had clearly in mind an excise tax upon the business

done by corporations and associations and even if the Supreme Court should hold that the method of measuring the tax by net income from all sources as unconstitutional, yet the income derived solely from actual business may properly be taxed under the present Act.

THE CASE OF THE APPELLANTS

In the brief for the appellants, the case of Mr. Vanderhoef against the Coney Island & Brooklyn Railroad Company was combined with that of a stockholder of the Home Life Insurance Company against that company and its officers to restrain them from paying the corporation tax. The counsel for the appellants in both cases are the same. The argument in the case against the Home Life Insurance Company et al. differs in some respects from that in the case against the Coney Island & Brooklyn Railroad Company et al., because, among other reasons, the greater part of the assets of the insurance company are invested in real estate, United States Government bonds, bonds of individual States and municipalities and in real estate bonds and mortgages. Some of the principal points made in the brief, so far as they relate to the railway case, follow:

The first point made is that the tax is not an excise tax upon business or occupation, but is either (a) a corporate franchise tax, or (b) an income tax.

In the body of the act the tax is described as "a special excise tax with respect to the carrying on or doing business" by corporations, joint stock companies and insurance companies on which it is imposed." These words, the counsel say, were taken verbatim from the opinion of the United States Supreme Court in the case of the Spreckels Sugar Refining Company, where a tax was imposed on corporations carrying on the business of refining sugar. But this latter tax should not be considered a precedent to the one under consideration, because (1) it applied to persons and firms as well as corporations and (2) it related to income obtained from a particular business and not that received from all sources. The proposed corporation tax does not vary reasonably with the value of the business and authorities are cited to prove that a tax on all persons irrespective of their calling, measured upon a percentage upon their income, is not an excise tax on business, but is essentially an income tax. This is also shown from the fact that the tax applies to profits derived from exporting, and from business done in various countries, neither of which can be taxed by Congress as a business.

The second point made is that if the tax is construed as a franchise tax, it constitutes, so far as State corporations are concerned, an interference with sovereign powers and functions of the States not surrendered to the general government and expressly reserved to the States by the Tenth Amendment.

Counsel for the appellant believe that if the tax is not an income tax, as suggested in the first point, it can only be a franchise tax on the privilege of doing business within the United States. Congress has the right to tax corporations organized under the Federal law, but not corporations chartered by the State which do only an intrastate business, because the power to tax involves the power to destroy and if Congress can impose a tax of 1 per cent it can impose a tax of 10 per cent or 50 per cent. The right of the States to grant charters of incorporation is unquestionable and inherent in the sovereignty of the States. The Federal inheritance tax is not a precedent to the interference with these internal rights of the State because the inheritance tax falls on the transmission or transfer of property and not on any privilege granted from the State. The inheritance laws of the States simply describe the channels in which the transmission of property shall flow. There was also no question of a franchise or privilege from the State involved in the South Carolina liquor case, as this tax was a tax upon the business of selling liquor. If the proposed tax is upheld, representatives from States where an anti-corporation feeling is high, if their views are supported by a majority in Congress, can interfere with the intrastate business of other States, a condition which the founders of the government sought carefully to avoid.

The third point in the brief is that if the tax is construed as an income tax it is unconstitutional (a) because imposed upon income from real estate and personal property and, therefore, a direct tax not apportioned among the States according to population, and (b) because imposed upon income from State and municipal securities and, therefore, a burden on the borrowing power of the States. As these are essential and inseparable parts of the taxing scheme, the tax must fall as a whole.

In elaborating this point the brief says that if the words "special excise" and "with respect to the carrying on or doing business by such corporation, joint stock company or association or insurance company" should be stricken from the law it would become entirely an income tax. But these words are simply descriptive and do not change the nature of the tax. The brief points out also that substantially all of the income of the Coney Island & Brooklyn Railroad is derived from the use of real and personal property and from the exercise of franchises which by the laws of the State of New York are defined to be real estate.

The fourth point made in the brief is that the tax ordained by the act in question is non-uniform, arbitrary and unequal, and if imposed and enforced would deprive the corporations and joint stock associations against which it is levied of their property without due process of law contrary to the provisions of the fifth amendment of the constitution.

Congress, the brief says, may impose an excise tax upon the carrying on a particular business when exacted from all persons, copartnerships and corporations engaged in the business because then no inequality is involved. But any classification for taxing purposes is most unreasonable, arbitrary and vicious which includes some members of a class engaged in a competitive business and excludes others of the same class. The present act exempts fraternal benefit societies or associations operating under the lodge system, and domestic and loan associations. The latter engage in business solely for the profit of their members, and fraternal benefit associations operating under the lodge system do not differ in principle from a mutual life insurance association. There are other exceptions provided for in the act which render it unequal.

The fifth and final point in the brief of Mr. Vanderhoef's counsel is that whatever view may be taken of the act in other aspects, it must be held unconstitutional, so far as it imposes a tax on the franchises or business of State railroads or other public-service corporations, because an interference with State agencies or instrumentalities.

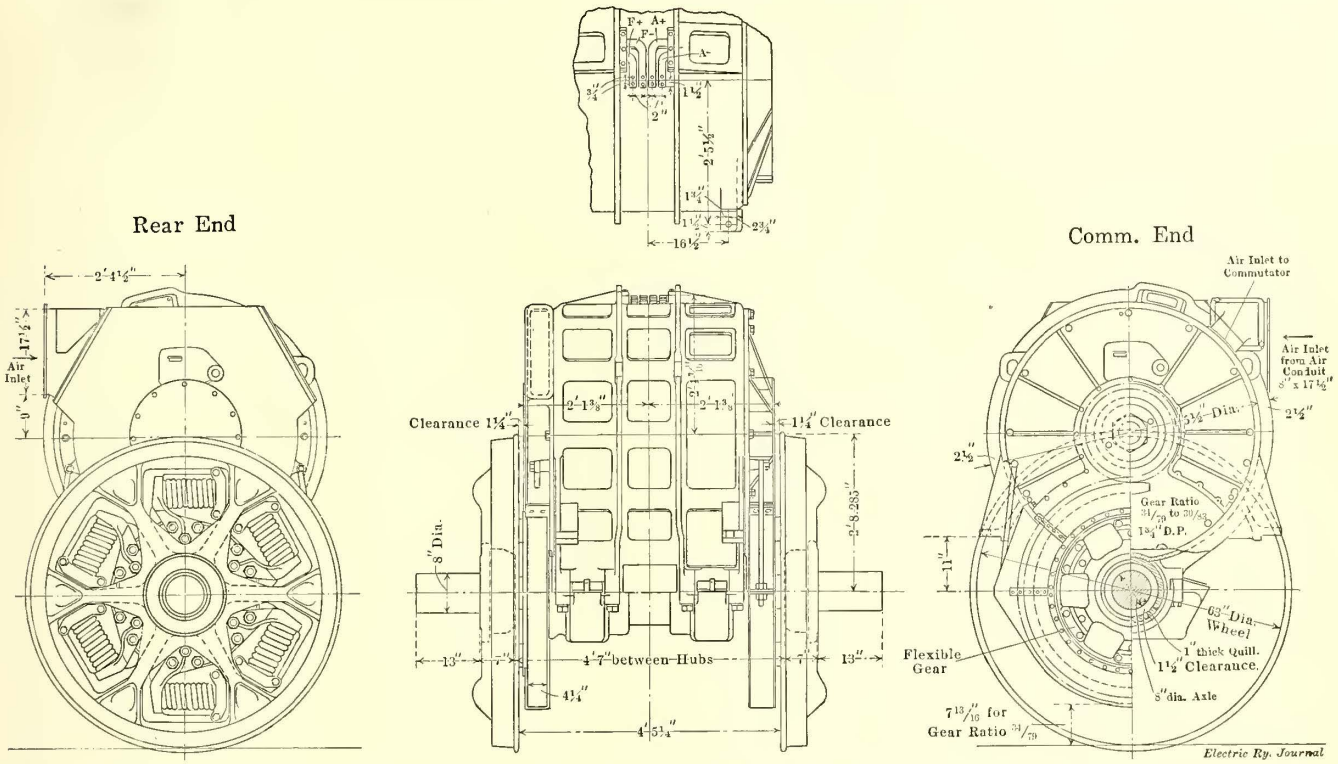
The franchises of intra-state railroad corporations like the Coney Island & Brooklyn Railroad Company are conferred by a State for public purposes. These corporations are formed, in part at least, for the purpose of aiding the State in the discharge of a governmental function; viz., to provide means of transit and intercommunication for its citizens and troops. Their business is of a public character, subject to regulation by the State in the public interest and not to be abandoned without the State's consent. They are controlled or are controllable in all their operations by the State, which has the right, not infrequently exercised, of fixing the rates they shall charge and prescribing in detail the service they shall render. In exercising the power of eminent domain, they exercise a power and perform a function of the State which charters them. The exercise of this power is part of their business. With some of them it doubtless constituted a part of the business transacted during the year ending Dec. 31, 1909, which is what the act purports to tax. Even if a person should concede the right of the general government to tax the property of these corporations as distinguished from their franchises or business, it is difficult to perceive how Congress can tax their franchises or business without violating the well-established principle that neither the general government nor a State can tax the agencies or instrumentalities of the other.

The London County Council Tramways report that the traffic receipts for the year ending March 31 were £1,845,444 from electric and £122,505 from horse tramways, making a total of £1,967,949, compared with £1,801,477 in the previous year.

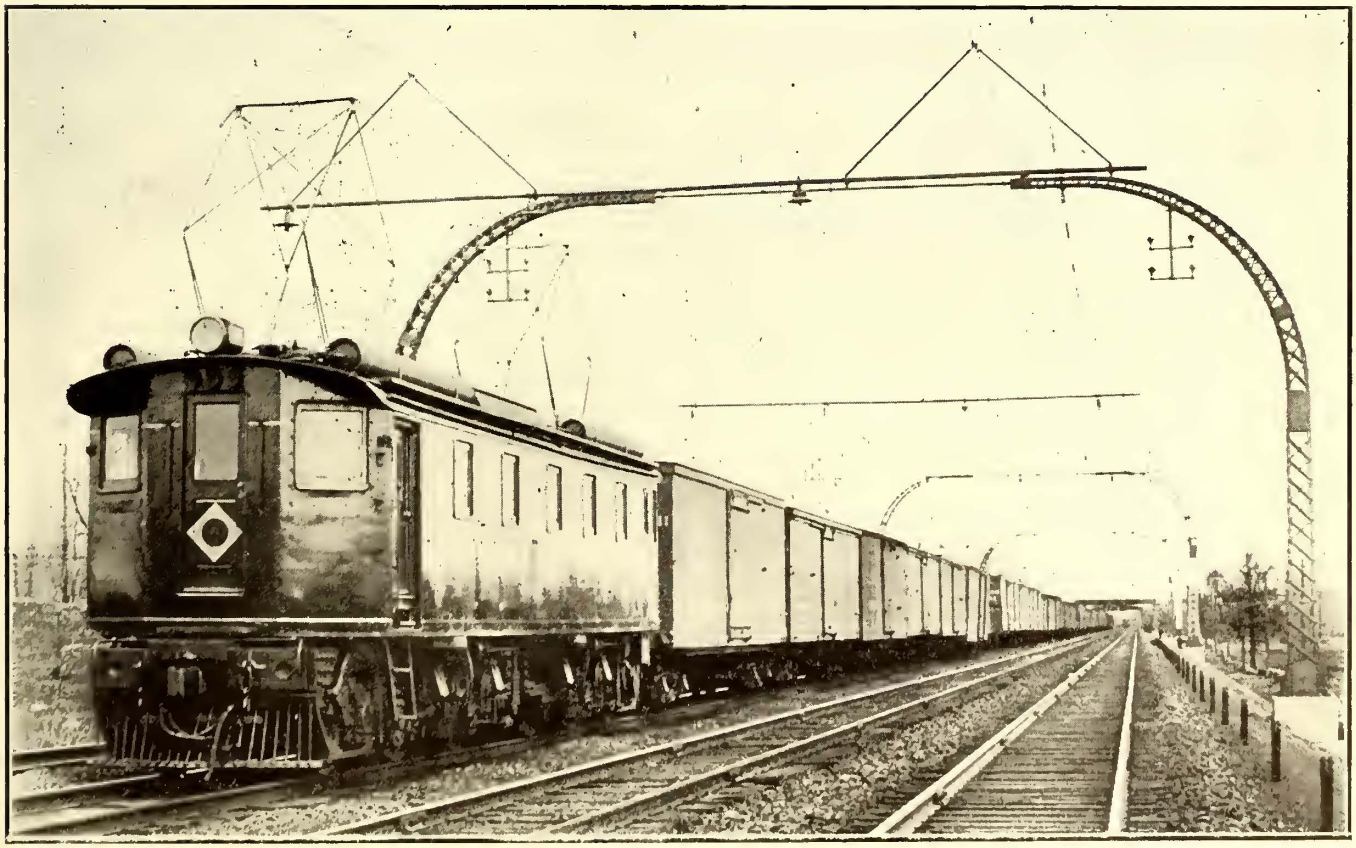
NEW HAVEN ELECTRIC LOCOMOTIVES

The New York, New Haven & Hartford Railroad on March 18 completed the first series of trial runs in freight service with electric locomotive No. 071. This locomotive which was described in the Electric Railway Journal of Sept. 25, 1909, is of the articulated truck type with four driving axles and a swiveling pony truck at each end. Each pair of driving wheels is geared to a 350-hp single-phase motor, mounted on top of the truck frames above the driving axle. The most novel feature of the locomotive is the method of mounting the driving gears on the wheel centers. The details of this mounting are shown in the accompanying engraving.

A pinion with 34 teeth is mounted on each end of the armature shaft and engages with a gear of 79 teeth. The gear is secured to the circumference of a spider casting, mounted on a hollow shaft or quill 13 in. in outside diameter, which surrounds the driving axle with 1½ in. clearance space between.



New Haven Freight Locomotives—Motors and Gearing of Geared Locomotive



New Haven Freight Locomotives—Geared Locomotive Hauling Long Freight Train East of Stamford, Conn.

This quill turns in bearings formed in the bottom of the motor frame. The driving wheel centers have six spokes suitably formed to serve as spring pockets for the six helical springs which are mounted on arms bolted to the outside face of the gear spider casting. The torque of the gear is transmitted through these springs to the driving wheel center. The springs are mounted so that three are in compression in either direction of rotation of the gear. This arrangement substitutes quill bearings on the motor frame for the usual axle bearings and relieves the axle of all bending stresses. This allows for vertical movements of the axle with respect to its motor. The manufacturer's and service tests of this experimental geared locomotive have proved this driving mechanism to be very rugged and otherwise satisfactory.

In designing this locomotive the aim was to build a unit which could haul freight trains up to 1600 tons weight at 35 m.p.h. and could also be used to haul heavy passenger trains of 800 tons weight at a speed of 45 m.p.h. For this reason it was equipped with both a.c. and d.c. collecting and control apparatus to enable it to be run over the New York Central third-rail tracks into the Grand Central station. There have been incorporated in its construction all of the improvements which have been made from time to time in the New Haven passenger locomotives and no serious mechanical or electrical troubles have developed since it was put in service. The ratio of continuous capacity of the motors to their hourly capacity which is very high in the passenger locomotives has been considerably exceeded in the freight locomotive owing to slight changes in the design and better ventilation.

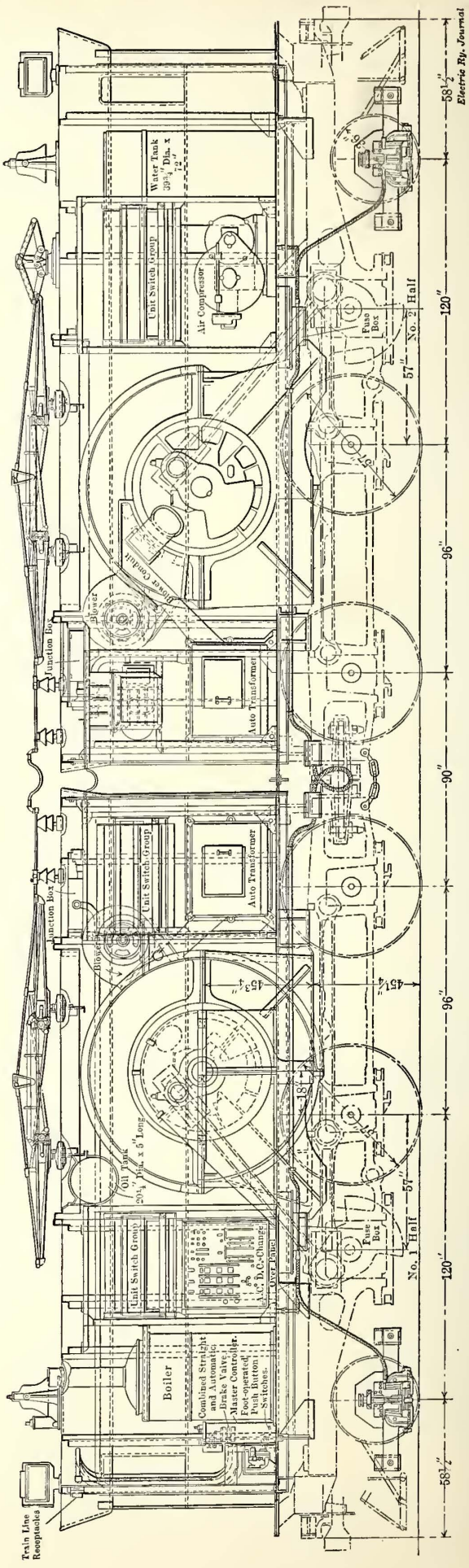
Before leaving the works of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., the locomotive was tested for tractive effort on both alternating current and direct current. It developed a maximum tractive effort at the rail of 51,000 lb. and started and accelerated a train of coal cars weighing 2100 tons on a 0.5 per cent grade. On Feb. 12, the locomotive began a service test of 2000 miles hauling regular freight trains between Stamford and New Rochelle, 17 miles. The electric locomotive was coupled in front of the steam locomotives which were allowed to drift. Regular trips were made every day; the daily runs were between 100 and 120 miles with no road failures. At no time was the capacity of the motors fully taxed and the speeds attained were limited only by the fears of the operating department. It is believed that the present running time of freight trains between Harlem River yards and Stamford can be reduced nearly 50 per cent when the Harlem River branch is electrified below New Rochelle. While rapid acceleration is not so important in freight service as in passenger service the results attained with this locomotive are interesting as an index of its reserve power. With a trailing load of 1600 tons the locomotive accelerates at the rate of 0.2 m.p.h.p.s., attaining a speed of 12 m.p.h. at the end of one minute. With an 800-ton train which is equivalent to 12 heavy passenger cars the rate of acceleration is 0.45 m.p.h.p.s.

This geared locomotive will also haul heavy passenger trains between Grand Central Station and Stamford, 33 miles. Further endurance runs will be conducted in this service which will test the d.c. control apparatus and the general performance of the locomotive at higher speeds.

SIDE ROD LOCOMOTIVE

A second experimental a.c. freight locomotive of the side-rod type is nearing completion at the Westinghouse works and will be delivered to the New York, New Haven & Hartford Railroad for test within a short time. The general arrangement of this machine is shown in the engraving on this page. The mechanical details were designed and built by the Baldwin Locomotive Works, Philadelphia.

The locomotive consists of two separate units each complete in itself, but designed to be operated in pairs. Each unit comprises two pairs of driving wheels and a leading pony truck mounted in a forged frame of the locomotive type. An a.c.-d.c. motor of 750 hp is mounted on top of the frame



New Haven Freight Locomotives—Side Elevation of Side Rod Locomotive

with its center line 18 in. in the rear of the forward driving axle. Forward of the front driver is a jack shaft extending across between side frames and carrying on each end a crank arm and counterweight casting. The motor shaft has a crank arm keyed to each end and connecting rods on each side extend down through the cab floor to the jack shaft crank arms. The two driving wheels on each side are coupled to the jack shaft crank pin by locomotive side rods of the ordinary type. The driving mechanism is almost exactly the same as that employed in the Pennsylvania Railroad Company's tunnel locomotives, described in the ELECTRIC RAILWAY JOURNAL of Nov. 6, 1909, page 982.

The auxiliary apparatus on the locomotive is distributed between the two halves of the cab but each unit is supplied with independent current collecting devices for both a.c. and d.c., ventilating blower, auto-transformer, unit switches, controller and change-over panel. Either motor may be operated without the other. A boiler for furnishing steam for the steam heating of passenger trains and an oil tank are mounted in No. 1 half, while the air compressor and a water tank are mounted in No. 2 half. The location of all of the principal apparatus is indicated on the drawing.

MEETING OF ARKANSAS PUBLIC UTILITY OPERATORS AT PINE BLUFF

The third annual convention of the Arkansas Association of Public Utility Operators opened at Pine Bluff, April 27, with about 50 members present, the majority of the properties represented being the central stations of the State. The membership includes, however, gas, water and street-railway companies as well. The president of the association, B. C. Fowles, in reviewing the events of the past year, mentioned an adverse decision of the State courts which requires central-station and other public-service corporations to continue furnishing service to customers who are delinquent in payment. A favorable court decree within the last year sustains the right of the electric companies to charge a minimum amount monthly for each meter connected. The speaker said that careful investigation by the public of the actual conditions under which the average utility is operated would result in a less critical and more tolerant attitude toward the public-service companies. The large place which the behavior of these companies occupy in the thoughts of the people is reflected in the recent reform platform elected in Milwaukee, where nine out of the 21 planks enunciated by the successful party relate to the regulation of public-service corporations. The benefits resulting from commission rule of these companies are often unequal to the expense involved upon the taxpayers, while the commissions themselves are too frequently given unlimited power and bear too close an association with politics.

Thursday morning's session opened with a paper on "The Effect of Natural Gas Upon Municipalities," by W. L. Wood. After discussing briefly the technics of natural-gas transmission and distribution, Mr. Wood referred especially to its effect as a competitor with other forms of light, heat and power.

D. A. Hegarty, general manager of the Little Rock Railway & Electric Company, next laid before the convention a paper outlining "A Law for the Prevention of Theft of Electricity, Gas and Water from Public-Service Corporations." The only present law bearing on this subject in Arkansas is one prosecuting wire-tapping, which is not effective in cases of theft of energy or tampering with meters. Theft is most prevalent in the case of electric supply on account of the ease of unauthorized connections. Loops around meters, taps ahead of the meters, tightened jewels and magnetic braking of meter elements are some of the common offenses. As protection against these methods it is now the local practice, so far as possible, to set meters directly at the service entries, to make careful inspections at intervals of from 60 to 90 days, and to scrutinize all bills carefully for unusual variations in consumption. Mr. Hegarty read, and suggested for local enactment with some amendments, the present law in force in the State of New York, which imposes one year's imprisonment or $500 fine, or both. To the terms of this ordinance, Mr. Hegarty proposed additions covering the wasting of electricity and tampering with the indications of meters. Under the proposed law anyone aiding, abetting or counseling the theft of energy is made equally guilty with the principal, while proof that the act was done on the customer's premises or that he received benefit therefrom is taken as *prima facie* evidence of guilt. To guard against theft of electricity W. L. Wood proposed to use metal-enclosed block terminals in all downtown installations. Mr. Hegarty told of the use of pole-mounted meters in suspected cases, and J. E. Cowles advocated the use of conduit enclosing all service wires up to the meter, which should be set in some standard place. It is planned to draw up an energy theft bill which the Arkansas Legislature will be urged to enact into a law when it meets next January.

At the afternoon session, Louis Friedman read a paper on "Modern Apparatus for Street Illumination," in which he discussed series tungsten and luminous-arc street lighting. J. D. A. Cross next read a paper on "The Extension of the Electric Heating and Cooking Device Business." Felix Borden presented a paper on "Illumination from a Contractor's Standpoint," which discussed the general and special lighting of buildings. Mr. Borden described the effects of various reflecting globes, and the walls and ceiling reflections from room interiors. In lieu of a paper by L. E. Sawyer, of Hot Springs, on 'Opinions of Various Cases in Various States," Secretary Cowles read a paper on "Public-Service Corporations." An interpretation of the recent court decision handed down in Arkansas which requires public-service companies to continue furnishing service after the customer has become in arrears in payment, included in the paper, was to the effect that this ruling does not apply after efforts have been made to collect the account by suit or otherwise. This paper also discussed the doctrines of the "fellow-servant" law and "assumed risk" as applied to public-service corporation affairs, and urged the appointment of a legislative committee to exercise its efforts for the passage of the best corporation laws. W. J. Thorp read a paper on "Customers' Accounts," in use by the Little Rock Railway & Electric Company, and which are based upon those of the Commonwealth Edison Company of Chicago and other Edison illuminating companies. The association passed a resolution approving the use of the T-rail as the standard for street railway track construction.

Following the close of the regular program the present officers of the association were re-elected by acclamation, and instructed to take steps looking toward the combination of the Arkansas association with the public-utility operators of Mississippi and Tennessee. Such a tri-state organization, if effected, will, it is believed, take a strong place among the similar associations of the country. L. G. Van Ness and V. A. Henderson, of the Merchants' Power Company, of Memphis, Tenn., who were present, gave the Arkansas operators a cordial invitation to join in making a single strong public-corporation association in the States above named. The officers and executive committee unanimously re-elected were: President, B. C. Fowles, Pine Bluff; treasurer, E. Hardin, Hot Springs; secretary, J. E. Cowles, Little Rock. Executive committee: D. A. Hegarty, Little Rock; W. J. Thorp, Little Rock, and W. C. Maguire, Arkadelphia. The legislation committee comprises D. A. Hegarty, E. Hardin and W. L. Wood, of Texarkana. The place and date of the next meeting will be announced later.

On Thursday evening, as the guests of the Citizens' Light & Transit Company, of Pine Bluff, the Pine Bluff Corporation and the Pine City Electric Company (a local contracting firm), the members of the association enjoyed a trolley ride out to Forest Park, where a Dutch lunch was served. Matters of entertainment were in charge of a committee consisting of B. C. Fowles, T. Y. Murphy and J. R. Bloom. During the convention the blue badges of the association were honored for transportation on the city street car lines and for admission to the local places of amusement.

MEETING OF THE COMMITTEE ON SHOP ACCOUNTING IN NEW YORK

A meeting of the committee on shop accounting of the American Street and Interurban Railway Engineering Association was held at the headquarters of the association in New York on Friday, April 29. Those present at the meeting were P. S. Young, comptroller of the Public Service Railway Company, Newark, N. J.; Charles Hewitt, superintendent of motive power, Philadelphia Rapid Transit Company; M. R. Boylan, auditor, Public Service Railway Company; Frank B. Lasher, traveling auditor of the New York State Railways; N. E. Stubbs, auditor of the United Railways & Electric Company, of Baltimore, and H. H. Adams, superintendent of rolling stock and shops, Metropolitan Street Railway Company. Mr. Young is chairman for the accountants. Messrs. Adams and Boylan are not members of the committee, but have kindly given their help.

The meeting opened with a discussion of the revised list of sub-accounts of rolling stock and shops sent in by John Lindall, superintendent of rolling stocks and shops of the Boston Elevated Railway Company. This report was discussed by Mr. Adams, who said that it was along the same general principle as his own system of job numbers. He did not believe that it would be possible to make a cast-iron schedule which would be followed by everybody, but it should be possible to develop a general method which could be used as a guide. Mr. Adams assumed the case of a typical car and said he would take various sub-divisions to cover different classes of work on the same. Thus, he would use job numbers 3201 to 3210 for painting, 3211 to 3220 for wood-working, and so on.

Mr. Hewitt said that the method of naming the sub-accounts was a matter that could easily be fixed. He had no objection, for instance, to using numbers along the lines proposed by Mr. Adams instead of letters like A, B, C, D, etc. Mr. Young said that what was wanted was not an extraordinary number of sub-accounts, but a method of getting the detailed costs in following up a given job like that of equipping a car. Mr. Adams thought that the recommendations for sub-accounts could be submitted to the classification committee for further action. Mr. Young said that in the meantime separate job order forms or authorization blanks might be devised for finding the costs of different classes of work. Messrs. Young and Boylan in this connection submitted the job order forms of the Public Service Railway Company.

It was agreed that the schedules of sub-accounts presented by Messrs. Lindall and Adams could be used as a suitable basis for working out a system of detailed cost accounts. Upon the suggestion of Mr. Young, a sub-committee consisting of Mr. Adams, Mr. Lasher and Mr. Boylan was appointed to work out a job number system, and to submit a set of forms in connection therewith for rolling stock and shop work. Mr. Stubbs was requested to make a special study of mileage records and forms for submission to the committee.

The committee found, in discussing the question of detailed costs in track work, that the standard classification is ample for that purpose, without any further sub-division. It was therefore decided to recommend the use of the standard classification divisions and titles for finding detailed track costs.

Mr. Hewitt then presented his sub-division of power house and sub-station accounting. He had made several changes from the schedule originally presented to bring it into conformity with the standard classification. Referring to account No. 51, covering fuels, such as coal, natural gas, crude oil, Mr. Young said he did not believe a comparison of accounts based on costs per kw.-hour was enough. There were so many other conditions which affected the result that if a company wanted to find what fuel was best for its purposes, it would have to make special experiments under fixed conditions. It was decided, however, that it would be advisable to sub-divide account 51 to cover different kinds of power generation. Mr. Hewitt was of the opinion that account No. 53, covering lubrication, was really too small to be a primary account. Speaking from the auditor's standpoint, however, Messrs. Young and Stubbs thought that this account was very desirable, even though small, because it was one that could very easily increase unless carefully watched. Mr. Hewitt admitted that through keeping a separate account of lubrication costs the Philadelphia Rapid Transit Company had been able to cut down this item to one-third of its former proportions.

There was some discussion between Mr. Hewitt and Mr. Young as to whether the sub-division proposed by the former really would lead to the obtaining of detailed costs. Mr. Hewitt explained that because rolling stock and shops covered such an immense field, a great number of job orders were required aside from the sub-accounts. This was not the case in power accounting because the items were comparatively few. The committee finally agreed that the sub-divisions presented by Mr. Hewitt were satisfactory, and it was decided to use his report as a basis for recommendations on power plant and sub-station accounting.

It is expected that the next meeting of this committee will be held some time in June, after the sub-committees have arranged their data on rolling stock and shop accounting.

MEETING OF COMMITTEE ON POWER DISTRIBUTION

On Wednesday, April 27, there was held at the headquarters of the American Street & Interurban Railway Association, in New York, a meeting of the committee on power distribution of the Engineering Association. The members of the committee present were James Heywood, chairman, superintendent of lines and cables, Philadelphia Rapid Transit Company; E. J. Dunne, superintendent of distribution, Public Service Railway Company, New Jersey; A. F. Hovey, cable engineer, Interborough Rapid Transit Company, New York. On invitation of the committee, there were also present at the afternoon session the following representatives of trolley wire manufacturers: Arthur G. Warren, of the American Steel & Wire Company; C. C. Baldwin, Standard Underground Cable Company, and H. J. Horn, of John A. Roebling's Sons Company.

Discussion was had on the revision of the present specifications on paper insulated cables, and it was decided to make these revisions after corresponding with the manufacturers of this material. It was decided to start the work of standardizing dimensions and quality of some lines of material used in overhead construction. At the afternoon session, the subject of specifications for hard-drawn copper wire was taken up with the representatives of manufacturers. The report of committee "W," of the American Society for Testing Materials, was discussed, and certain revisions, which are contemplated in this report, commented on. The subjects of conductivity, tensile strength, elastic limit and surface seams, brazes, and the necessary tests to determine these qualities were gone into. At the close of the meeting the manufacturers' representatives were extended the thanks of the committee for their presence and assistance.

CABLE BREAKDOWNS ON THE INTERBOROUGH SYSTEM

Through the courtesy of H. G. Stott, superintendent motive power, Interborough Rapid Transit Company, the following record of high-tension cable breakdowns on the 11,000-volt distribution system of that company from January, 1904, to January, 1910, is available.

Year	Miles of Cable	In Joint	In Bend	In Cable	External Causes	Total	Number Per Year Per Mile*
1904	330	1	0	1	1	3	.61
1905	351	0	0	1	0	1	.28
After Grounded Neutral Installations:							
1905	351	0	1	1	0	2	.57
1906	353	3	0	3	5	11	1.70
1907	353	1	0	0	5	6	.28
1908	368	1	0	0	4	5	.28
1909	371	3	0	1	5	9	1.08
Total		9	1	7	19	36	

* Excluding external causes.

Note:—External causes include mechanical injury, steam leaks and armor burns from other cables.

MUTUAL INSURANCE IN GERMANY AGAINST ACCIDENTS TO EMPLOYEES

The last report of the accident insurance association of the German street railway companies presents some interesting statistics on accidents to employees in that country. In accordance with the workmen's protection law of Germany, during the first 14 weeks of an employee's disability he is supported from a sick benefit fund to which the employees are the sole contributors. After that time the burden of his support falls upon the employer. Hence the employers in different trades have organized accident associations, of which one of the largest is that comprising the street and interurban railway companies.

This organization, known as the Strassen-und-Kleinbahn-Berufsgenossenschaft, had at the end of 1907 441 company members, divided into five classes according to their risk factors. As originally arranged these five classes were: Class A, city horse-car lines and mountain railways, danger factor 10; Class B, electric railways, danger factor 13; Class C, steam street railways and lumber roads, danger factor 20; Class D, steam branch lines, danger factor 30; Class E, suburban horse-car lines, danger factor, 35. The actual danger factors per 1000 employees for the years 1904 to 1907, inclusive, were as follows: Class A, 6.22; Class B, 6.82; Class C, 9.49; Class D, 22.87; Class E, 11.59. It is now proposed to revise the danger factors so that the electric lines in Class B will not have to carry an unfair proportion of the burden.

At the end of 1907 the number of employees for which the association was responsible was 97,989 earning $21,220,092 annually. Reduced to a "full-time" basis of 300 working days of 10 hours each the number was 69,465. The average annual payment was $2.30 per name enrolled, or $2.68 for every $250 in wages. The annual cost of accidents per name enrolled was $1.95 and $2.25 per $250 in wages. There were 5128 accidents in 1907, which would be equivalent to 73.82 injuries per 1000 "full-time" employees. In all, 5963 accident cases were recorded, and of these 4321 recovered before the fourteenth week, when the employers' organization begins to take charge of the patient. Damages were denied in 250 cases. All disputes as to payments are settled by arbitration and only 29 per cent of the disputes were decided in favor of the plaintiffs.

A feature of the system is that the association has a committee which inspects the different properties and has power to compel the adoption of safety devices when necessary. Recommendations of this kind were made in 422 instances in 1907. These visits were made at very short notice and the inspection was carried out in the presence of the manager and his foreman. After investigation the committee lists all defects in duplicate and allows a period within which the proper appliances should be installed. Up to this time it has not been necessary to impose any fines for neglect.

The committee stated in its last report that absolute accident prevention is practically impossible owing to the indifference of the employees. Workmen frequently removed the safety devices from machines because they considered them in the way. This was especially the case with the dangerous woodworking tools. About 31 per cent of all accidents were due to the disregard of the safety devices or printed warnings and only 3.3 per cent to the sole neglect of the employer. The committee recommended that more attention should be given to educating the employees in regard to accident prevention as 34.7 per cent of all accidents occurred to men employed not more than one year.

CONVENTION COMMITTEE GOES TO SARATOGA

A meeting of the committees of the American Street & Interurban Railway Association and of the Manufacturers' Association on location of the 1910 convention was held at Saratoga on April 26, 1910. Saratoga is being seriously considered as the place for the next convention, and the trip to that city was made to determine the facilities of the hotels. Those representing the committee who went to Saratoga were: James F. Shaw, Charles C. Peirce, H. C. Evans and George Keegan.

STRIKE AT COLUMBUS, OHIO

The conductors and motormen of the Columbus Railway & Light Company, Columbus, Ohio, went on strike on the morning of April 28, 1910, because the company, they claimed, had not restored to their former standing several employees whom it had been agreed between the men and the company should be reinstated. They also demanded recognition of the union of employees. E. K. Stewart, general manager of the company, ordered all cars to be returned to the car houses in the afternoon of April 28, and informed the police department that he would not attempt to operate cars until the men who had remained with the company were properly protected. Very few cars were operated on April 29 and 30, but on May 2 a few cars were started on their regular morning runs. Traffic was interfered with, however, and the company made no effort to increase the number of cars in service. Mayor Marshall refused at first to put patrolmen on the cars to protect the crews and passengers on the ground that the administration would be charged with favoring the company. Officers in automobiles were, however, detailed as escorts for the cars in some cases. On May 2 the mayor said that the cars should be operated at 2 o'clock that day and that he would furnish protection.

On May 2 Mr. Stewart made public a letter addressed to the mayor in which he referred to the disorder which followed immediately after the strike had been declared and expressed his willingness to resume service as soon as proper protection was guaranteed. He said that the reason the disorder of April 29 was not then in progress was "due to the fact that the company, to save bloodshed and loss of property, ceased to operate its cars." There could be no doubt about the question of whether the company was entitled to the fullest protection from mob violence. Mr. Stewart concluded his letter as follows:

"This company has always met its men and taken up fairly and dispassionately all questions of difference. A few weeks ago all matters of difference were so adjusted. The adjustment then made has been broken by some of the men who brought on a strike. Most of the men are at heart loyal to the company. Most of them at least want to resume work. Whether they shall be permitted to do so or shall be assaulted in the presence of police who refuse to interfere 'under orders' is not an open question, nor one that is for arbitration."

On the afternoon of May 2, R. E. Sheldon, president of the company, Mr. Stewart and L. G. White, general superintendent of the company, conferred with a committee from the men on strike. After the meeting Mr. Stewart said:

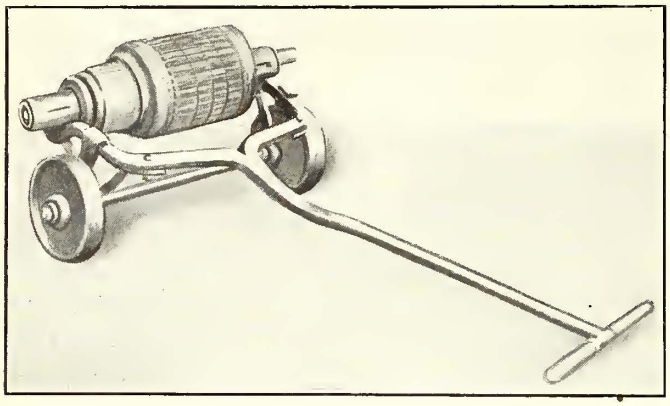
"The only thing which now stands before a settlement of this difficulty is recognition of the union. Mr. Sheldon assured the men that inspectors and foremen of the company would be instructed to refrain from trying to influence the men against joining the union or to influence members to withdraw.

"It was also agreed that the four men not reinstated before the strike would be put back to work in positions as good as those they occupied prior to their discharge. Mr. Sheldon made it plain to them, however, that he would not recognize the union under any circumstances and would not consider their original demands, which the men displayed at the conference."

The Department of State has delegated Dr. W. H. Tolman, director of the American Museum of Safety, to represent the United States at the ninth International Housing Congress, to be held in Vienna next month. Robert W. DeForest is the president of the American section of the International Housing Committee, of which Dr. Tolman is the executive secretary. T. Commerford Martin and Arthur Williams are the other members. This congress is one of the most important international gatherings, assembling the leaders in the movement of improving housings, which is attracting the earnest attention of governmental officials, statesmen, publicists, social economists and men of affairs. The reports from the United States will summarize the progress of the movement in this country.

A HANDY ARMATURE TRUCK

The armature shop of the Pittsburgh Railways Company is in a building separated by an alleyway from the truck repair shop. All armatures going to or from the shop have to be hauled 100 ft. or more across this alley, and a convenient form of truck has been devised for this purpose. It consists of a pair of iron wheels, 12 in. in diameter, turning loosely on an axle. Mounted

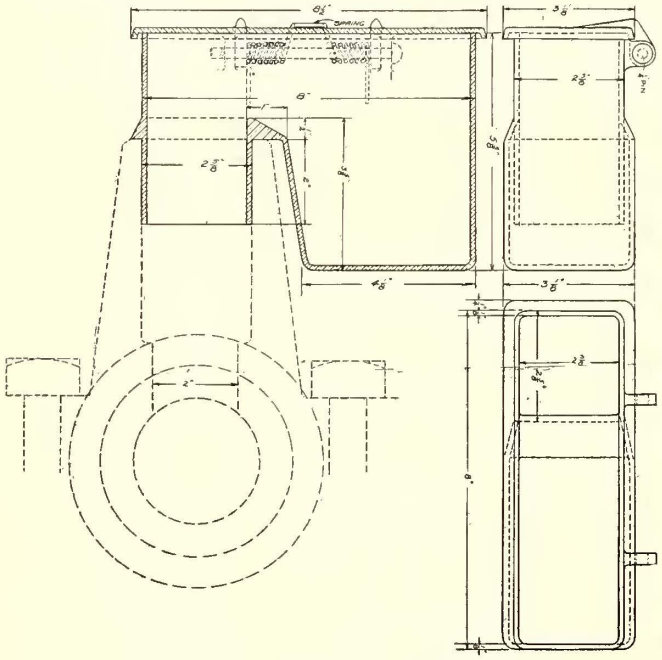


Handy Armature Truck

on this axle is a forked iron frame terminating in a long handle and cross-bar. The forked arms are curved downward to form a resting place for the armature shaft. By elevating the handle of the truck the forked arms can be lowered and pushed under the shaft of an armature lying on the floor. When the handle is lowered to about waist height the armature is lifted clear of the floor and the truck can be moved anywhere about the shop.

OIL CUP FOR GREASE-TYPE MOTORS

The Virginia Railway & Power Company, Richmond, Va., still operates a considerable number of GE-57 and GE-67 motors, which were designed originally for grease lubrication. It has been found possible, however, to use oil and wool waste packing with much greater satisfaction and economy by installing oil

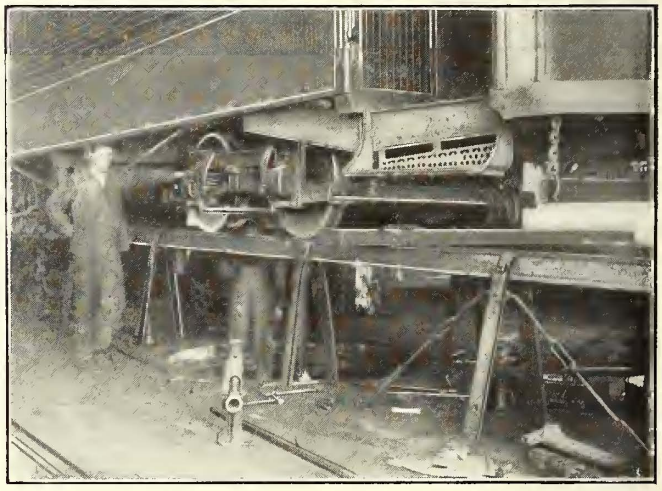


Oil Box for Grease Type of Motor

boxes of the design shown in the accompanying drawing. The box is riveted to the motor frame and has a spring cover which effectively excludes dust. Oil cups of this type are being applied to the armature bearings of all motors of the above types, resulting in substantial increase in the life of the bearings and fewer hot and melted bearings, due to the better lubrication obtained. Before putting these oil boxes on the GE-57 motors the company experienced a great deal of trouble with bearings on account of water getting into the armature boxes, and it was necessary to drain the oil wells after any considerable spell of wet weather. The application of these oil cups has entirely done away with this trouble. Lubricants are supplied on a mileage basis by the Galena Signal Oil Company.

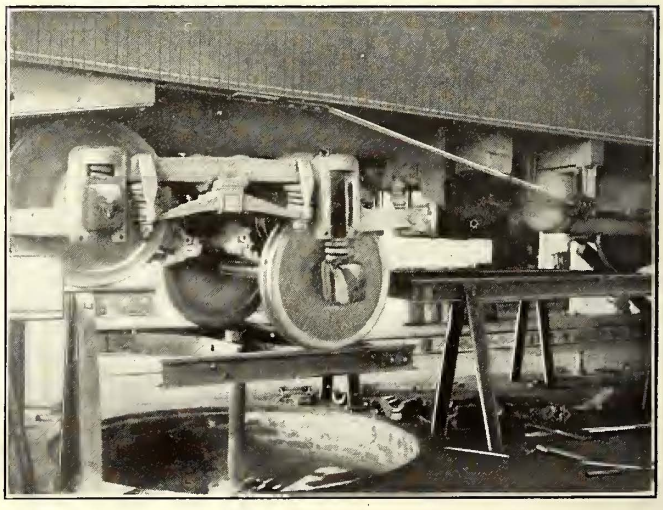
WHEEL CHANGING AT MOBILE

As shown in the accompanying illustration, S. M. Coffin, master mechanic of the Mobile (Ala.) Light & Railroad Company, dispenses with the usual pit or car-jacking methods of changing wheel pairs in trucks. A car requiring attention of this kind is run up an inclined track until the truck rests on a removable section which is kept in place by an air hoist. As soon as the wheel and axle set is unbolted, it is lowered to the floor by means of the hoist and taken to the machine shop. Vice versa, the replacing set is rolled into the removable section when the latter is flush with the floor and then raised into the side frames as shown. This method was very economical to



Truck Over Wheel-Changing Hoist

install as the trestle was built up of old rails, brakebeams, turnbuckles, etc., and the pit itself did not require much work as it had to be of little greater depth than the rails.



Raising Wheels Up to the Truck

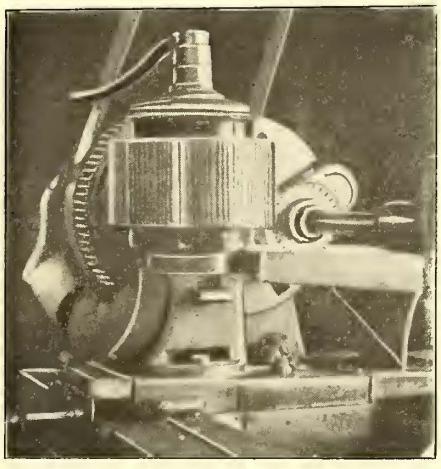
Mr. Coffin states that with wheels fitted on the axles two men usually can change a pair of wheels in an hour but the record time for this work is 36 minutes. If it is desired to put the same axle back into the car when changing, three men can bore, fit and make the complete change in two and a half hours.

METHODS AND COSTS OF COMMUTATOR MANUFACTURE

The master mechanic of a railway company which is a long distance from the bases of electrical supplies has furnished the following illustrated particulars of the methods followed by him in the manufacture of commutators at home. The costs of the principal types used were also furnished and are given in the tables in the next column.

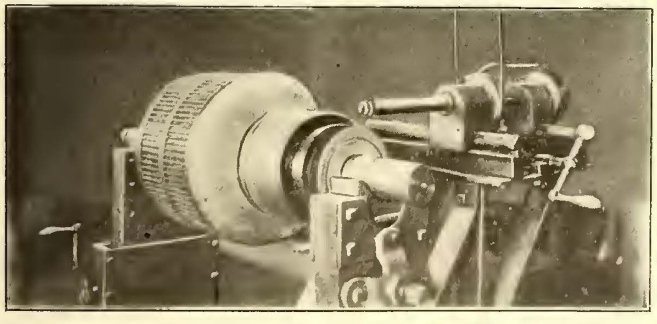
All commutators are made from Eureka drop forged bars, which are assembled in the four-piece clamping plate shown in the illustration on page 836. Upon inserting the mica, the bars

Vertical Commutator Repair



Milling a Commutator for Armature Leads

are squared and the clamps tightened, after which the assembled commutator is placed on a lathe chuck to bore out the bars. The latter are then tested for short-circuits. Next, the commutator bars are secured on the commutator core and a second short-circuiting test is made after the removal of the clamps. The commutator is then baked over gas to soften the mica, after which it is tightened again and allowed to cool. Then it is taken to a lathe to have the face turned and the bars slotted for the armature leads. Following this, a third short-circuiting test is made, and the commutator is shellacked at both ends. Finally, the commutator is pressed on the armature shaft at three to seven tons pressure. The hydraulic press used



Commutator Slotter with Side and Upward Adjustment

for this purpose also serves to remove the commutators. No trouble has ever been experienced from loose commutators. They are made with a taper of about 3/16 in. and are held by a jam nut between the oil deflector and the commutator end and by a collar shrunk on with a holding pin or dowel to prevent turning.

Instead of using a milling machine for cutting the bars for the armature leads, the shops have devised a special tool post, which is employed for this work in connection with a cutter wheel on the arbor of a lathe. The general arrangement is shown in an accompanying illustration. It will be observed that the commutator is set on the tool post, which, in turn, is set on the lathe carriage. The post is furnished with adjustable

COST OF COMPLETE COMMUTATORS.

WEST.—3 MOTOR.

Commutator bars, 47½ lb., at 27½ cts.	$13.06
Mica, 3¾ lb., at $1.75	6.78
Four mica circles, at 75 cts. each	3.00
One flat mica ring, at 70 cts. each	.70
One vulcabeston ring, at 65 cts. each	.65
Commutator shell (labor included)	3.00
Labor	1.65
	$28.84

WP.—50 MOTOR.

Commutator bars, 32 lb., at 27½ cts.	$8.80
Mica, 3¾ lb., at $1.40	5.42
Two mica circles, at 70 cts. each	1.40
Two mica circles, at 75 cts. each	1.50
Commutator shell (labor included)	3.00
Labor	1.65
	$21.77

G. E.—800 MOTOR.

Commutator bars, 39½ lb., at 27½ cts.	$10.66
Mica, 3¾ lb., at $1.40	5.43
Four mica circles, at 70 cts. each	2.80
One flange mica ring, at $1.35 each	1.35
One vulcabeston ring, at 85 cts each	.85
Commutator shell (labor included)	3.00
Labor	1.65
	$25.74

G. E.—1000 MOTOR.

Commutator bars, 49½ lb., at 27½ cts.	$13.61
Mica, 4 lb., at $1.75	7.00
Two mica circles, at 85 cts. each	1.70
Two mica circles, at 90 cts. each	1.80
Commutator shell (labor included)	3.00
Labor	1.65
	$28.76

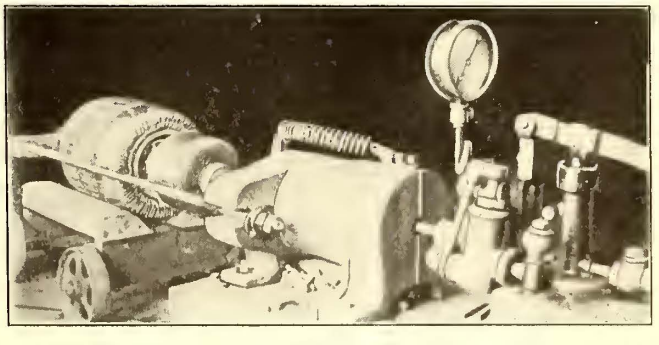
G. E.—67 MOTOR.

Commutator bars, 55½ lb., at 27½ cts.	$15.26
Mica, 4 lb., at $2	8.00
Two mica circles, at 90 cts. each	1.80
Two mica circles, at 95 cts. each	1.90
Commutator shell (labor included)	3.00
Labor	1.65
	$31.61

G. E.—80 MOTOR.

Commutator bars, 69½ lb., at 27½ cts.	$19.11
Mica, 4¼ lb., at $2.50	10.62
Two mica circles, at $1.15 each	2.30
Two mica circles, at $1.10 each	2.20
Commutator shell (labor included)	3.00
Labor	1.65
	$38.88

collars for different sizes of commutators. The teeth of the Brown & Sharpe bar-cutting wheel used in this operation, designed especially for milling copper, are alternately square and diamond-shaped. The latter teeth split the copper and the former sweep out the copper dust. These wheels are far superior

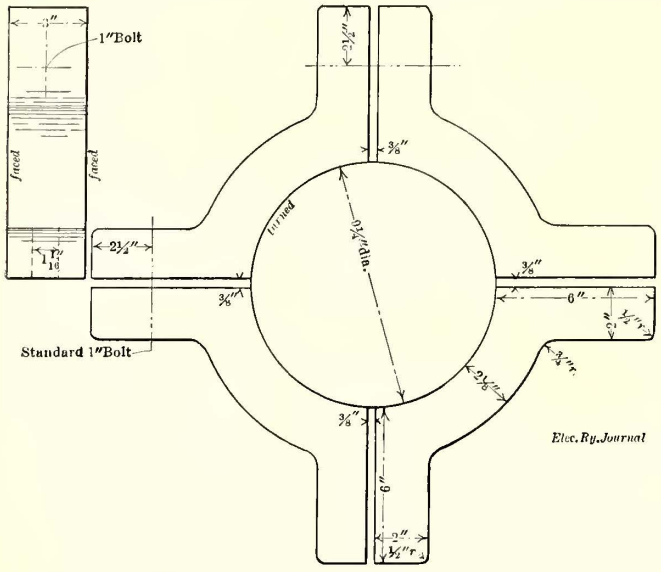


Hydraulic Press for Commutators

to the old cutters, which were made with all teeth square. They can mill 28 commutators without re-sharpening, whereas the square teeth could mill only 12 commutators without re-sharpening. The best record so far made was with two cutters which milled 64 GE-1000, GE-67 and GE-80 commutators, in all of which the arrangements for leads are alike. The cutter is not cooled by a drip, but is allowed to run in a pan of water, which arrangement is safer for the attendant. With this device a Westinghouse No. 3 commutator is slotted in 6 minutes and a GE-67 commutator in 15 to 20 minutes. The finishing touches are made with a hand file.

The commutator slotter, which is also illustrated, is suitable for cutting commutators of any size. Both ends of the support-

ing frame can be moved vertically, and by means of bevel gearing at one end the commutator can be moved sidewise to handle bars out of true without shaving the copper. Another feature is the quick reverse of the feeding mechanism, which is attained



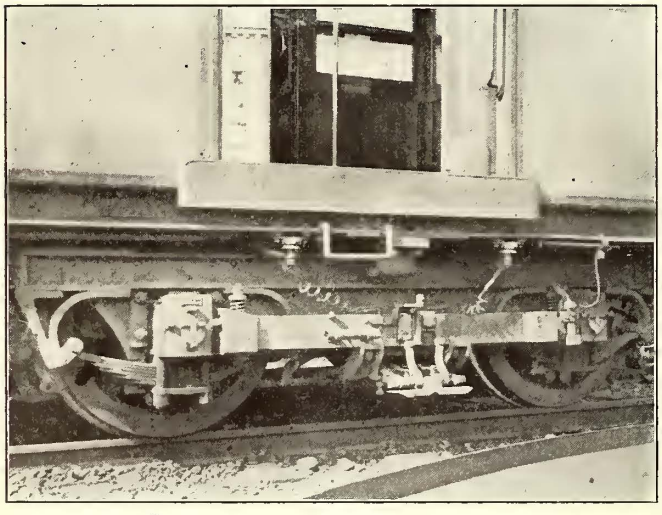
Clamp for Setting Up GE-800 Commutators

by releasing a spring thumb latch pressed against the feed thread and then drawing back the carriage.

A number of repairs to commutators are made with the commutator in a vertical position. After the bearings have been taken off and both the collar and oil deflector removed, the armature is set with the commutator end up in a floor casting containing an armature pinion. The jam nut is then unscrewed and the mica circle removed, after which the commutator may be readily examined for grounds and other troubles.

INTERESTING DETAILS OF BERLIN ELEVATED AND SUBWAY CARS

The motor cars of the Berlin elevated and subway system are furnished with a short-circuiting method whereby the conductor can immediately short-circuit third-rail sections between adjoining section insulators. The purpose of this device

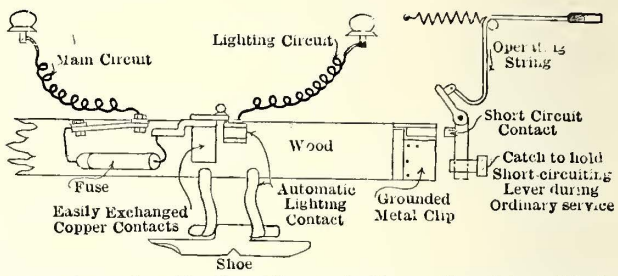


Motor, Automatic Lighting and Emergency Connections from Car to Shoe

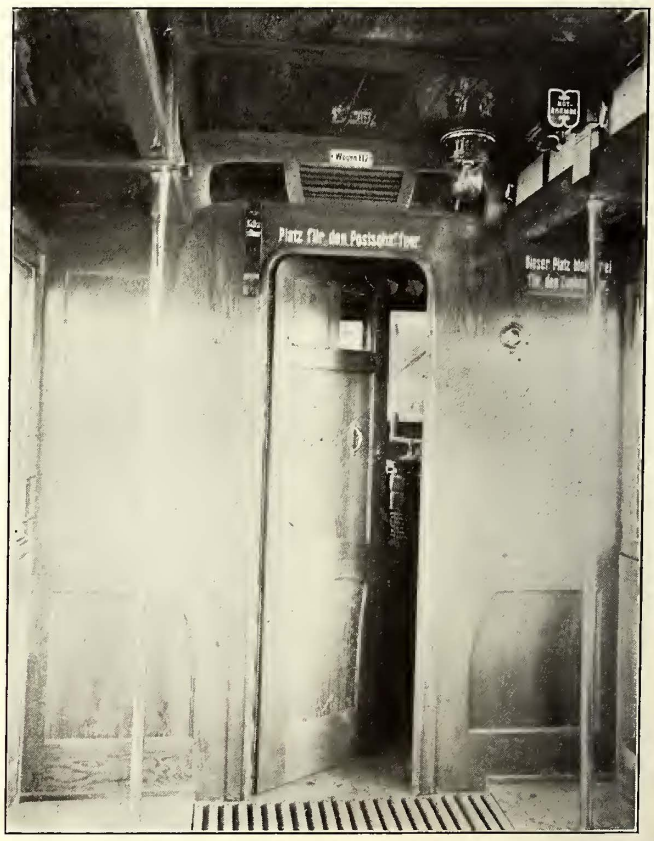
is to prevent injury to passengers from the third-rail should they be obliged to walk on portions of the structure. This short-circuiting device is operated by a handle carried in a sheet-iron, brass-trimmed box in a car corner opposite the emergency air-brake handle. The pulling of the handle causes a dead short which trips the proper feeder circuit breaker in the power house and makes the affected section dead. The connection to the short-circuiting contact is shown in the accompanying diagram and in the half-tone view of a motor truck..

In the subway the third-rail is a little higher than elsewhere. Therefore, when a car enters the tunnel the rising of the shoe closes the automatic lighting circuit. On the other hand, when the car leaves the subway the dropping of the shoe opens the lighting circuit, unless the regular lighting switch is closed. The lighting circuit of the subway is independent of the third-rail circuits, and is supplied with current from a storage. battery. There is also an emergency connection with the Berlin Electricity Works.

Each motor car is provided with two cabs, one for the motorman and one directly in the rear, which is used only by the conductor and the government mail carriers. The emergency devices can be operated from the conductor's cab, but are not subject to interference by passengers. In the Berlin cars it has been customary for the conductor to watch the motorman and the track signals from this rear cab through a small bull's-



Connections for Berlin Elevated Short-Circuiting Method



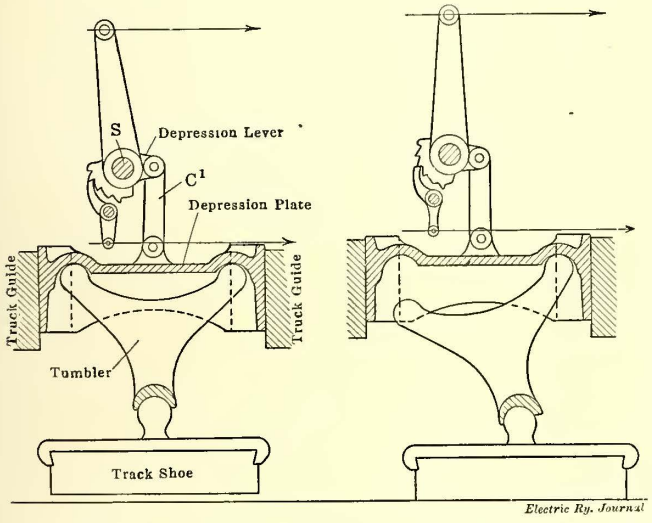
Compartment Behind Motorman's Cab, with Air and Electrical Emergency Devices

eye, but since the accident of Sept. 26, 1908, one of the former blind panels in the cab door has been glazed for this purpose. The third illustration shows the position of the emergency devices in the compartment behind the motorman's cab.

A SELF-TIGHTENING TUMBLER BRAKE USED IN ENGLAND

The Yorkshire (England) Electric Tramway Company has recently installed on 12 cars a novel track brake, known as the Freund self-tightening tumbler brake. This device was originally intended for the mechanical control of magnetic track brake shoes to avoid the failure of the latter in case of non-excitation. In practice, however, it is stated to have proved both an efficient hand brake and a powerful, self-tightening mechanical brake, adaptable to a wide variety of conditions. The motorman's work has been reduced to a minimum by the interposition of a "tumbler" between the depression links and the shoes of an ordinary track brake. The manipulation of this device requires the motorman's right hand only for an instant, enabling him to attend also to the wheel brake to secure the advantage of the combined operation of both brakes. The details of this contrivance are explained in the following paragraphs and the accompanying drawings:

The depression levers are keyed to the customary braking axle and are linked by connecting rods to depression plates which can be moved up and down between guides fixed on the truck. These depression plates contain cup-shaped housings for the shoulders of the tumblers, which rest with cups on spherical pivots over the brake shoes. To the shaft marked *S* in the drawing there are fixed operating levers which can be



Tumbler Type Track Brake Operated by the Yorkshire Electric Tramways

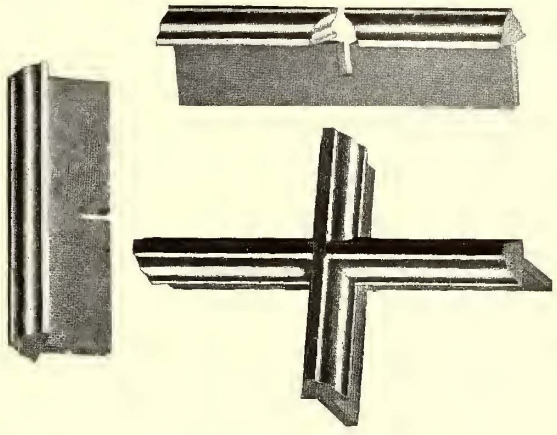
pulled by the usual gear from either car platform in the direction indicated by the upper arrow; the same shaft also has a toothed sector to engage a spring pawl as shown. When not in use the shoes are kept off the rails by pull-off springs, which are not shown in the drawing.

The brake is operated as follows: When the top lever is pulled from the platform in the direction indicated by the upper arrow, the depression plate descends and the pawl engages the lower teeth of the sector until the brake shoes touch the rail. If the car is moving to the left, the shoes will drag on the rails and thus shift to the right relatively to the car. In doing so the tumbler is tilted as shown on the right-hand drawing, thereby increasing the distance between the brake shoes and the depression plates. A toothed sector and drawbolt are used to regulate the amount of drag which, in turn, controls the brake pressure, because the greater the drag allowed, the greater the proportion of the car weight made available for braking.

The brake shoes can be instantaneously released by pulling the lever and the pawl lever in the direction indicated by the arrows. As soon as the pawl has been withdrawn from the sector in this way, the top lever is released, and there is nothing to prevent the release springs from returning all parts to their original positions.

STEEL SASH

The attention being given to fire protection of car houses emphasizes the importance of a new type of steel sash just brought out by the David Lupton's Sons Company, of Philadelphia. The sash is of rolled steel sections and the munnions are locked together as shown in the illustration by a method which holds

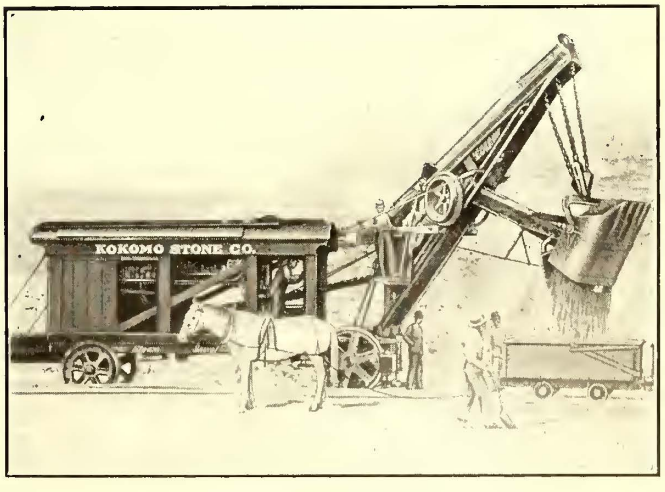


Samples of Steel Sash

them rigidly without impairing the strength of the members. The sash are glazed on the inside of the building after they are built in the walls. The steel construction described permits the use of a sash providing the maximum illumination and durability, with a low first cost and low maintenance.

AN ELECTRIC SHOVEL

Where electric power is available an electric shovel offers many advantages over a steam shovel, the chief of which is the elimination of the boiler. Furthermore, it uses power only when it is doing work. The shovel shown in the illustration is of the "Little Giant" type, mounted on cast-steel wheels. It carries a 1¼-cu. yd. dipper and weighs approximately 35 tons. It will make a cut 40 ft. wide in a 10-ft. bank and will clear a floor of 26 ft. The point of the crane stands 20 ft. above the ground. The dipper will dump 12 ft. 6 in. above the ground

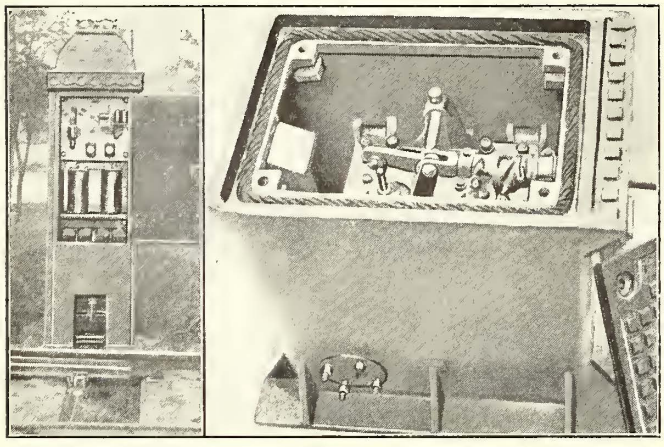


An Electrically Operated Shovel

and 21 ft. out either way from the center of the shovel. The car body is 23 ft. long and 7 ft. wide. The shovel is equipped with three Westinghouse motors, as follows: one 60-hp unit for hoisting the dipper, one 30-hp for swinging the crane, and one 30 hp on the crane for crowding the dipper into the bank. All the motors are for 60-cycle, two-phase, 220-volt alternating current. The shovel has a capacity of from 600 cu. yd. to 800 cu. yd. of blasted rock per 10-hour day. It was installed for the Kokomo Stone Company by the Vulcan Steam Shovel Company, Toledo, Ohio.

TWO GERMAN AUTOMATIC SWITCHES

The Siemens-Schuckert Works, Berlin, Germany, has been successfully installing throughout that country and elsewhere three types of automatic switches. The electric apparatus used in two of the designs is shown in the accompanying illustrations. The design, Fig. 1, was devised for situations where it is not objectionable to have the electrical apparatus set alongside the track or at the base of a pole. Naturally, this arrangement is the most convenient, both on account of its accessibility and its freedom from water troubles. The operating equipment consists essentially of two solenoids, the cores of which are joined to the double-arm lever which pulls or pushes the switch tongue; a cut-in switch, and a reversing switch which is so connected in the circuit that the second solenoid cannot pull the switch tongue back to its original position until the initial movement is complete.



Figs. 1 and 2.—Automatic Electric Track Switches

Fig. 2 shows the cast-iron box and equipment used when it is necessary to bury the solenoids. As in the other design, the cores are connected to a double-arm lever. The switches are placed in a small box on a pole. In this design special precautions are taken to keep water out of the solenoid box. The magnet coils are made of enamelled wire and the cores are copper plated to prevent rusting. It will be observed from the illustrations that the entrance of dirt and water by way of the top of the box is prevented by using a gasket of tarred hemp rope laid in a groove over which the lid is tightly screwed. The side opening for the rod between the solenoid core and switch lever is covered inside the case by an accordion-like leather bag which is connected to both the rod and the case, as shown. This minimizes the friction caused by the rod as it moves back and forth through the opening, and at the same time the bag prevents the rod from bringing water into the case. The box is also provided with a drain to the sewer system for carrying off interior condensation.

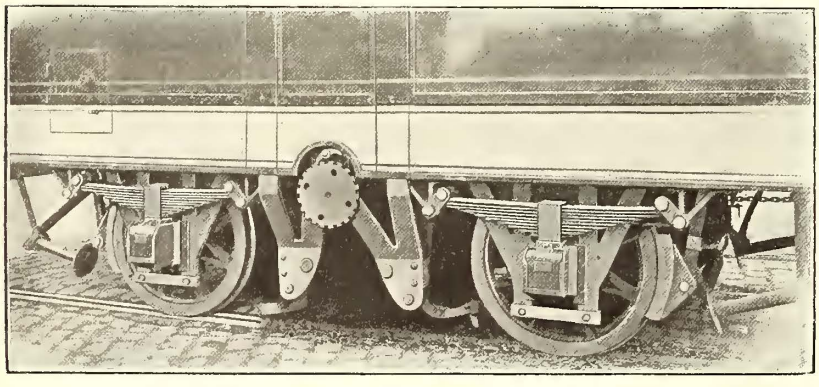
In both forms of switches described, overhead contact is made through wires which are suspended from insulators at a level slightly below that of the trolley wire. As is customary with automatic track switches, motormen who do not have to leave a straight run simply pass under the contact with their controllers in the "off" position. Lamp signals can be used in connection with these switches to show from a distance the position of the switch.

A SPECIAL CAR FOR RAIL CLEANING

The Vereinigte Isolatorenwerke Aktiengesellschaft, Berlin, Germany, has developed a car which is intended especially for the cleaning of the grooved rails generally used abroad and for the removal of the refuse from the side of the rail. In appearance the car does not differ materially from regular passenger cars, and it can be operated at any speed up to 15 m.p.h. The grooves are first cleaned with ordinary scrapers, but after this the refuse is drawn into a 4½-in. cu. yd. capacity tank through a pipe. The nozzle of the latter is the exact width of the rail groove to prevent the removal of loose soil outside the rails. Even pieces of brick and stone are drawn into the tank because of the great suction produced. The tank pipe is connected to a vacuum pump, which is driven by a motor using line current.

The four scrapers per car are operated under pneumatic pressure. They adapt themselves automatically to the direction in which the car is traveling, and have their bearings so arranged that they do not foul or lose their efficiency on switches, crossings and curves. The scrapers are the only parts of the equipment subject to appreciable wear. The rails are watered before the scrapers touch them to prevent the raising of dust. In the car illustrated the water is carried in two 800-gal. tanks piped together but placed at opposite ends of the body. The vacuum apparatus is carried in the upper part of the car with piping to the refuse tank in the center. This tank contains a cut-off arrangement to prevent dust from being drawn into the suction apparatus. Gages are provided to indicate the amount of water in the water tanks and the degree of vacuum in the refuse tank. An alarm indicates when the refuse tank is full, thus permitting the cleansing apparatus to be cut off and the car to proceed to the dumping grounds. As shown in one of the accompanying cuts, the car is run up a trestle and its load is discharged by gravity.

The car shown is provided with two 26-hp motors. It is 23 ft. long and has a truck wheel base of 6 ft. 6 in. The maximum width is 6 ft. 9 in., and the total height from rail to rail 11 ft. The truck wheels are 32 in. in diameter. The consumption of power when the car is operating at 10 m.p.h. averages 2.3 kw per car mile.



Rail-Cleaning Mechanism Under Car

Car Discharging Refuse

The Municipal Council of Paris is understood practically to have decided to accept the offer of the General Omnibus Company for the working of the street railway and omnibus services of that city, but the agreement has yet to be formally confirmed by the Council in full session. The company will have three years to carry out the reconstruction of its omnibuses.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES AND FRANCHISES.

California.—Railroads—Right of Way—Conveyances.

If it be necessary to find consideration for right of way deeds executed and delivered pursuant to an agreement to make them without consideration, the enhancement of the value of property in the neighborhood by construction of the road is sufficient. (United Investment Co. vs. Los Angeles Interurban Ry. Co. et al., 101 Pac. Rep., 543.)

Connecticut.—Street Railroads—Construction of Railway or Extension—Effect of Approval of Plan—Condition Precedent to Location—Right to Make Location—Nature of Power—Extension of Line—Obligation to Complete—Conditions of Approval by City Authorities—Time for Completion of Work—Power of City Authorities—Obligation of Lessee—Partial Abandonment—State as Party Plaintiff—Effect of Amendment of Charter—Compelling Extension of Street Railroad—Laches—Proceedings Against Street Railroad Company—Writ in Name of City or State—Subjects of Relief—Construction and Operation of Street Railroads—Obligation Imposed by Law.

Gen. St. 1902, Sec. 3833, provides that, where a street railroad company constructs a railway or lays new tracks, it shall make a plan showing the highways in or through which it proposes to lay its tracks, their location as to grade, and the center line of the highways, and such changes, if any, as are proposed to be made in any highway, and such plan shall be presented to the Mayor and Common Council, who, after a hearing, may adopt it or modify it as they deem proper, and notify the company of their decision, but that no company shall construct a railway or lay additional tracks except in accordance with the plan approved by the city authorities, or, on appeal, by the railroad commissioners or superior court, as provided in sections 3832, 3834. Held that, where a plan presented was an entirety, the approval thereof was an approval of it in its entirety, and such approval either by the city authorities or on appeal was a condition precedent to the location of an extension.

The right to locate a railway or any part of it is a power of election, and, when once exercised, is exhausted in the absence of a statute to the contrary.

Where the location of an extension of a street railroad is made and approved as a whole, the company is not obliged to construct it, but if it enters on its construction it must not stop when it has constructed a part and proceed to operate cars thereon without completing it within a reasonable time.

One of the particulars of a plan of a street railroad extension which city authorities had power to modify under Gen. St., sec. 3833, as a condition of their approval, was the grade proposed for the tracks, and another was the change, if any, to be made in any highway, and their approval was conditioned on the company's bringing the street, in a part of the extension, throughout its full width, to a specified grade, and putting it, both within and outside of the tracks, in good condition for public travel, and another condition required this and certain other work to be completed, and the whole extension to be put in operation by a specified date. Held, that both these conditions were germane to the plan.

The right given a street railroad company by the State to locate its railroad in city streets within a certain period is a qualified right, subject to the approval and control of the city authorities pursuant to Gen. St. 1902, sec. 3833, and hence it does not prevent shortening of such period by the city in case of an extension, which, in the order of approval, was required in the public interest to be completed during the current season.

A lessee succeeding to the rights and franchises of a street railroad company takes the same burdened with the obligation of its lessor to complete the construction of an extension begun by it, and put the same in operation.

If the entire authorized extension of a street railway has been completed and put in operation, no part of it can afterwards be abandoned at the will of the company.

The fact that the lessee of a street railroad company was not a party to proceedings for proposed alterations and extensions was no objection to mandamus to require completion of an extension begun by the lessor, as the lessee thereafter succeeded to the rights, franchises and obligations of the lessor.

That a street railroad has not completed an extension by the time required by a city in the order approving of its plans therefor is no excuse for not subsequently doing so, and its lessee stands in its shoes in this respect.

An alternative writ of mandamus which is entitled "State of Connecticut ex rel.," a certain city against a specified railroad company, is a proceeding in which the State, as the party plaintiff, is seeking to enforce its laws, and is not open to the objection that the State and not the city named control the use by the public of the defendant's railway and the interest of the public in its operation.

The amendment to the charter of the Connecticut Railway & Lighting Company in 1905 14 Sp. Laws, p. 704), though validating and confirming the location and construction of the railway, as formerly located and constructed, did not prevent the State in mandamus on relation of a city from complaining that a part of a certain route had not been finished, as this assumed that what was done was lawful as far as it went, and simply insisted that a franchise to lay a railway on a certain route in part ex ecuted shall be wholly executed.

A delay of three years in bringing mandamus to compel a street railway company to complete the construction of an extension does not call for explanation, in the first instance, on the face of an alternative writ, when assigned as ground for motion to quash.

Gen. St. 1902, sec. 3824 (Pub. Acts 1907, p. 806, c. 219), provides that the mayor and common council of each city shall have in the first instance exclusive control over the placing of street railroad tracks, and of changes in grade of a railway, and, if any company shall fail to obey their orders in these respects, "may proceed by mandamus to compel such company, at its own expense, to carry out such orders." Held, that the procedure in such case may be in the name of the city, but that there was no reason why it may not be in the name of the State on relation of the city, or in the name of the State alone.

The State can always proceed by mandamus to enforce a legal duty created by the authority to which it has intrusted power to create it, and, when it invests a city with power to make orders with respect to the construction or operation of a street railroad, it charges those against whom such orders may be directed with the duty of obeying them, and their duty is therefore one of law. (State ex rel. City of Waterbury vs. New York, N. H. & H. R. Co., 71 Atl. Rep., 942.)

Indiana.— Railroads — Mechanics' Liens — Construction — Statutes.

Acts 1873, p. 187, c. 78, providing, in section 1, that all persons who by contract with any railroad corporation shall perform work or labor in the way of grading, building embankments, etc., for the track of any railroad, shall have a lien on such grading, etc., does not apply to a contractor who performs no manual labor himself, but who employs men and teams in the performance of his contract and derives his compensation from the profits realized. (Indianapolis Northern Traction Co. et al. vs. Brennan et al., 90 N. E. Rep., 65.)

LIABILITY FOR NEGLIGENCE

Alabama.—Damages—Exent of Injury—Burden of Proof.

In an action for injuries to a horse, buggy and harness, caused by collision of a street car, there can be no recovery for injury to the harness where the evidence shows that the harness was injured, but does not show to what extent in damage the harness was injured. (Birmingham Ry., Light & Power Co. vs. Camp, 49 Southern Rep., 846.)

Alabama.—Rules—Construction—"Standing."

An electric railroad rule provided that, when passing standing cars, the gong must be rung and the car brought to a stop with the front end opposite the rear end of the standing car. Held, that the word "standing" did not limit the application of the rule to the passing of cars absolutely at rest, but included cars that had stopped and had just started to continue their journey from which passengers might have alighted.

A requested charge that, if the motorman did all he

could to stop the car after he saw intestate, the jury should find for defendant, was properly refused, as eliminating the motorman's duty to warn intestate of her danger. (Birmingham Ry., Light & Power Co. vs. Morris, 50. S. Rep., 198.)

Alabama.—Street Railroads—Operation of Cars—Obligation of Motorman—Injuries to Pedestrians—Contributory Negligence—Proximate Cause.

While a motorman may assume that a pedestrian will turn out of the way of the car, he cannot rest on such assumption so long as to reach a point where it will be impossible for him to control the car or to give warning in time to prevent injury.

Where a motorman, after discovering that a pedestrian was unaware of the danger, failed to use reasonable care to avoid injuring him, the act of the pedestrian in placing himself in danger was the remote cause of the ensuing injury. (Randle vs. Birmingham Ry., Light & Power Co., 48 Southern Rep., 114.)

California.—Master and Servant—Safe Appliances—Duty to Furnish—Delegation of Duty—Danger Arising in Doing of Work—Acts of Fellow Servant.

A master is liable for a breach of duty to furnish safe appliances, resulting in injury to a servant.

The obligation of a master to furnish his servants with safe appliances and a safe place for work cannot be delegated, and the delegation of the duty to an employee who would for other purposes be regarded as a fellow servant of an employee injured through failure of the duty would not exonerate the master.

Where the place in which work is to be done and the appliances to be used by servants are as safe as can reasonably be expected, and danger arises necessarily in the doing of the work, the master has discharged his duty when he has furnished to the servants suitable means of obviating the danger.

The failure of a co-employee to use the means furnished to obviate the danger in the work is the act of a fellow servant, and, where a company operating an electric substation maintained highly charged wires, and furnished means whereby the current might be shut off, and authorized the foreman of a construction gang working on the roof to shut off the current, and decedent, one of the gang, was killed by coming into contact with a live wire, either because of the foreman's failure to turn off the current or his negligence in informing decedent that the line was clear, the company was not liable under Civ. Code, Sec. 1970, prior to the amendment of March 6, 1907 (St. 1907, p. 119, c. 97), providing that the master is not liable for injury to a servant from the negligence of a co-employee, unless the negligence was committed in the performance of a duty the master owes by law to a servant or the master has not used ordinary care in the selection of the culpable employee. Bridges et al. vs. Los Angeles Pac. Ry. (L. A. 2299), 105 Pac. Rep., 586.)

California. — Railroads — Crossing Accident — Contributory Negligence.

Decedent and his driver, riding behind a team of mules, approached an electric railroad crossing in the country at a slow trot. The road crossed the railroad at right angles, through a cut with banks about 8 ft. high. The driver listened for a car, but did not hear it. He did not stop to listen, though he admitted that, if he had stopped, he might have heard the noise of the car when there was no noise of the wagon to prevent it. Another witness, who was walking and listening proximately from the same position that decedent occupied, testified that, while no gong was sounded, he could hear the rumble of the car. Held, that decedent and the driver having failed to listen for a car which they knew might cross the road from behind the obstruction, decedent was negligent as a matter of law precluding a recovery for his death. (Heitman vs. Pacific Electric Ry. Co. (Civ. 616), 102 Pac. Rep., 15.)

Iowa.—Carriers—Injury to Passenger on Street Car—Facts Constituting Negligence—Alighting in Middle of Block—Negligence of Carrier.

Where it is found that a passenger on a street car gave a conductor the stop signal, and he recognized it and indicated a purpose to stop where requested, and, as the passenger with his knowledge is in the act of alighting, the speed is suddenly increased, causing him to fall and be dragged a considerable distance before the car was brought to a stop, the court ought not to disturb a conclusion of negligence drawn from such facts.

If a passenger indicates by word or gesture to a conductor a desire to leave a car, though it be in the middle of the block, and the conductor, understanding the request, indicates his assent, and the car stops or slows down, so that the passenger, acting as a reasonably prudent person, with the conductor's knowledge, attempts to alight, and while so doing is thrown off by a sudden increase in speed, it is negligence for which the company is liable. Cohen vs. Sioux City Traction Co., 119 N. W. Rep., 964.)

Kentucky.—Street Railroads—Collision with Vehicle—Negligence.

A motorman who sees a standing vehicle close to the track, and who knows that the only person in the vehicle is a boy not old enough to appreciate the danger, must stop the car until the vehicle is moved to a place of safety; and, where he attempts to pass, the street railroad company will not be relieved from liability for injuries to the boy because the horse attached to the vehicle by a slight movement throws the wagon in such a position that the rear of the car strikes it.

Where a standing vehicle is so close to the street car track that the slightest movement of the horse attached to it will bring it in contact with a car, and this fact is known or by ordinary care should be known to the motorman, that a part of the car passes in safety will not excuse the company if another part of the car strikes it, and causes injury to person or property. (Louisville Ry. Co. vs. Flannery, 121 S. W. Rep., 663.)

Massachusetts.—Damages—Reduction of Injury—Personal Injury—Exercise of Will—Instructions—Reduction of Effect of Personal Injury.

In a personal injury case, where the evidence showed that plaintiff could lessen the occurrence of certain fits by improving her general tone and resisting the impulse by her will, a charge that if plaintiff's fits were entirely under her own control, and if she need not have had one unless she wished, she could not recover therefor, was error, since it disregarded the right of recovery for such fits "as could have been prevented by the exercise of self-control"; there being a material difference between the two classes. Those which would occur only when the victim wished would be those to which the victim's active will would contribute, while the other class would be those where there was no active exercise of the will to prevent them.

Plaintiff's condition being likely to appeal to the sympathies of the jury, it was defendant's right to have plaintiff's duties in the situation defined with precision. (Dooley vs. Boston Elevated Ry. Co., 87 N. E. Rep., 586.)

Michigan.—Damages—Personal Injuries—Excessive Damages.

A street car passenger was injured while attempting to board a car. She was held down under the projecting step of the car, and could not be released until the car was backed. After her release she was in a dazed condition, suffering from the shock. She sustained bruises and injury to her back, confining her to her bed from 10 to 12 days. At the date of the trial, several months thereafter, she complained of recurring pains in the back. Held, that a verdict for $2,000, reduced by the trial court to $1,500, was not excessive. (Marshall vs. Saginaw Valley Traction Co., 122 N. W. Rep., 131.)

Washington. — Damages — Personal Injuries — Excessive Damages.

Plaintiff was 27 or 28 years old, a carpenter, with an earning capacity of $3.50 a day. By an accident in a planing mill he lost the entire little finger of his left hand, the middle finger above the knuckle, and the end of the index finger was cut off diagonally, without injuring the bone; the ring finger having been cut off in childhood. The injured fingers were very sensitive to touch and cold, and plaintiff could not take up material or tools with the injured hand, and is greatly hampered in climbing ladders, etc. Held, that a verdict for $3,008 was not excessive. (Rood vs. Seattle Electric Co., 104 Pac. Rep., 249.)

LONDON LETTER

(From Our Regular Correspondent.)

The fifteenth annual convention of the Incorporated Municipal Electrical Association will be held in Glasgow and Edinburgh on June 14, 15, 16 and 17. It will be opened by A. McInnes Shaw, Lord Provost of Glasgow. W. W. Lackie, chief electrical engineer of the corporation, will deliver the presidential address. A paper will then be presented on "Commercial Progress," by A. C. Cramb, Croydon, and H. Collings Bishop, Newport. The delegates will lunch at the City Chambers by invitation of the tramways and electricity committees and will visit the various electrical stations. In the evening there will be a reception and conversazione at the City Chambers tendered by the lord provost and magistrates. On June 15 the delegates will be received by the lord provost of Edinburgh, and the following papers will be read and discussed: "Mixed Pressure Turbines," "Exhaust Steam Turbines" and "Chemistry in the Boiler House." After luncheon the various electric departments will be visited. On June 16 the following subjects will be discussed in Glasgow: "Advantages of Continuous Records of Costs and of Steam Consumption" and "Cheapening of the Cost of Mains and Service." The annual dinner will be held on the evening of June 16. June 17 will be devoted entirely to pleasure.

The report of the Underground Electric Railways, London, for the second half of 1909 shows a distinct improvement. Reference was made recently in this letter to the various improvements which the Metropolitan District Railway contemplated making. Perhaps the most important of these was the construction of a link in the vicinity of Charing Cross between the Charing Cross and Hampstead line, the Bakerloo Railway and the District Railway. The Hotel Metropole, under which the line would have to be built, opposed the line and the improvement has been abandoned. The South Eastern Railway also opposed the line, as the tube would have had to be carried underneath the pillars of that company's bridge across the Thames.

The report of the London United Tramways, which are now under the management of the Underground Railways, is perhaps the most unsatisfactory that the company has ever presented. It shows a decrease of about £36,000 in net profits for the year. No dividend will therefore be available on the preferred stock, on which 3¾ per cent was distributed in 1908, all the surplus being allocated to the reserve account. With Mr. Stanley, who is general manager of the Metropolitan District Railway, acting as manager, however, there is no doubt that the fortunes of the company will be bettered. The reserve account will be utilized to improve the track. New rolling stock will also receive consideration, and the whole property will be put into better condition.

It has been decided by the special committee, which inquired into the construction of an electric railway from Wimbledon, in connection with the District & South Western Railway to Sutton, there joining the Brighton line, to allow the bill to proceed. The committee does not insist upon a junction between the new line and the South Western at Wimbledon, nor does it insist upon a junction with the Brighton line at Sutton. Arrangements must, however, be made for public access between the two stations.

Leeds has the distinction of being the first municipality to have its trackless trolley bill authorizing the use of the trackless trolley passed by a select committee of the House of Lords. J. B. Hamilton, general manager of the Leeds Corporation Tramways, described the various trackless trolley systems on the Continent. He estimated the cost per mile at from 4½d. to 5½d. and on the proposed line to Farnley, a distance of about 4½ miles, he estimated that there would be a net return of ⅝ of a penny per car mile. The bill which has been passed is particularly interesting as it endows the board of trade with power to approve the use of the trackless trolley on other routes in the city to which the corporation may wish to extend the system. This will save future Parliamentary expenses. The tramways at Leeds show a surplus for the year of about £47,000, and a very substantial amount will again be paid for the relief of rates. Probably the next municipality to secure permission for trackless trolleys will be Bradford.

It is interesting to note that returns from municipal tramways for the past year or half year are better than for the preceding year or two. Sheffield, Leeds, Bradford, Belfast and other large cities show increased returns, and even the Metropolitan Electric Tramways, which operates in the north of London and has not done particularly well since its inception, shows an increase in receipts. The number of passengers on this system was more than 62,000,000, an increase of nearly 5,000,000, while the total revenue increased and enabled the directors to pay the interest on the debentures and to increase the dividend on the common stock from 4½ per cent to 5 per cent.

Liverpool is well satisfied with the first-class cars in which a double fare is charged. When the experiment was begun the whole car was first-class, inside and outside. Afterwards the cars were made first-class inside only. It has now been decided to extend the experiment to the Croxteth Road route, the most fashionable in the city. The intention is to run a first-class service daily, except on Sundays, applicable only to the inside. The tramway committee has been criticized for catering to snobs, but the cars have increased the revenue and have proved a source of great satisfaction to people who prefer comfort at a little extra cost. Reserving the inside of the cars for first-class traffic has increased the earnings on the route on which the cars are operated from 5.26 of a penny to 10.92 of a penny per car-mile.

The London County Council electric tramway constructed on the conduit system up Highgate Hill, which replaces the cable tramway, has been opened with a 6-minutes' service. The cars are smaller than those on the other lines of the company. They are fitted with emergency brakes which work on the slot rail, which is extremely heavy for a rail of this kind. The new line connects at the Archway Tavern with the lines to the City, Holborn and Euston Road and with the Metropolitan Tramways line to Finchley and High Barnet.

It has been suggested to the London County Council that season tickets would be a distinct advantage, but it is not likely that the Council will accede to the request. A report by the highways committee sets forth the first agreement which it has been able to make regarding conditions of labor of tramway men under the new conciliation board scheme, referred to in this letter recently. It has been decided that Sunday labor shall be restricted to eight hours, to be completed within a period of 12 hours. Holidays to be taken any time during the year, instead of during the winter months only, as at present. The adoption of the alterations will increase the expenditure about £12,000 a year, but the highways committee recommends the Council to accept the agreement. A. C. S.

The Brooklyn Rapid Transit Company has explained more clearly to the Public Service Commission its proposal to operate cars through the Centre Street subway loop in Manhattan. The company states that 20 trains now operated over the Brooklyn Bridge could be diverted from the Lexington Avenue, Myrtle Avenue and Fulton Street lines in the eastern section of the city to the Williamsburg Bridge hourly during the rush hours, thus making it possible for the company to operate more trains on its Fifth Avenue division in South Brooklyn over the Brooklyn Bridge. The trains diverted to the Williamsburg Bridge would be operated through the Centre Street tunnel to the terminal of the Brooklyn Bridge in Manhattan and patrons would not be inconvenienced, as the route by way of the Williamsburg Bridge would be shorter. Concerning compensation, the company suggests that a five-year franchise should be granted with a charge for operation "at a fair rate per mile," with the understanding that the city reimburse the company for all money expended should the contract be broken by the city. The Board of Estimate has authorized Controller Prendergast to issue $150,000 worth of corporate stock, so that the Public Service Commission can pay for extra work on the contract for the construction of the Fourth Avenue subway in Brooklyn.

News of Electric Railways

Program of Meeting of Southwestern Electrical & Gas Association

In the Electric Railway Journal of April 23, 1910, brief mention was made of the preparations for the convention of the Southwestern Electric & Gas Association, to be held in Beaumont, Tex., on May 12, 13 and 14, 1910, and the tentative program of entertainments for the meeting was published. The program in detail has since been made available. The headquarters of the association will be at the Crosby Hotel. Meetings of the association, however, will be held at the Kyle Theater, which is a block from the hotel, on May 12, morning and afternoon; May 13, morning and afternoon, and on May 14, morning. As previously stated the storeroom and the lobby of the Kyle Theater will be used as an exhibit hall and members who desire space should communicate with D. G. Fisher, assistant secretary of the association, 300 Commerce Street, Dallas, Tex.

The registrar of the association will be located on the main floor of the lobby of the Crosby Hotel, and those in attendance at the convention are requested to register their names at once so as to secure their badges and programs. The executive committee has adopted a standard badge for the association, which it is hoped will remain a permanent one and be used at future conventions. The question box feature of the association will be retained and the question box and souvenir program will be bound together and distributed to the members on the first day of the convention. Special railroad arrangements have been made, which include a one-week excursion ticket, good for 21 days, to be on sale on May 10, 1910. The rates provide round-trip transportation for one fare plus $2. Delegates from the East are requested to confer with S. A. Hobson, St. Louis, Mo., or with Milton Mill, Olive Street, St. Louis, Mo., regarding transportation facilities or reservation of sleeping car accommodations. The program of entertainments follows:

MAY 12.

10 to 12 a. m.—Automobile ride for visiting ladies.

4 p. m.—Automobile ride for all visitors to oil field, Country Club, and other points of interest.

8 p. m.—Theater party.

MAY 13.

2 to 6 p. m.—Boat trip on Neches River; refreshments and music.

9 to 12 p. m.—Ladies entertained at Woman's Reading Club.

8 p. m.—Sons of Jove.

MAY 14.

3.30 p. m.—Street car tour of the city.

During the session of the convention the following papers will be presented: "The Watt-Hour Meter in Actual Operation," by O. Brasher; "Dry Gas Meters in Actual Operation," by P. E. Nichols; "Individual Factors in the Development of the Gas Business," by M. T. Walker; "Proper Operation of Water Gas Apparatus," by W. J. Dewey; "Suggestions for a Standard Rule Book for Operation of City Cars," by H. S. Cooper; "Condensers for Small Central Stations," by Harry Pennington; discussion, "The Internal Combustion Engine in the Small Central Station," by R. B. Stichter and others.

Cleveland Traction Situation

The Cleveland Railway, through a resolution introduced in the City Council on April 25, 1910, has asked that body to approve an expenditure of $250,000 for improvements. Among other things the resolution provides for the conversion of 230 cars into cars of the pay-as-you-enter type, at a cost of more than $190,000, and additions to the Cedar Avenue and viaduct power houses at a cost of more than $50,000.

G. M. Dahl, street railway commissioner, has reported to the Council that the surplus of the Cleveland Railway for March, 1910, should be $19,854.94, instead of $18,880.94, as given by the company. This difference, Mr. Dahl says, is due to charging interest on stock held in the treasury. The Tayler ordinance has been construed by the company to mean that 6 per cent. interest shall be allowed on all the stock.

The resolution introduced by Councilman Laferty, requesting the company to charge 5-cent fare to Collinwood and Euclid Beach, has been adopted. J. J. Stanley, president of the Cleveland Railway, states that the request cannot be considered until the directors meet. Until then the fares authorized by the ordinances under which the company operates will be charged.

Mr. Stanley has informed Mr. Dahl that no new cars will be ordered at present. Only a small proportion of the new issue of $1,500,000 of stock of the company has been subscribed by the old stockholders and obligations, which amount to about $1,000,000, inherited largely from the Municipal Traction Company, have been presented for payment. In addition, considerable track must be repaired, and Mr. Stanley feels that the need for completing this work is more imperative than supplying new cars. Under the Tayler ordinance the order in which improvements shall be made to the property is not fixed.

Experiments have been made with another fare register, with a view to its adoption if found satisfactory. The cost will be 12 cents a day for each register, whereas an outlay of 25 cents a day for each register would be entailed for the one tested some time ago.

A resolution has been prepared for introduction in the City Council to require the company to submit its rules for passengers to that body for approval. The rules promulgated by Mr. Dahl which prohibit passengers from riding on the rear platform and smoking on the cars resulted in this action. Both rules are opposed by several members of Council, and many riders, who feel that they should at least be allowed to ride where they please.

The *Cleveland News* counsels patience and a trial of the rules which the commissioner has made, but asserts that Mr. Dahl is seemingly, at least, endeavoring to conduct affairs so that the 3-cent rate will pay, instead of securing the very best service.

Railroad Commission of Pennsylvania to Inquire into Transit Affairs in Philadelphia

The Railroad Commission of Pennsylvania has announced that it proposes to conduct an inquiry into the transit situation in Philadelphia, now that conditions in that city are again practically normal. It will be recalled that the commission refused to conduct such an inquiry during the recent strike because conditions were unsettled and it was likely that the purpose of its observations might be misconstrued. The commission says:

"It has for some time been the intention of the commission to prosecute an inquiry of the transit situation in the city of Philadelphia, and this has been delayed only by reason of the abnormal conditions which have existed there for the past three months, awaiting the termination of which action on the part of the commission has been postponed. So soon now, however, as a reliable and competent party can be secured for the purpose such inquiry and investigation will be inaugurated."

Concerning the complaints filed with it, the commission states:

"Upon consideration of the complaints filed against the Philadelphia Rapid Transit Company, it has developed that many of the charges contained therein are so general in character as to furnish us no sufficient guide in any investigation we may prosecute.

"For instance, it is alleged that 'portions of the city which should have good service are not accommodated,' but those portions of the city are not named; also, that 'portions of the city which need new car lines and ask for them have been neglected, while outlying sections that do not offer a proper return in fares have been catered to,' without specify-

ing those portions of the city and those outlying sections; and, also, that 'the transfer system is unjust to many sections of the city and inadequate,' without stating what sections these are. With respect to these items the complaints should be more specific, and it is suggested that the petitioners may by way of amendment supply the particular data necessary to furnish the required information to the commission.

"In other respects, there are items in the complaint which transcend the powers of the commission; for instance, that 'new elevated and subway lines are needed to furnish rapid transit to outlying sections,' and 'the transit system is grossly over-capitalized.'

"The capitalization of the company has already been determined, and the commission has no authority to reduce it; and the construction of new elevated and subway lines is a matter about which the company and the city authorities will have to deal, and with the latter, particularly, the commission can exercise no authority.

"It will readily be understood that this will require some time, and if definite action by the commission seems to be somewhat delayed it must be attributed to the necessity and the difficulty of obtaining definite and accurate information upon which to base such action, and the time required therefor."

Association Meetings

Oklahoma Public Utilities Association.—Sapulpa, Okla., May 10.

Southwestern Electrical & Gas Association.—Beaumont, Tex., May 12, 13 and 14.

Central Electric Traffic Association.—Fort Wayne, Ind., May 14.

Pacific Claim Agents' Association.—San Francisco, Cal., May 20 and 21.

Central Electric Railway Association.—Toledo, Ohio, May 26 and 27.

Master Car Builders' Association.—Atlantic City, N. J., June 15, 16 and 17.

American Railway Master Mechanics' Association.—Atlantic City, N. J., June 20, 21 and 22.

Central Electric Accounting Conference.—Toledo, Ohio, June 25.

Street Railway Association of the State of New York.—Cooperstown, N. Y., June 27 and 28.

Colorado Electric Light, Power & Railway Association.—Glenwood Springs, Col., Sept. 21, 22 and 23.

Proposed Electrification of London & Port Stanley Railway.—J. H. A. Beattie, Mayor of London, Ont., who is a member of the special committee appointed to report on the advisability of electrifying the London & Port Stanley, states that the lease of the property does not expire until Jan. 1, 1914, and that no action has been taken toward the electrification of the road.

Date Set for Hearing on Brakes Before the Commission of Canada.—The Board of Railway Commissioners of Canada set May 3, 1910, as the date for the hearing before the board at Ottawa regarding air-brake equipments on the Hamilton & Brantford Electric Railway and the Hamilton Radial Electric Railway and the proposed order requiring all electric railways subject to the jurisdiction of the board to equip their cars with automatic air brakes.

Two-Day Session of the Central Electric Railway Association.—It has been decided by the executive committee of the Central Electric Railway Association to make the May meeting of the association at Toledo, Ohio, a two-day session, and the association will therefore meet on May 26 and 27, 1910. This will make it possible to dispose of all the work in hand before the summer, as the May meeting is the last until September. The change to a session covering two days will also afford the railway men a better opportunity to inspect carefully the apparatus of manufacturers who exhibit at the meeting.

Maryland Commission Appointments.—There have been several conferences between Governor Crothers and Chairman James M. Ambler and Philip D. Laird of the Maryland Public Utility Commission regarding the selection of the chief attorney to the commission. William L. Marbury declined to accept the position, as he has among his clients a number of public service corporations and persons interested in such corporations. The salary is $4,800 a year. It is believed that William P. White, Jr., will be appointed assistant counsel. The Governor and the members of the commission have not yet discussed the election of a secretary.

Charter Granted for Elevated Railway in Philadelphia.—The Philadelphia & Suburban Elevated Railway was chartered at Harrisburg, Pa., on April 28, 1910, by S. S. Neff, president of the Interstate Engineering Supply Company, Philadelphia; Russell Thayer, Robert K. Cassatt, S. Coates Coleman, C. W. Haines and J. H. Hawkins. As stated in the ELECTRIC RAILWAY JOURNAL when the proposal of the company was first mentioned in Philadelphia several months ago, the company has in contemplation the construction of an elevated railway from a terminal station at Broad Street and Filbert Street to the northwestern section of the city, North Philadelphia, Frankford and the northeastern section of the city. It was proposed to apply to the Councils of Philadelphia on May 5, 1910, for a franchise.

Answer to Swensson Report on Pittsburgh.—At a conference held in Harrisburg on April 29, 1910, between Mayor William A. Magee of Pittsburgh, J. B. Callery, president of the Pittsburgh Railways, and the members of the Railroad Commission of Pennsylvania, it was decided to have Mr. Magee and Mr. Callery each file an answer to the report made recently on street railways in Pittsburgh by Emil Swensson. Mr. Callery told the commission that to follow out all the suggestions made by Mr. Swensson would require an expenditure of at least $5,000,000 for cars and power station equipment. Mr. Swensson will be asked by the commission whether the operation of the loops which he suggests would be feasible under existing conditions and whether, in his opinion, the additional cars which he recommends should be put in operation before the proposed widening of certain streets. Mr. Magee and Mr. Callery will file their answer with the commission not later than May 10, 1910.

Detroit Situation.—Efforts have been made to induce Frederick T. Barcroft, who made the appraisal of the property of the Detroit United Railway for the committee of fifty, to reconsider his decision not to appear before the board of arbitration. In an interview published in the Detroit *News*, Mr. Barcroft made the following statement in relation to the efforts of Mayor Breitmeyer to persuade him to appear before the board: "It is incomprehensible that the Mayor cannot seem to understand my position and that financial remuneration cannot change it. I will appear before any board of arbitration that is given official standing, with a definite purpose fixed in advance, that has police power and power to subpœna witnesses and that has the sanction of the city and the company to the extent that both will be bound by the result. In such a body I must have an opportunity to aid in preparation of my own case. I must have funds for such purpose and I must have sympathetic legal assistance. These are only necessary contingencies. I must repeat that my position cannot change."

Public Service Commission in South Carolina.—The General Assembly of South Carolina has passed a bill which establishes a public service commission to fix rates and charges for water, gas and electricity in the cities of that State. The commission is to consist of three members, to be appointed by the Governor with the consent of the Senate, to act on complaint of 20 or more citizens, with power to summon before them the representatives of the company about which complaint is made. Appeal from the finding of the board may be made to the Circuit Court of the county in which is located the city in which the complaint is brought. Upon conviction of an over-charge the commission may impose a fine of from $25 to $50. Each member of the commission is to receive $10 a day and traveling expenses, while actually employed, to be paid by the party against whom the complaint is made if the rates charged are found to be unjust, or by the city if the complaint is not borne out by the fact. The first members of the commission are to serve two, four and six years, respectively. Every two years thereafter the Governor is to appoint one member of the commission to serve six years.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The General Court has received several additional petitions to allow the New York, New Haven & Hartford Railroad to acquire street railways west of the Connecticut River. They have been referred to the committees on railroads and street railways sitting jointly. The bill to provide for the transportation of pupils of normal schools at half fares by street railways has been ordered to a third reading in the House, and the resolve to provide for an investigation by the Boston Transit Commission of the cost of building a subway from Park Street to the South Station has been passed by the House to be engrossed. An attempt to reconsider the bill to require street railways to equip their cars with lifting jacks has been defeated in the House. Governor Draper has signed a bill which permits a street railway incorporated in Massachusetts to purchase from any such company incorporated under the laws of another State so much of the railway, franchise and property of the other company as is located in Massachusetts, when the second company connects with, intersects or forms a continuous line with the first road. The act provides that the facilities for travel are not to be diminished or the rates of fare increased, and the terms of the purchase are subject to the approval of the Railroad Commission. The committee on banks and banking has reported leave to withdraw the bill introduced on petition of the Massachusetts Street Railway Association for legislation to define more clearly the cases in which savings banks may invest in the bonds of street railways which are leased. The bill provided that dividends paid by way of rental to the stockholders of a street railway which is leased shall be deemed to have been earned and paid by the company within the meaning of the statute providing for the investment of savings banks in bonds of companies which have paid 5 per cent dividends for five years. The bill to permit the Shelburne Falls & Colraine Street Railway to refund its funded debts and fund its floating debt has been read a third time in the Senate. The bill to permit the Railroad Commission to grant temporary locations to street railways to prevent the interruption of traffic has been read a third time in the House.

New York.—Both houses of the Legislature on May 2, 1910, passed the bill outlining the procedure to be followed in eliminating subways and dock bonds from the computation of New York City's debt limit, in accordance with the constitutional amendment adopted by the voters at the election in November, 1909. Under the provisions of the bill the Controller is required when requested by the board of estimate to submit a statement of the city's indebtedness growing out of any rapid transit or dock investment prior to Jan. 1, 1910. Details in connection with the issue of the bonds and the revenue derived by the city from the investment are to be given in connection with the statement. The board of estimate, acting for the city, may then apply to the appellate division for a determination of the amount of debt to be excluded. The bill was amended before passage so as to permit any parties in interest to intervene in the proceedings before the appellate division. The determination of the appellate division is to be final and conclusive. A hearing was held before the committee of the Assembly on internal affairs on the bill to repeal the Burns law of 1896, which reserves the Albany Post Road to vehicular traffic and prohibits the granting of franchises to street railway companies.

Ohio.—The Woods Utility Bill was defeated in the Senate on April 28, 1910, by a vote of 10 to 22. The bill was reported out by the House in March and was passed by that body by a vote of 96 to 13. Senator Patterson opened the argument against the bill. He said that the measure had been amended so often that it bore only a slight resemblance to the act as originally drawn, and that he was not quite certain of its provisions even as redrafted. The few compensating features of the original bill had been so emasculated as to make them negative. Senator Mather said that he considered the measure a futile bill, as the companies which would come under its jurisdiction had contracts with the municipalities in which they operated which were binding, and that the Legislature was without authority to confer power to adjust differences between utilities and municipalities upon a commission.

At a hearing before the committee on commercial corporations of the Senate on April 12, 1910, S. P. Bush, president of the Buckeye Steel Castings Company, Columbus, and A. M. Kittredge, president of the Barney & Smith Car Company, Dayton, protested against the passage of the measure in behalf of a deputation of Ohio manufacturers constituting the Ohio business committee of the Railway Business Association. Mr. Bush said that the injury which would be inflicted to the railroads by the proposed measure would seriously affect in all its ramifications the manufacturing interests identified with railroads. The group of interests whose product goes into railway uses was the greatest interest in the country except agriculture. In Ohio there were 800 railway establishments employing between 100,000 and 150,000 men. It was to the public interest to foster and not to assail railway development. The plan proposed of making the government a partner in the management of the railroads with powers much greater than heretofore deemed wise or necessary was a new and untried one calculated to suppress the initiative which has characterized railway and other development. While there might be a demand for railway regulation, there was also a demand, equally proper, for conservatism.

Mr. Kittredge said that the attitude of the delegation before the committee was final and that those in attendance had visited Columbus because they felt that the Legislature was in danger of making an error which might prove disastrous to many industries. One of the greatest temptations was to legislate too much. The attempt was being made to do too much in too short a time, without the opportunity to digest the underlying facts properly. The very men before the committee had their differences with the railroads, sometimes even sharp and acrimonious; they were present to say that before the proposed law, drastic in its provisions, radical in its changes of business method, costly to the State and the railroads to enforce, was enacted, every member of the Assembly should be sure that he knew what he was doing and why he was doing it and that the consensus of public opinion demanded it. There was no theorizing about the matter so far as Mr. Kittredge was concerned, as the Barney & Smith Company paid freight bills of at least $60,000 a year during times of normal business. Ninety-six prominent business houses in Dayton alone had signed a petition filed with the chairman of the committee urging conservatism in dealing with the Woods bill. There was no grievance properly coming within the purview of the Railroad Commission as now constituted that that body had not taken cognizance of and possessed power to deal with.

So far as the interests which Mr. Kittredge represented had learned, the Railroad Commission did not feel itself improperly equipped to regulate the railroads adequately in the interest of the public. If the railroads followed unjust methods in their business, the facts could easily be ascertained through investigation by a special committee or commission and proper action could be taken with all the facts and with the knowledge that Ohio wants such legislation. The members of the Ohio business committee of the Railway Business Association, at the invitation of the chairman of the committee on commercial corporations of the Senate, supplemented the speeches made by Mr. Bush and Mr. Kittredge with a written communication further protesting against the bill largely on the ground that there was no need for the proposed measure. In transmitting this letter, the association said that it asked only reasonable proof that the measure proposed would correct definite evils without producing new ones.

The House of Representatives has acted favorably upon the bill to require all electric cars to be equipped with air brakes. At least 50 per cent of the cars of each company in the State must be equipped by January, 1911; 75 per cent by January, 1912, and all by January, 1913. The Senate concurred in this bill. The Assembly voted to recess Saturday evening, but will meet on May 10, when action will be taken upon those bills about which disagreement still exists. The Langdon bill, creating a tax commission to take the place of the small tax boards, awaits the signature of the Governor. It makes the Nichols law applicable to public utility corporations. The bill which gives interurban railways authority to condemn land on which to build tracks has been passed by both houses.

Financial and Corporate

New York Stock and Money Market

May 3, 1910.

The stock market was irregular in price and weaker in tone last week. Prices declined several points during the week and trading was light. The downward movement was started a fortnight ago, when the severe storms in the West occasioned general alarm. This occurred at a period when confidence in the future was already at low ebb and when the majority of conservative traders believed it advisable to stay out of the market. Interborough-Metropolitan shares continued to be quite active, although lower in price. There is little interest in the securities of either the Metropolitan Street Railway or the Third Avenue Railroad.

The money market was considerably tighter during the week and rates were more irregular. Quotations to-day were: Call, 4 to 5½ per cent; 90 days, 4¼ to 4½ per cent.

Other Markets

Philadelphia Rapid Transit and Union Traction are weaker in tone and lower than during the strike.

Massachusetts Electric and Boston Elevated have each eased off a trifle in price. A few blocks of West End have been sold at former prices.

There has been little trading in tractions in the Chicago market during the week. Metropolitan Elevated has been offered in small blocks, but there is no significance to these sales and prices are unchanged.

In Baltimore, both the stock and the bonds of the United Railways Company have been moderately active. Prices are practically unchanged.

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

	April 26.	May 3.
American Railways Company	a45¼	a45¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	*94¼
Boston Elevated Railway	a126	126
Boston & Suburban Electric Companies	a16	*16
Boston & Suburban Electric Companies (preferred)	73	*73
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a45	a44
Brooklyn Rapid Transit Company	a77⅝	74⅝
Brooklyn Rapid Transit Company, 1st pref. conv. 4s	83⅞	82¼
Capital Traction Company, Washington	a132	a132
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*3½	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a100	a100
Chicago Railways, ptcptg., ctf. 2	a29	a29
Chicago Railways, ptcptg., ctf. 3	a13	a13
Chicago Railways, ptcptg., ctf. 4s	a7¼	a7¼
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds	a104½	a104½
Detroit United Railway	*61	59½
General Electric Company	148¾	146
Georgia Railway & Electric Company (common)	111	a115
Georgia Railway & Electric Company (preferred)	a87	a87
Interborough-Metropolitan Company (common)	21¼	19⅞
Interborough-Metropolitan Company (preferred)	55⅜	51
Interborough-Metropolitan Company (4½s)	80¾	79⅝
Kansas City Railway & Light Company (common)	*31	*31
Kansas City Railway & Light Company (preferred)	*77⅝	*77⅝
Manhattan Railway	136	132
Massachusetts Electric Companies (common)	a18	16⅞
Massachusetts Electric Companies (preferred)	a88	a88
Metropolitan West Side, Chicago (common)	*16	a16½
Metropolitan West Side, Chicago (preferred)	*53	a56
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	72¾	70⅛
Northwestern Elevated Railroad (common)	a17	a18
Northwestern Elevated Railroad (preferred)	a70	a70
Philadelphia Company, Pittsburg (common)	a50¼	a49½
Philadelphia Company, Pittsburg (preferred)	a44½	a43½
Philadelphia Rapid Transit Company	a19⅝	a16½
Philadelphia Traction Company	a86	a85
Public Service Corporation, 5 per cent col. notes	a96½	*96½
Public Service Corporation, ctfs.	a104½	a103½
Seattle Electric Company (common)	a115	*115
Seattle Electric Company (preferred)	104½	103
South Side Elevated Railroad (Chicago)	*53½	*53½
Third Avenue Railroad, New York	6½	6
Toledo Railways & Light Company	*10¼	9
Twin City Rapid Transit, Minneapolis (common)	113	112½
Union Traction Company, Philadelphia	a48	a44
United Rys. & Electric Company, Baltimore	*12¼	*12¼
United Rys. Inv. Co. (common)	37	*37
United Rys. Inv. Co. (preferred)	65	*65
Washington Ry. & Electric Company (common)	a39	a37
Washington Ry. Electric Company (preferred)	a92	a91
West End Street Railway, Boston (common)	a88	a87½
West End Street Railway, Boston (preferred)	a102	a101¼
Westinghouse Elec. & Mfg. Company	62½	62
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	*125

a Asked. * Last Sale.

Report of the General Electric Company

The General Electric Company made public last week its report for 1909. The fiscal year of the company has been changed so as to end on Dec. 31 to comply with the corporation tax law, so that the present report is for the 11 months ended Dec. 31, 1909. It shows profits for the period, after allowance for depreciation, etc., of $6,493,670. The orders received during the 11 months amounted in value to $54,360,562, compared with $42,186,917 during the 12 months ended Jan. 31, 1909, and $59,301,040 during the 12 months ended Jan. 31, 1908. Orders received were at the yearly rate of $49,769,000 and for the last five months were at the yearly rate of $69,670,000.

The report refers to the continued success of the company's 1200-volt direct-current railway system and says that "more than 66,000 hp of 1200-volt railway motors are in operation and on order." Fourteen companies are mentioned as having adopted the system. Curtis turbines are now installed in 650 central distributing stations and power plants throughout the world, having a total capacity in excess of 1,750,000 hp. The aggregate floor space at the company's shops in Schenectady, Lynn, Pittsfield and Newark at the end of the fiscal year was 7,180,000 sq. ft. and the number of employees was 30,000.

In referring to engineering, the report refers to the improvements of high-tension transmission devices by means of which potentials of 100,000 volts and over can be used, to the development of a new electrolytic lighting arrester and to the development of turbo-generators of 20,000 kw. The 14,000 high-pressure turbines in use in New York and Chicago are giving good satisfaction. The company has $3,048,604 invested in copper mining and milling properties in California and New Mexico.

The balance sheet follows:

ASSETS.

Patents, Franchises and Good Will		$ 1.00
Cash		17,623,466.72
Stocks and Bonds	$22,329,663.71	
Real Estate (other than Factory Plants)	118,063.34	
Notes and Accounts Receivable	19,377,972.37	
Work in Progress	462,223.41	
	$42,287,922.83	
Merchandise Inventories:		
At Factories	$21,610,283.91	
At General and Local Offices	3,321,870.94	
Consignments	217,880.98	
	25,150,035.83	
		67,437,958.66
Factory Plants (including all lands, buildings and machinery)	$14,330,958.12	
Copper Mining Investment	3,048,604.41	
		17,379,562.53
		$102,440,988.91

LIABILITIES.

5 % Gold Coupon Debentures of 1892	$ 40,000.00
3½% Gold Coupon Debentures of 1902	2,047,000.00
5 % Gold Coupon Debentures of 1907	12,875,000.00
Accrued Interest on Debentures	83,664.58
Accounts Payable	2,753,617.30
Advance Payments on Contracts	777,133.34
Dividend Payable Jan. 15, 1910	1,303,592.00
	$19,880,007.22
Capital Stock Issued	65,179,600.00
Surplus	17,381,381.69
	$102,440,988.91

Proposal for Consolidation of the Elevated Railways in Chicago

The proposal to consolidate the elevated railways in Chicago has again been brought forward. Henry A. Blair, in the interest of the National City Bank, New York, N. Y., and N. W. Harris & Company, New York and Chicago, has made a proposal to the representatives of the elevated railways of cash in exchange for the preferred and common stock of the companies at a price hereafter to be agreed upon, the cash offer for the preferred stock to be distinct from the cash offer for the common stock. As an alternative, Mr. Blair proposes that the preferred and the common stock be deposited under an agreement which shall provide for a plan under the terms of which the depositors of the preferred stock will receive in exchange new securities sufficient in amount, at par, to represent the par value of the preferred stock which has been deposited, and the depositors of the common stock shall receive in exchange new securities commensurate with the cash offer made for the

common stock. Mr. Blair concluded his communication setting forth the proposal as follows:

"It is understood that a formal agreement is to be drawn up, setting forth the terms and conditions under which the exchange of securities, either for cash or for the new securities, to be offered by the bankers' syndicate, will be made.

"The said formal, written agreement will fix the price agreed to be paid in exchange for the preferred and common stock, and will provide that the syndicate shall have the right to call for the deposit of the preferred and common stock in exchange for the new securities of the syndicate, upon the basis set forth in the agreement and shall provide that Henry A. Blair, representing the bankers' syndicate, shall have the power to make an examination of the condition of the properties, to verify figures and estimates, to draw up a plan, and declare the plan operative, when possible to do so after the deposit of an amount of the stock sufficient to make it operative; and shall provide that, in case at the end of a stipulated period, the plan is not declared operative, then the depositors of the preferred and common stock shall have the right to withdraw their securities free from any obligations whatsoever.

"It is further understood that, in case the plan is declared operative by Henry A. Blair, representing the bankers' syndicate, within a time stipulated, then the depositors of the preferred and common stock shall have the right either to accept the cash offer made in the agreement already referred to, or in the alternative, to come in under the plan and receive in exchange for the preferred and common stock deposited thereunder the new securities of the syndicate, upon the basis agreed upon in the agreement."

Organization of Public Securities Company

The organization of the Public Securities Company with an authorized capital stock of $20,000,000 was announced in Chicago on April 27, 1910, by Homer W. McCoy, of McCoy & Company, Chicago, Ill., who has been elected president of the company. The purpose of the company is to occupy a position in Chicago to correspond to some extent to that of the private banking houses in the East in financing railroad, electric railway, gas, electric, hydroelectric and timber properties. The stock of the company is to be divided into 100,000 shares of 7 per cent cumulative first preferred stock of a par value of $10,000,000, 20,000 shares of second preferred stock of a par value of $2,000,000 and 80,000 shares of common stock of a par value of $8,000,000. The dividends on the first preferred stock are to be payable semi-annually or quarterly and the stock is to be redeemable 3 years after the date of issue at $110 per share plus any accumulated and unpaid dividends. The officers and directors of the Public Securities Company follow: Homer W. McCoy, president; Charles H. Deppe, vice-president; Walter A. Graff, vice-president; Joseph H. Roy, secretary and treasurer; Horace G. Burt, formerly president Union Pacific Railway; Samuel Insull, president Commonwealth Edison Company, Chicago; B. E. Sunny, president Chicago Telephone Company; Edward G. Cowdrey, vice-president People's Gas, Light & Coke Company, Chicago; Thomas E. Mitten, president Chicago City Railway; H. M. Byllesby, H. M. Byllesby & Company, Chicago; Clark L. Poole, Chicago; Walter Barker, Peoria; John W. Blodgett, Grand Rapids; Frank H. Buhl, Sharon, Pa.; James E. Danaher, Detroit; M. D. Thatcher, Pueblo, Col.; H. H. Picking, East Orange, N. J.

Following the announcement of the organization of the company, Homer W. McCoy made public a statement in which he said:

"The need for an investment banking institution in Chicago with a large capital to conduct a security underwriting and a wholesale bond business in the Middle West has long been recognized by bankers and business men. We have determined to take the initiative in this field and with the aid of local bankers and a coterie of prominent men experienced in the operation and conduct of lines of business which originate securities this company has been organized. Although the public offering has not been made $3,000,000 of the capital already has been subscribed. The public offering will be made at once. The company will not receive deposits nor will it interfere in any manner with the business now undertaken by local banks and trust companies, but rather facilitate through their co-operation and good will the underwriting or financing of securities not adapted to their requirements as carriers of commercial or savings deposits. The company has acquired the business and good will of McCoy & Company, which, however, will continue in the bond business as heretofore as a separate organization. It is not the present intention to engage in the business of retailing or distributing securities, but stockholders will be given the opportunity from time to time to join in underwritings on a profit-sharing basis."

Charleston Consolidated Railway & Lighting Company, Charleston, S. C.—The stockholders of the Charleston Consolidated Railway, Gas & Electric Company will meet on May 21, 1910, to vote to increase the capital stock of the company from $1,500,000 to $2,000,000 by creating an issue of $500,000 of 6 per cent preferred stock in $50 shares, which will be taken by the Charleston Consolidated Railway & Lighting Company, the organization of which was noted in the Electric Railway Journal of April 30, 1910.

Chicago City & Connecting Railways, Chicago, Ill.—The syndicate which controlled the stock of the Chicago City Railway has called upon the underwriters of the $22,000,000 issue of bonds of the Chicago City & Connecting Railways for a second cash payment. On April 1, 1910, a 60 per cent payment was made.

Joplin & Pittsburg Railway, Pittsburg, Kan.—The $2,800,000 of first mortgage 5 per cent gold bonds of the Joplin & Pittsburg Railway outstanding, which are dated June 10, 1907, and are due on July 1, 1927, have been called for payment on July 1, 1910, at 105 and interest at the office of the Germantown Trust Company, Philadelphia, Pa.

Lake Shore Electric Railway, Cleveland, Ohio.—E. W. Moore, president of the Lake Shore Electric Railway, says that 22,000 of the 30,000 shares of the preferred stock of the Lake Shore Electric Railway which are outstanding have been deposited under the plan for the readjustment of the preferred stock and that the holders of an additional 4000 shares have signified their intention to deposit their holdings. The terms of the proposed readjustment were published in the Electric Railway Journal of March 19, 1910, page 465.

Northampton Traction Company, Easton Pa.—The Northampton Traction Company and the Easton & Washington Traction Company, controlled largely by Thomas A. H. Hay and William O. Hay, Easton, Pa., have been consolidated as the Pennsylvania-Jersey Traction Company. It is proposed to build a connection between the lines of the Pennsylvania-Jersey Traction Company and the Morris County Traction Company so as to afford a route for travel by electric railway from New York via Newark to Easton.

Public Service Corporation, Newark, N. J.—The first annual report, covering the year ended Dec. 31, 1909, has been made public. Gross earnings of leased and controlled companies were $25,103,019. Miscellaneous income of the Public Service Corporation was $1,457,432, making a total of $26,560,451. Operating expenses and taxes were $13,331,228, leaving a balance of $13,229,223. Bond interest and rentals of leased and controlled companies amounted to $10,111,404, leaving a balance of $3,117,819. The fixed charges of the Public Service Corporation aggregated $1,689,372 and the surplus was $1,428,447. Of the total gross earnings reported by the corporation $12,114,412 were contributed by the Public Service Railway Company. The number of revenue passengers carried in 1909 was 238,171,257 and of transfers and passes redeemed 81,548,978, making a total of 319,720,235. The passenger receipts per car-mile were 29.08 cents and per car-hour $2.50.

Sioux City (Ia.) Service Company.—The Sioux City Service Company has made a first and refunding mortgage to secure not more than $2,500,000 of bonds dated May 1, 1910, and due May 1, 1928, but redeemable at $105 and interest on any interest payment date. Of these bonds $1,000,000 have been issued and sold to N. W. Halsey & Company, Chicago, Ill., who will offer them for public subscription.

Winona Interurban Railway, Warsaw, Ind.—Charles H. Worden has been elected a director of the Winona Interurban Railway to succeed C. O. Johnson, deceased.

Traffic and Transportation

Ticket Sales in the New York Subway

According to the Public Service Commission of the First District of New York, the Interborough Rapid Transit Company sold in 1909 35,777,769 more subway tickets than in 1908. The total was 256,768,961, as against 220,991,212, an increase of 16.19 per cent. The largest increase is noticed at the Brooklyn stations, where a total of 30,221,985 were sold, against 21,611,295 the year before. At the Brooklyn Bridge station 16,980,474 tickets were sold. On the Lenox branch travel was the heaviest during the last three months of the year, and the same condition prevailed on the Broadway branch. The statement by months for principal stations follows:

	Lenox Branch.	Broadway Branch.	Brooklyn Bridge.	Brooklyn Stations.	Total Entire System.
January	3,909,252	2,418,098	1,435,745	2,468,932	22,371,396
February	3,676,893	2,309,001	1,324,647	2,304,463	20,769,591
March	4,116,860	2,564,675	1,500,997	2,631,599	23,316,473
April	4,024,535	2,557,260	1,445,696	2,589,154	22,564,008
May	4,082,154	2,672,717	1,449,763	2,583,707	22,077,744
June	3,515,334	2,291,650	1,356,127	2,336,727	18,996,084
July	3,156,554	2,057,878	1,312,499	2,160,055	16,818,051
August	3,168,060	2,022,735	1,306,497	2,170,617	16,975,864
September	3,720,216	2,690,528	1,462,226	2,521,216	20,796,207
October	4,249,680	2,898,417	1,479,436	2,757,266	23,489,467
November	4,224,514	2,752,545	1,400,106	2,731,967	23,193,014
December	4,451,357	2,917,184	1,506,735	2,966,282	25,401,082
1909	46,295,409	30,152,688	16,980,474	30,221,985	256,768,961
1908	39,877,715	24,877,110	16,909,244	21,611,295	220,991,212
Increase	6,417,694	5,275,578	71,230	8,610,690	35,777,769
Increase in per cent.	16.09	21.21	0.42	39.84	16.19

The number of tickets sold on other portions of the subway (included in total figures shown in table above) follow:

	Ninety-sixth Street to Fiftieth Street.	Times Square.	Grand Central.	Thirty-third Street to Worth Street.	Fulton Street to South Ferry.
January	2,669,002	1,052,253	1,199,332	4,971,134	2,219,574
February	2,453,552	970,098	1,072,126	4,637,134	2,008,139
March	2,706,655	1,028,866	1,200,067	5,245,070	2,305,422
April	2,588,747	957,221	1,190,475	4,975,797	2,217,986
May	2,472,079	879,481	1,123,572	4,669,358	2,121,519
June	1,883,351	684,966	994,039	3,957,241	1,980,659
July	1,489,110	600,956	862,948	3,351,288	1,803,259
August	1,473,981	655,712	871,846	3,459,440	1,836,907
September	2,142,352	848,106	1,140,603	4,175,752	2,072,480
October	2,601,966	984,534	1,224,807	5,015,620	2,263,129
November	2,633,987	1,011,362	1,208,981	4,965,861	2,252,232
December	2,859,517	1,102,974	1,322,157	5,665,024	2,596,090
Total	27,974,299	10,776,529	13,390,953	55,088,719	25,677,396
Total, 1908	24,970,133	9,638,382	11,752,264	48,791,307	22,354,124
Increase	3,004,166	1,138,147	1,638,689	6,297,412	3,323,272
Increase in per cent.	12.03	11.81	13.94	12.91	14.87

Through Elevated Routes and Transfers in Chicago

Bion J. Arnold, chairman of the Board of Supervising Engineers, Chicago Traction, conferred on April 26, 1910, with a subcommittee of the engineers representing the Chicago elevated railways in reference to the problems of through routing and transfers. Another meeting, at which Mr. Arnold and the presidents and engineers of the companies were present was held on April 28, 1910. Out of 38 tentative plans for through routing only five were deemed to be feasible and were submitted to the companies for consideration. A summary of these plans follows:

"1. Through routing all trains on the Northwestern Elevated Railroad and South Side Elevated Railroad, looping the lines of the Metropolitan West Side Elevated Railway as at present. This plan would give a capacity of 205 five-car trains.

"2. Through routing of trains of the Northwestern Elevated Railroad and the South Side Elevated Railroad, and running some of the Humboldt Park and Logan Square trains of the Metropolitan West Side Elevated Railway over Lake Street from Paulina Street, entering the loop at Lake Street and Fifth Avenue. This plan would give a capacity of 237 trains an hour.

"3. Through routing of trains of the Northwestern Elevated Railroad and the South Side Elevated Railroad and of the Metropolitan West Side Elevated Railway and the Chicago & Oak Park Elevated Railroad. To facilitate this operation connections would have to be made between the Metropolitan West Side Elevated Railway and the Chicago & Oak Park Elevated Railroad at Paulina or Market Street, or both. The capacity under this plan would be 365 trains an hour.

"4. Loop operation of all roads with a separation of the grades at Lake Street and Fifth Avenue. This plan would give a capacity of 222 trains an hour.

"5. Through routing of Northwestern Elevated Railroad and South Side Elevated Railroad over a new structure in State Street from Chicago Avenue to Twelfth Street, or over the present structure in Fifth Avenue, looping the Chicago & Oak Park Elevated Railroad and the Metropolitan West Side Elevated Railway as at present. The capacity under this plan with a new structure in State Street would be 444 trains an hour."

Conference Probable in Illinois on Interurban Rules

Orville F. Berry, chairman of the Railroad & Warehouse Commission of Illinois, is considering the subject of the rules which govern the operation of electric railways in Illinois, and it is probable that he will request a conference with the managers of electric railways in the State with a view to the adoption of rules that shall be more nearly uniform. Mr. Berry was recently reported to have made the following statement regarding the operation of electric railways:

"I have found by inquiring into the mode of operation of the electric railways that their rules and regulations all bear the imprint of haste. The development of the electric railway has been so fast that the management has not been able fairly and carefully to organize the operating systems.

"There seems to be no definite plan or arrangement for controlling the operation of these roads. There seems to be no uniform schedules for operating. The responsibility of the movement of the cars seems to be divided in many instances between the motorman and the conductor. This divided responsibility is bad on the service.

"The commission contemplates calling together at an early date the officials of the interurban railways for the purpose of taking up with them the publishing by the commission of rules and regulations for the operating in a general way of these roads. This matter has been submitted to a number of the managers and has met with favor. The motormen on electric railways should be very carefully selected and be well versed in electricity and the manner of its handling. The commission feels that this is a very important subject and it will be dealt with at an early date. A set of rules should be adopted fixing absolutely the responsibility for the movement of cars."

Fare Complaint in New York.—Patrons of the Syracuse, Lake Shore & Southern Railroad, Syracuse, N. Y., have filed with the Public Service Commission of the Second District of New York a complaint about the fare of 10 cents charged by the company between stop 26 and Fulton, N. Y., a distance of 3.82 miles. They claim that the present rate between stop 26 and Fulton constitutes unjust discrimination in favor of passengers who ride within other 5-cent zones of the company.

Rochester, Syracuse & Eastern Railroad Ordered to Maintain Passenger Station.—The Public Service Commission of the Second District of New York has ordered the Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y., to provide a station on its line at Savannah, Wayne County, on or before Oct. 1, 1910, and to submit plans for the station on or before May 30, 1910. The company is given an option of renting space for a passenger station in any building in which suitable accommodations for the public are offered.

Booklet Issued by the Terre Haute, Indianapolis & Eastern Traction Company.—John H. Crall, general passenger agent of the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has issued a booklet, "A Trip to Nature's Beauty Spots," devoted entirely to the Martinsville division of the company illustrated with half-tones reproduced from photographs taken along the company's lines. The cover of the booklet contains the legend "Dedicated to all lovers of nature by the passenger department

of the Terre Haute, Indianapolis & Eastern Traction Company.

Application to Abandon Line Disapproved.—The Public Service Commission of the Second District of New York has denied the application of the Bennington & North Adams Street Railway, Hoosick Falls, N. Y., to abandon a part of its route in Hoosick Falls and construct this route on a part of High Street, Hoosick Falls, not now occupied by it. The portion of the route proposed to be abandoned now constitutes a loop and the company desired to abandon this and run the line through High Street, making a direct route. At the hearing it was objected that the portion of High Street, which it was proposed to occupy, was narrow and that a large school was located along the route. It was also contended that the steep grade on the street would endanger the lives of children.

Lehigh Valley Transit to Operate Into Philadelphia Over Philadelphia & Western Railway.—E. B. Smith, of E. B. Smith & Company, Philadelphia, Pa., who purchased the Philadelphia & Western Railway, as announced in the Electric Railway Journal of April 9, 1910, page 667, stated on April 30 that it was proposed to connect the Philadelphia & Western Railway with the line of the Lehigh Valley Transit Company, so as to afford an entrance to Philadelphia for the cars of the latter company which are operated from Allentown. At present the Lehigh Valley Transit Company operates only to Chestnut Hill, in the suburbs of Philadelphia. The Philadelphia & Western Railway is operated to Sixty-ninth and Market Streets, Philadelphia, where passengers transfer over the Market Street elevated line of the Philadelphia Rapid Transit Company for down-town Philadelphia. The connection between the two systems will reduce the time for the trip from Allentown to Philadelphia about 45 minutes. Stone & Webster, Boston, Mass., have been retained to determine how the plans for a physical connection between the Philadelphia & Western Railway and the line of the Lehigh Valley Transit Company can best be carried out.

Traffic Capacity of Boston Elevated Terminal Discussed.—J. Henry Neal, general auditor of the Boston (Mass.) Elevated Railway, in a recent lecture before the Roxbury Improvement Association, discussed the traffic capacity of the Dudley Street terminal station for elevated lines, and pointed out the efforts the company had made to handle the service at this point in the face of changing conditions. The Dudley Street terminal was the southern end of the original elevated system built in Boston in 1901. During the early years of elevated service it fulfilled its mission admirably and afforded the public additional transfer facilities without the interchange of checks. On account of the growth of business and the construction of the Forest Hills elevated extension it became necessary to change the design of the terminal, as described in the Electric Railway Journal. Perhaps the most notable improvements were the added platform facilities and the separation of inward from outward foot passenger movements to prevent congestion. The completion of all the changes at the terminal will give the station a capacity of 1420 cars per hour, whereas in the South Station at Boston, one of the largest stations in the world, 817 trains per day were handled, or a total of 4902 cars. From 8 to 23 platform men were on duty constantly. The volume of daily passenger traffic was larger at the Dudley Street Station than at the North and South railroad stations together at Boston.

An ordinance has been introduced in the upper house of the Council of Kansas City, Mo., to create a new public utilities commission in that city to consist of three members instead of seven as at present, each member to receive a salary of $1,000 a year. The commission is to be nonpartisan, the majority of the members to come from the dominant political party. Appointments are to be made by the Mayor, and members of the commission must be citizens of Missouri. The ordinance has been referred to the finance committee. Under the present laws of Missouri public utility commissions appointed by cities are only empowered to recommend to the Council changes in the operation of public utilities which their study of a case may seem to deem proper.

Personal Mention

Mr. W. J. Goldthwait has resigned as superintendent of the Manchester Traction, Light & Power Company and the Manchester Street Railway, Manchester, N. H.

Mr. Henry A. Everett, of the Everett-Moore Syndicate, Cleveland, Ohio, has sailed from San Francisco on a tour of the world for the benefit of his health. Mr. Everett spent the winter in California. He is accompanied by Dr. T. N. Moore, Willoughby, Ohio.

Mr. J. V. H. Torner has recently been appointed shop foreman of the Beloit division of the Rockford & Interurban Railway. Mr. Torner was formerly car house foreman of the Calumet & South Chicago Railway, Chicago, and has had several years' experience with the Chicago City Railway.

Mr. L. E. Lynde has been appointed superintendent of the Manchester Traction, Light & Power Company and the Manchester Street Railway, Manchester, N. H., to succeed Mr. W. J. Goldthwait. Mr. Lynde has recently been superintendent of the Eastern Massachusetts and the Eastern New Hampshire divisions of the New Hampshire Electric Railways, Haverhill, Mass.

Mr. John F. Collins, who recently resigned as general manager of the Saginaw-Bay City Railway and the Saginaw Valley Traction Company, Saginaw, Mich., to become assistant general manager of the Toledo Railways & Light Company, Toledo, Ohio, was tendered a banquet at the Boody House, Toledo, by his friends as an indication of their appreciation at his return to Toledo.

Mr. C. F. Franklin, who resigned recently as president and general manager of the Toledo & Western Railroad, Toledo, Ohio, has been appointed general superintendent of the Winona Interurban Railway, Warsaw, Ind. Mr. Franklin was formerly general superintendent of the Toledo, St. Louis & Kansas City Railroad, and has had 20 years' experience with steam railroads. He has been connected with interurban electric railways for the last 10 years.

Mr. Bertram H. Harrigan has been appointed superintendent of the Eastern Massachusetts and Eastern New Hampshire divisions of the New Hampshire Electric Railways, Haverhill, Mass., to succeed Mr. L. E. Lynde, who has been appointed superintendent of the Manchester Traction, Light & Power Company and the Manchester Street Railway, Manchester, N. H. Mr. Harrigan up to a short time ago was a conductor on the Eastern division of the New Hampshire Electric Railways, a position which he held for more than five years.

Mr. W. A. Satterlee has been appointed general manager of the Joplin & Pittsburg Railway, Pittsburg, Kan. Mr. Satterlee was formerly assistant general manager of the Metropolitan Street Railway, Kansas City, Mo., with which he was connected for 20 years. During this time he served as purchasing agent, auditor, cashier, assistant superintendent, superintendent and assistant general manager. Prior to 1902 he was superintendent in charge of the operation of all the lines of the Metropolitan Street Railway, and from 1902 until August, 1908, he gave his entire attention as assistant general manager to damages and claims. He took up the work with the operating department again in 1908 when Mr. J. W. Carter resigned as superintendent. Mr. Satterlee resigned from the Metropolitan Street Railway in September, 1909.

Mr. B. T. Longino, of the transportation department of the Seattle (Wash.) Electric Company, has been appointed assistant to Mr. F. A. Boutelle, superintendent of transportation of the Tacoma Railway & Power Company, Tacoma, Wash. Mr. Longino is a graduate of the technical department of the Georgia School of Technology, class of 1907. After finishing his course he entered the offices of Stone & Webster, in Boston, Mass., and was afterwards transferred to the Seattle Electric Company, where he has occupied different positions for the past year and a half. When he first entered the employ of the Seattle Electric Company Mr. Longino was connected with the engineering section of the master mechanic's department, from which he entered the offices of Mr. A. L. Kempster, superintendent of transportation of the company.

Mr. F. T. Hepburn, whose appointment as general manager of the Saginaw Valley Traction Company, Saginaw, Mich., was noted in the ELECTRIC RAILWAY JOURNAL of April 30, 1910, will also act as general manager of the Saginaw-Bay City Railway, the Saginaw City Gas Company, the Bay City Power Company and the Bay City Gas Company, which comprise the gas, electric light, power and street railway companies in Saginaw and Bay City and the interurban electric railway between these cities. Mr. Hepburn was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., in 1893, and for 13 years was connected with the construction, maintenance and operating department of the Pennsylvania Railroad. In 1906 he was appointed general manager of the Lima & Toledo Traction Company and the Indianapolis, Columbus & Eastern Traction Company, Lima, Ohio, which operated 250 miles of interurban electric railway in Ohio, and now comprise what is known as the Northern District of the Ohio Electric Railway. Mr. Hepburn has already entered upon his duties with the companies in Saginaw and Bay City.

Mr. W. R. W. Griffin, general superintendent of the Rochester lines of the New York State Railways, has been appointed general manager of the East Liverpool Traction & Light Company, East Liverpool, Ohio, and will assume his duties with that company on May 10, 1910. Mr. Griffin was connected with the Toledo, Fremont & Norwalk Railroad from 1900 until 1901, and with the Lake Shore Electric Railway after the consolidation of the Toledo, Fremont & Norwalk Railroad and other properties by the Everett-Moore Syndicate as the Lake Shore Electric Railway. On May 15, 1902, he was appointed superintendent of construction of the Rochester & Eastern Rapid Railway for the Comstock-Haigh-Walker Company. He became operating superintendent of the Rochester & Eastern Rapid Railway on Nov. 19, 1903, and remained in this position until Dec. 1, 1907, when he was appointed general superintendent of the Rochester Railway, which subsequently was merged into the New York State Railways. Mr. Griffin is a member of the American Society of Civil Engineers and an associate member of the American Institute of Electrical Engineers.

W. R. W. Griffin

Mr. A. W. McLimont has resigned as general manager of the Chicago & Milwaukee Electric Railroad, Chicago, Ill., to become vice-president and general manager of the Michigan United Railways, Lansing, Mich. He will assume his duties with the Michigan United Railways as soon as his successor with the Chicago & Milwaukee Electric Railroad is appointed. Mr. McLimont has been general manager of the Chicago & Milwaukee Electric Railroad since March, 1909, and was formerly electrical and operating engineer of the Public Service Commission of the First District of New York. He was connected with the Public Service Commission from the time it organized, and in the position which he held with the commission there devolved upon him the task of making recommendations regarding the physical properties of companies operating 7000 electric cars, 24 car houses and several very large power houses and of making a number of original investigations for the commission, the most important of which was undoubtedly the series of fender tests conducted at Schenectady and Pittsburgh. Mr. McLimont is a Canadian by birth. After entering business with the New England Telegraph & Telephone Company and subsequently installing railway plants in Dallas, Houston, St. Joseph, Nashville, Chicago, and other cities for the Thomson-Houston Electric Company, he became general manager and resident engineer of the Dubuque (Ia.) Electric Company. Later he joined the foreign department of the General Electric Company and for a number of years installed electric light and power plants in South America. He returned to the United States for a short while, but later he built and operated a number of electric light plants in Mexico. Entering the employ of W. R. Grace & Company, Mr. McLimont designed, built and operated 40 miles of city and interurban railway at Lima, Peru.

OBITUARY

Townsend Wolcott, electrical engineer at New York of the United States Signal Corps, died of pneumonia on April 29, 1910, after an illness of only a few days. Mr. Wolcott joined the American Institute of Electrical Engineers in 1888, and became a full member of the institute in 1890. For more than 10 years he was a member of the membership committee and was always an active participant in the discussion of papers before the institute. He was also a frequent contributor to the technical press on various subjects.

William A. Snow, formerly chairman of the board of directors of the American Brake Shoe & Foundry Company, Mahwah, N. J., died at his home in Hillburn, N. Y., on April 26, 1910. Mr. Snow was 81 years old. At the time of his death he was also chairman of the board of directors of the Metal Plated Car & Lumber Company, vice-president of the Ramapo Iron Works, president of the Standard Equipment Company, treasurer of the Rockland Electric Company and treasurer of the Mountain Spring Water Company.

George F. Porter, former secretary of the National Electric Light Association, died of apoplexy on April 29, 1910, at his home in Montclair, N. J. Mr. Porter's long official connection with the National Electric Light Association brought him a wide acquaintance, both in central station and electrical manufacturing circles. Mr. Porter was born on March 12, 1855, in Pittsburgh, Pa. In 1875 he turned his attention to the electrical field, commencing as a telegraph operator. Until 1877 he was connected with the Pullman Palace Car Company in its Philadelphia office. Later he went into the carbon business, and subsequently held a position with the Westinghouse Electric & Manufacturing Company in Philadelphia. In 1892 he was appointed secretary of the National Electric Light Association, which office he held continuously until 1902. In 1904 he became master of transportation of the association, and just prior to his death was busily engaged in making transportation arrangements for the convention of the National Electric Light Association in St. Louis.

George W. Williams and George T. Bishop, receivers of the Washington, Baltimore & Annapolis Electric Railway, Washington, D. C., have issued a statement which shows the earnings of the company for March, 1910, and March, 1909, and for the nine months ended March 31, 1910. The gross earnings for March, 1910, were $54,426, as compared with $50,949 for March, 1909; the net earnings for March, 1910, were $26,445, as compared with $14,169 for March, 1909; the percentage of operating expenses to gross earnings in March, 1910, was 51.2 per cent as compared with 72 per cent in March, 1909. The gross earnings for the nine months ended March 31, 1910, were $459,067 and the net earnings were $183,090. The percentage of operating expenses to gross earnings for this period was 60 per cent. In a letter addressed to the stockholders of the company, which accompanied the statement of earnings, Mr. Bishop said:

"On March 1, 1910, the receivers commenced to operate the new cars, equipped with 1200-volt direct-current motors, to the United States Treasury Building, Washington. This terminus is within 500 ft. of the White House. On the same date rates of fare were increased, the most important advance being in the rates between Baltimore and Washington. All these changes have now been in effect for the full month of March and the first half of April, and it is evident that not only will the earnings be increased, but the operating expenses will show a material decrease. Since these changes were made, the receivers have increased the limited train service between Washington and Baltimore and have added a two-hourly through service between Washington and Annapolis, thereby increasing the car mileage 600 miles a day. Notwithstanding the reduction in operating expenses, the receivers have provided better service to the extent of 18,000 miles a month."

Construction News

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

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

RECENT INCORPORATIONS

***Caldwell-Roswell Interurban Railway, Caldwell, Ida.**—Incorporated in Idaho to build an electric railway between Caldwell and Roswell. Capital stock $250,000. H. W. Dorman is interested.

Noccalula Railway, Light & Power Company, Gadsden, Ala.—Application for a charter has been made by this company in Alabama to build a railway from Gadsden to the Falls in Black Creek on Lookout Mountain. Capital stock, $300,000. H. A. Rogers is interested. [E. R. J., April 23, '10.]

Muskogee (Okla.) Transit Company.—Incorporated in Oklahoma to build a 225-mile electric railway to connect Wagoner, Corretta, Coweta, Broken Arrow, Tulsa, Sapulpa, Haskell, Boynton, Okmulgee, Checotah, Warner, Webber's Falls, Illinois Station, Bragg, Fort Gibson, Henryetta and Muskogee. Capital stock, $100,000. Headquarters, Muskogee. Incorporators: E. W. Mangson, and Oliver Borwick, St. Louis; O. D. Revell, Asheville, N. C., and Tams Bixby, Chas. Bliss, Thos. Smith, M. F. Hancock and Geo. A. Murphy, Muskogee. [E. R. J., April 23, '10.]

Philadelphia & Suburban Elevated Railroad, Philadelphia, Pa.—Chartered in Pennsylvania to construct elevated railroads on Twelfth and Thirteenth Strects, also for a subway under North Broad Street from Filbert Street to York Street with three elevated spurs running to Frankford, Wayne Junction and Strawberry Mansion. Among the directors are: Russell Thayer and Robert K. Cassatt. S. S. Neff president. [E. R. J., Dec. 4, '08.]

***Maryhill & Goldendale Railway Company, Olympia, Wash.**—Incorporated in Washington to build a railway between Maryhill and Goldendale. Capital stock, $10,000. Incorporators: Samuel Hill, A. E. Hanford, H. C. Richardson and N. D. Miller.

***Olympic Power & Development Company, Port Townsend, Wash.**—Application for a charter has been made by this company in Washington to build an interurban railway to connect Port Townsend, Irondale and Hadlock. Capital stock, $250,000. Directors: W. B. Martin, James H. Causten and James A. Calyert, Seattle; E. A. Sims, Port Townsend, and Eric Molander, Everett.

FRANCHISES

Gadsden, Ala.—H. A. Rogers, representing the Noccalula Railway, Light & Power Company, has been granted a franchise to build a railway in Gadsden. It will connect Gadsden, Alabama City, Attalla and Lookout Mountain top. [E. R. J., April 23, '10.]

Glendale, Cal.—The Glendale & Eagle Rock Railway, Glendale, has applied to the Trustees for a franchise to build an extension to the northern city limits of Glendale. E. D. Goode, president.

Eldorado, Ill.—The Egyptian Traction Company has been granted a 50-year franchise by the Councils of Harrisburg, Eldorado and Carrier Mills, and it is now negotiating with the Councils of Marion, Carbondale and New Haven for similar franchises. G. E. K. Hixon, general manager, announces that the company plans to begin work about June 1 on the section of the line between Eldorado and Carrier Mills. [E. R. J., April 16, '10.]

Bristol, Ind.—The St. Joseph Valley Traction Company, Elkhart, has been granted a franchise by the Board of Trustees to build a railway in Bristol. The plan is to extend this railway to Pioneer, Ohio, where it will connect with an electric railway into Toledo. [E. R. J., Apr. 9, '10.]

***Cedar Rapids, Ia.**—William Dows and Isaac Smith have asked the Council for a franchise to build a railway in Cedar Rapids.

Charles City, Ia.—The Charles City & Western Railway has been granted a franchise by the Council to build an electric railway in Charles City. It is planned to extend it to Marble Rock. [E. R. J., Apr. 23, '10.]

Davenport, Ia.—The Tri-City Railway, Davenport, has been granted a 25-year extension of its franchise to build extensions of its railway in Davenport. It is expected to extend the line to Muscatine.

Covington, Ky.—The Covington, Big Bone & Carrollton Railroad, Covington, has been granted a 50-year franchise by the Aldermen and Council to build a railway in Covington. M. J. Crouch is interested. [E. R. J., Apr. 30, '10.]

Ironwood, Mich.—Messrs. Sullivan and Appleyard have been granted an electric railway and light franchise in Ironwood. [E. R. J., Apr. 30, '10.]

Englewood, N. J.—The New Jersey & Hudson River Railway & Ferry Company have been granted a 5-year franchise to extend its railway in Englewood.

Welland, Ont.—The Niagara Falls, Dunnville & Welland Electric Railway, Welland, will ask the City Council soon for a franchise to build an electric railway through Welland. [E. R. J., Mar. 26, '10.]

Albany, Ore.—The Oregon Electric Railway, Portland, has been granted a franchise by the City Council to enter Albany.

Cold Spring Park, Pa.—The Huntingdon, Lewiston & Juniata Valley Traction Company, Huntingdon, has been granted a franchise to build a railway in Cold Spring Park.

Lykens, Pa.—The Schuylkill & Dauphin Traction Company, Harrisburg, has asked the Council for a franchise to build an extension to its lines to connect with the Pennsylvania Railroad in Lykens. W. E. Harrington, general manager.

Beaumont, Tex.—I. D. Polk, Beaumont, has applied for a 50-year franchise to build a railway in Beaumont. This is part of a plan to connect Beaumont and Port Arthur. [E. R. J., June 12, '09.]

***Houston, Tex.**—A. Foster Irwin, representing the Houston & Bay Shore Traction Company, has asked the County Commissioners for a franchise to build an interurban railway over county roads from Houston to Morgans Point, via Harrisburg and La Porte.

Provo, Utah.—A. J. Evans and S. L. Chipman has applied to the County Commissioners for a franchise to build an interurban railway through Utah County, similar to the one granted to Jesse Knight, which he declined to accept. Application has also been made to the Council for a local franchise. [E. R. J., Feb. 19, '10.]

TRACK AND ROADWAY

Birmingham Railway, Light & Power Company, Birmingham, Ala.—This company has just laid 2¼ miles of double track with 80-lb. rails between Ensley and Corey. A. H. Ford, general manager.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company has awarded the contract for building its 5-mile extension to Chilliwack to J. W. Pike, Vancouver.

Nelson Electric Tramway Company, Ltd., Nelson, B. C.—This company has awarded a contract to L. G. Brandt, Nelson, for the construction of 5 miles of new track. J. McPhee, Nelson, superintendent.

Pacific Electric Railway, Los Angeles, Cal.—This company has finished the grading work around the west basin in Los Angeles Harbor. The double-track railway intersects the main line of the Pacific Electric Company's San Pedro-Los Angeles line at First Street, Wilmington. It intersects the Los Angeles Interurban line at the extreme end of the west basin. The line from Wilmington to Long Beach is practically completed.

Oakland & Antioch Railway, Oakland, Cal.—This company has secured right of way and grading work has been started at Walnut Creek. This proposed railway will connect Oakland, Bay Point, Concord, Walnut Creek, Lafayette and Martinez. Fred Brooks, engineer. [E. R. J., Jan. 22, '10.]

***San Rafael, Cal.**—Frederick Butterfield and associates of Marin County are perfecting plans for the construction of a street railway from Corte Madera through Ross Valley towns and San Rafael to McNear Point. The plan is said to be backed by San Francisco capital.

Southern Pacific Company, San Francisco, Cal.—This company has started grading for the extension of its tracks

from the present terminus in Melrose to Stonehourst, where a junction will be made with track already laid, thereby completing a loop suburban system which will extend almost completely around the newly annexed districts of Oakland. It is probable that the loop will be extended to San Leandro.

Valdosta (Ga.) Street Railway.—This company has decided to extend its line through a number of streets in Valdosta, so as to form a belt line. W. S. West, general manager.

Bloomington, Pontiac & Joliet Electric Railway, Bloomington, Ill.—This company is reported to be laying tracks on its extension between Pontiac and Chenoa. F. E. Parks, Joliet, manager.

Taylorville (Ill.) Railway, Light, Heat & Power Company.—This company is planning a 4½-mile extension which will eventually extend to Jayne Park. Contracts are new being awarded for material. W. B. Adams, Taylorville, manager. [E. R. J., Oct. 24, '08.]

Evansville (Ind.) Railway.—This company has announced plans for the extension of its line from Boonville through Lynnville and the Pike County oil fields to Oakland City, Ind. F. M. Durbin, Evansville, general manager.

Iowa City, Ottumwa & Southwestern Electric Railway, Iowa City, Ia.—This company has let contracts for the construction of its 74-mile electric railway to August Steffin and Charles Kindt, Davenport, and R. C. Campbell, New York. The line will connect Iowa City and Ottumwa via Sharon Center, Trytown, Amish, Wellman, Keota and Ollie.

Central Kentucky Traction Company, Frankfort, Ky.—This company announces that it will build an extension from Frankfort to Owenton, provided rights of way can be secured from property owners.

Louisville, Lincoln Farm & Mammoth Cave Traction Company, Glasgow, Ky.—Organization of this company with a capital stock of $1,000,000 has been perfected and these officers elected: J. M. Richardson, president; J. A. McDaniels, vice-president; J. Wood, secretary and treasurer, and J. Lewis Williams, general counsel. Immediate action will be taken to secure rights of way to Mammoth Cave and the head of navigation on Green River. The line will be built on steam road lines as to gage and electric power equipment to enable the interchange of traffic with connecting steam roads. [E. R. J., April 23, '10.]

Baltimore & Pennsylvania Railway & Power Company, Annapolis, Md.—This company, which proposes to build a railway to connect Baltimore, Hanover and Reisterstown, has perfected its organization by the election of the following officers: J. Pierce Burns, president; Jacob H. Sherman, vice-president. Headquarters, 1209 Calvert Building, Baltimore. [E. R. J., April 30, '10.]

Easton & Washington Traction Company, Washington, N. J.—This company is preparing plans to build an extension of its line to Belvidere, Oxford, Buttsville and Bridgeville as soon as Belvidere will furnish $75,000 capital. W. O. Hay, Easton, purchasing agent.

Syracuse & South Bay Electric Railroad, Syracuse, N. Y.—This company is considering plans for extending its railway from North Syracuse to Cicero, Central Square and Brewerton, a distance of 10 miles. H. C. Beatty, general manager.

Grand Forks (N. D.) Street Railway.—This company will place contracts during the next few weeks for building three miles of track. Thomas D. Campbell, general manager.

Cherokee Belt & Interurban Railway, Collinsville, Okla.—Surveys have been completed for this company by Archer & Rolins, Kansas City, and construction will begin within 90 days on its proposed 45-mile electric railway from Pryor to Skiatook. Motor cars will be used for the passenger service and steam locomotives to handle freight traffic. Dr. E. Pleas, Collinsville, president and general manager. [E. R. J., May 16, '08.]

***Fossil, Ore.**—James Stewart and associates are planning to build a 20-mile railway from Condon via Marysville to Fossil.

Lane County Asset Company, Eugene, Ore.—This company advises that surveys are being made for the proposed 130-mile electric railway which is to connect Eugene, Florence and Coos Bay. Work is scheduled to begin on the line about July 1. The Lane County Asset Company has been organized for preliminary purposes only, and later it is proposed to organize a permanent company to build and operate the line. Capital stock authorized, $235,000; issued, $47,250. Officers: M. Svarverud, president; Alton Hampton, vice-president; John Baird, secretary and treasurer; H. D. Forner, chief engineer, all of Eugene. [E. R. J., June 5, '09.]

Huntingdon, Lewiston & Juniata Valley Traction Company, Huntingdon, Pa.—This company is reported to have awarded contracts to the Pennsylvania Excavating Company for the general grading, and to the Huntingdon Construction Company for the construction of the line. Preliminary arrangements are being made. J. M. Stare, Huntingdon, secretary and treasurer. [E. R. J., April 9, '10.]

Southern Cambria Railway, Johnstown, Pa.—This company has decided to proceed with the construction of its 1½-mile extension from Conashaugh to Woodvale Heights. F. R. Newman, Johnstown, general manager.

South Carolina Western Railway, Hartsville, S. C.—This company, recently incorporated to build a 40-mile railway from McBee to Florence, advises that it plans to operate the line by steam. W. R. Bonsal, Hamlet, N. C., president. [E. R. J., April 16, '10.]

***Cleburne, Tex.**—Daniel Hewett and associates are considering plans for building a street railway in Cleburne. As soon as the citizens subscribe for $30,000 work on the new line will be started.

Texas Traction Company, Dallas, Tex.—This company has decided to extend its railway to Waco. J. F. Strickland, president.

***Houston-Bay Shore Traction Company, Houston, Tex.**—This company, recently organized by Detroit and Cedar Rapids capitalists, has completed arrangements for building a 24-mile interurban railway between Houston and La Porte. A. Foster Irwin, Detroit, president.

***Salt Lake City, Utah.**—George H. Lawrence has succeeded in financing a proposed electric railway to connect Idaho Falls and Hizer's Hot Springs. Rights of way have been secured and work will be started July 1.

Norfolk & Portsmouth Traction Company, Norfolk, Va.—This company plans to double-track its line from Ocean View to Willoughby Spit. E. C. Hathaway, general manager. [E. R. J., March 26, '10.]

Virginia Railway & Power Company, Richmond, Va.—This company is negotiating with the citizens of Chesterfield County to extend its lines from Cockade City to Matoaca. C. B. Buchanan, Richmond, superintendent.

Blue Ridge Light, Power & Railway Company, Staunton, Va.—J. M. Spotts, president, is reported to have completed arrangements for financing improvements and extensions of this railway.

Everett-Tacoma Railway, Snohomish, Wash.—This company will soon begin construction of its proposed 110-mile railway to connect Everett, Snohomish, Monroe, Holt, Issaquah, Renton, Kent, Auburn, Sumner, Puyallup, Seattle and Tacoma. It has recently filed with the county auditor a first mortgage to secure an issue of $5,000,000 in bonds. C. A. Barron, Snohomish, general manager. [E. R. J., May 1, '09.]

SHOPS AND BUILDINGS

Chicago (Ill.) City Railway.—This company has just purchased a site on Langley Avenue and Thirty-eighth Street, 60 ft. x 112 ft., for $18,000 on which it will build a new car house.

United Railways & Electric Company, Baltimore, Md.—This company will build additions to its Pratt Street power house. They will be two one-story fire-proof structures, 6 ft. x 43 ft., built of concrete with slag roofs. The estimated cost is $5,500. The contract has been awarded to John Cowan.

Twin City Rapid Transit Company, Minneapolis, Minn.—This company states it has begun the building of a new

car house and storage yards to have a capacity of 300 cars in Minneapolis. [E. R. J., Nov. 27, '09.]

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—This company will build two extensive additions to its car houses in Buffalo this summer. The last extension will be a car storage house and the west addition will be 120 ft. x 50 ft. This will also be for storage purposes.

Scioto Valley Traction Company, Columbus, O.—This company contemplates the erection of a new station at Chillicothe. The estimated cost is $25,000.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company has acquired additional property at Pen Mar for its new substation and additional terminal tracks. It will also build a small car house and repair shop.

Dallas Consolidated Electric Street Railway, Dallas, Tex.—This company has prepared plans for the erection of an additional car house adjoining the present one on Elm Street and Main Street. The structure will be half basement and one-story high, 60 ft. x 300 ft. E. T. Moore, Dallas, general manager.

Wheeling (W. Va.) Traction Company.—This company has under consideration the installation of new generating equipment which will increase the present capacity of its plant by 50 per cent. The company also plans to build a power house and the installation of equipment thereby centralizing the power for its various divisions. George O. Nagle, general manager.

POWER HOUSES AND SUBSTATIONS

Northern Electric Railway, Chico, Cal.—This company expects to erect a station at Lake Winola to cost $30,000. A. D. Schindler, San Francisco, general manager.

Los Angeles (Cal.) Railway.—This company proposes to remove its old power house at the southeast corner of East First Street and Chicago Street in Los Angeles.

Rome Railway & Light Company, Rome, Ga.—This company has placed an order with the General Electric Company for a 500-kw turbine, a 300-kw rotary converter and other small station equipment.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company plans to build a large power plant in West Tenth Street, Indianapolis. The new plant will furnish power only for the interurban divisions of the company and will be in addition to the present power plants along the lines. It is estimated to cost about $1,000,000 complete.

Louisville, Lincoln Farm & Mammouth Cave Traction Company, Glasgow, Ky.—This company will install a hydraulic water power plant where this proposed railway crosses at Green River, near Linwood, Ky., of sufficient capacity to operate the entire line and supply light and power to all towns adjacent to and along the line.

Rockland, Thomaston & Camden Street Railway, Rockland, Me.—This company will improve its line between Camden and Rockland by the installation of 51,000 lb. of new copper feed wire.

Boston (Mass.) Elevated Railroad.—This company announces that it will build a new power station at Green Street, Jamaica Plain, between Forest Hills and Egleston Square.

Milford & Uxbridge Street Railway, Milford, Mass.—This company proposes to install a new boiler in its power house in Milford.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company has placed an order with the Allis-Chalmers Company for a 3750-kva, 25-cycle, 13,200-volt, three-phase, 1500 r.p.m. steam turbo-generator, to be installed in its power house in Omaha. G. W. Wattles, president.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company has added a 1500-hp engine to its power plant at Akron.

Cleveland (Ohio) Railway.—Press report states that this company plans to expend $65,727 for four new boilers. They are to have a capacity of 500 hp. Three will be installed in the Cedar Avenue power plant and one in the power plant at the viaduct.

Manufactures & Supplies

ROLLING STOCK

Meridian Light & Railway Company, Meridian, Miss., has ordered six open trail cars from the Southern Car Company.

Atlanta Northern Railway, Atlanta, Ga., has ordered two 30-ft. 8-in. closed trail cars from The J. G. Brill Company. They are to be mounted on Brill No. 27-FE1 trucks.

Los Angeles (Cal.) Railway, which was noted in the Electric Railway Journal of March 26, 1910, as planning to purchase 90 cars, has placed the order with the St. Louis Car Company.

Grand Forks (N. D.) Street Railway, expects to purchase two new or second-hand double-truck trailers, also three second-hand two-motor equipments. Thomas D. Campbell, manager.

Pawcatuck Valley Street Railway, Pawtucket, R. I., has ordered four 15-bench open cars and two 28-ft. semi-convertible cars from the John Stephenson Company. These cars will be mounted on Brill No. 27-GE1 trucks.

Birmingham Railway, Light & Power Company, Birmingham, Ala., reported in the Electric Railway Journal of April 2, 1910, as being in the market for nine cars, has ordered them from the St. Louis Car Company.

Ogden (Utah) Rapid Transit Company, which was noted in the Electric Railway Journal of March 26, 1910, as being in the market for six trailer cars, has ordered three 37-ft. trailer cars, mounted on Brill No. 420 trailer trucks, from the American Car Company.

Utica & Mohawk Valley Railway, Utica, N. Y., is in the market for four interurban cars of the same type as those now being operated on the Rome-Little Falls division. These cars will be equipped with multiple unit control for train operation. The company also proposes to purchase four double-truck cars having a larger seating capacity than the present double-truck cars.

Lynchburg Traction & Light Company, Lynchburg, Va., mentioned in the Electric Railway Journal of March 26, 1910, as having ordered four semi-convertible cars of the pay-as-you-enter type from The J. G. Brill Company, has drawn the following specifications for this equipment:

Length of body...30 ft. 8 in.	Gears and pinions..G. E. Co.
Over vestibule....42 ft. 8 in.	Gongs.....Brill Dedenda
Width over sills.7 ft. 10½ in.	Hand brakes.....Sterling
Over posts at belt..8 ft. 2 in.	Heaters ..... Consolidated
Interior trim ..... ash	Headlights.....A. & W. Co.
Air brakes.... Westinghouse	Motors.....GE-80; 4 per car
Brakeshoes....A. S. I. R. A. standard.	Push buttons.. Consolidated
	Registers ..... International
Bumpers....Brill angle iron	Seats ..... Brill Winner
Center bearings...Symington	Seating material..... rattan
Control system...GE K-28B	Springs ..... Brill
Curtain fix....Curtain S. Co.	Trucks.....Brill No. 27 GE1
Curtain material.. Pantasote	Special device..Wallace sliding door fixtures.
Destination signs.... Hunter	

TRADE NOTES

McCord & Company, Chicago, Ill., moved their offices on May 1 to larger quarters in the People's Gas Building.

Heany Fireproof Wire Company, New York, N. Y., has moved its office from 25 Broad Street to 1733 Broadway.

D. F. Holman Railway Tracklayer Company, Oak Park, Ill., has moved its offices from 1534 Masonic Temple, Chicago, to 102 Wesley Avenue, Oak Park.

Ackley Brake Company, New York, N. Y., announces that the Imperial Railways of Japan have decided, after numerous tests, to equip all cars with Ackley brakes.

A. W. Erickson Advertising Agency, New York, N. Y., has moved its offices from 127 Duane Street to the Fourth Avenue Building at Fourth Avenue, corner of Twenty-seventh Street.

Massachusetts Chemical Company, Walpole, Mass., has moved its New York agency from the Hudson Terminal Building, 30 Church Street, to 1964 Broadway. H. E. Cozzens is the New York representative.

Everstick Anchor Company, St. Louis, Mo., is building a new factory at 1622-24 North Eighth Street, St. Louis. The

factory will be equipped with machinery to manufacture Everstick anchors and Blackburn's telescoping auger handles exclusively. The company reports a large increase in its business.

Wonham, Sanger & Bates, New York, N. Y., have received an order for 4032 H. B. wheelguards from the Brooklyn Rapid Transit Company. This probably is the largest single order ever placed for fenders or wheelguards. Another order calls for 68 sets of H. B. wheelguards for the Northern Texas Traction Company, Fort Worth, Tex.

George O. Baker has resigned as chief engineer of the New England Engineering Company, Waterbury, Conn., to take up general engineering, with offices at 35 Wall Street, New York, N. Y. Mr. Baker was connected with the New England Engineering Company for nine years, and prior to 1901 was with the engineering department of the General Electric Company.

Moss & Satterlee Electric Railway Supply Company, Kansas City, Mo., in addition to its supply business operates the Autogenous Welding Devices Company and has installed a complete Davis-Bournonville oxy-acetylene welding equipment and an oxygen generating plant. It is doing a general repair business, and is welding broken motor cases, truck frames, machinery parts, etc., and refilling oxygen drums for the local operators of oxy-acetylene apparatus.

J. Milton Hagy Waste Works, Philadelphia, Pa., report an excellent demand for their packing waste. This company was the first manufacturer to introduce an especially spun yarn for journal packing, and its success was practically instantaneous. This packing contains a percentage of hair fiber which produces resiliency and forces the waste well up against the bearing. It is a convenient form of packing, because of its long strands, and as the ingredients are well proportioned in the spinning, even lubrication is insured. This product is being marketed under the name of S.R. motor packing. The principal ingredients used in the other packings of the Hagy company's manufacture are carpet yarns, shredded carpets and a composition wool and cotton thread, which acts as a binder and gives length of fiber. The company's "Fidelity" packing is guaranteed an all-wool carpet mixture. This grade is used by several roads for high-speed equipment, while the company's "foreign" and "domestic" packings, which contain small percentages of cotton threads, are specified for local and freight service. The company carries at all times a complete stock, from which prompt shipments can be made.

Lord Manufacturing Company, New York, N. Y., in reviewing the progress of its business says that when the manufacturing department of the Lord Electric Company was started the output was limited to rail bonds and lightning arresters. The success of these specialties, however, encouraged the company to investigate and take up the manufacture of other articles. During the last six years the policy of the management has been to confine itself to street railway lines, particularly safety and economizing devices which include those for lightning and power requirements. No specialty has been manufactured without the most severe service test and investigation. As a result trolley retrievers, trolley catchers and an intermediate device which semi-retrieves, choke coils, hydrogrounds and lightning arrester accessories, controller regulators, the Bradshaw car skid for bringing in broken-down cars under their own power, and a line of arc lamps have been added to the original line of lightning arresters and rail bonds manufactured by the company. Finally the progress of the Lord Electric Company made it advisable to incorporate the Lord Manufacturing Company, which is intimately associated with the Lord Electric Company and the Lord Construction Company, and contracts, agreements and orders with the manufacturing department of the Lord Electric Company will be assumed and carried out by the Lord Manufacturing Company. The Lord Manufacturing Company is incorporated under the laws of New York, with a capital of $100,000. The officers follow: F. W. Lord, president; W. R. Garton, vice-president and general manager; G. Lehmann, secretary and treasurer; John D. Clay, superintendent. The officers and F. W. Erickson form the board of directors.

ADVERTISING LITERATURE

Arthur S. Partridge, St. Louis, Mo., has issued List 33 of second-hand electrical and steam equipment for May.

Automatic Trolley Guard Company, Buffalo, N. Y., is mailing a folder in which it calls attention to the merits of its automatic trolley guard.

Everstick Anchor Company, St. Louis, Mo., has issued a folder entitled "A Moving Picture of the Time it Takes," which shows the quick method of installing Everstick anchors.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 4730 in which is described the single-truck type of gas-electric motor car. It contains illustrations and detailed descriptions of the car, motor and engine, also a table of schedule speeds for this car. Another bulletin No. 4729 issued by the company describes and illustrates the various designs of Mazda economy diffusers.

Manufacturers of American Ingot Iron Corrugated Culverts have just issued the April number of the *Highway Improvement News*. The exhibit of these culverts at the recent annual meeting of the American Railway Engineering and Maintenance of Way Association at Chicago is described. The first installment of a history of this culvert is also given, as well as several interesting articles bearing on the culvert problem.

Joyce-Cridland Company, Dayton, Ohio, has issued an attractive 100-page catalog entitled "Lifting Jacks." Besides listing its complete line of jacks for all purposes, the catalog also contains a description of the construction and recent improvements in this line of jacks. It also points out the relative merits of various types of jacks for different classes of service and contains complete information concerning the dimensions, weight, price, etc., of the various jacks listed.

David Lupton's Sons Company, Philadelphia, Pa., has issued an illustrated 52-page catalog on Lupton specialties. A new type of steel sash is described and illustrated by a photograph which shows two sections of No. 103 steel sash loaded horizontally. The sashes are supported at the ends only and sustain the combined weight of 26 men, distributed over an area of 109 sq. ft. Among the other products of the company which are described are rolled-steel skylights, Pond continuous sash hollow metal windows and the Pond operating device for pivoted sash and louvers. The catalog is profusely illustrated with half-tones showing the installation of Lupton products in various parts of the country.

J. G. Brill Company, Philadelphia, Pa., in *Brill's Magazine* for April publishes the fourth of a series of biographical sketches of prominent street railway officials in the United State. The subject in the April issue is John J. Stanley, president of the Cleveland (Ohio) Railway. The sketch is accompanied with an excellent portrait of Mr. Stanley. The publication also contains the sixteenth of a series of articles on the type of car adopted for use in large cities of the world. In the present issue conditions are described in Moscow. Other articles which appear are: "One Man Pay-As-You-Enter Cars for Muskogee, Okla.," "Truck Brake Rigging Accessibility," "Large City Cars for Cleveland," "Special Equipment for Chicago City Railway," "Straight Side Closed Cars for New England," "Cars for Fresno Traction Company" and " More Wason Equipment for Guatemala Railroad."

United States Graphite Company, Saginaw, Mich., has issued an attractive 24-page booklet entitled "Graphite Mining in Mexico." The opening paragraphs describe graphite and the various uses to which it may be put. The remainder of the booklet is devoted to excerpts quoted from the report of Frank L. Hess, a geologist in the service of the United States Geological Survey, who visited the company's mines in Mexico in March, 1909. Several maps showing the location of these mines and illustrations accompany the article. The company has also issued a general 40-page catalog, No. 20, which is descriptive of its graphite products. It contains information regarding graphite lubrication, and describes briefly the various kinds of lubricants and graphite compounds for special purposes. Attention is also called to several devices for introducing lubricating graphite into steam cylinders.

TABLE OF MONTHLY EARNINGS.

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table sh be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various fisca years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit.

Company	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Mar. '10	173,425	*99,159	74,266	43,292	30,974
	1 " " '09	150,684	*86,720	63,964	43,803	20,161
	3 " " '10	484,575	*286,173	198,403	129,875	68,528
	3 " " '09	435,084	*251,971	183,112	131,486	51,626
BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co.	1m., Feb. '10	32,816	21,249	11,567	9,325	2,243
	1 " " '09	30,745	19,235	11,510	8,790	2,721
	12 " " '10	411,792	233,099	178,693	100,471	78,222
	12 " " '09	366,238	212,880	153,358	101,381	51,977
BINGHAMTON, N.Y. Binghamton St. Ry.	1m., Feb. '10	25,485	14,953	10,532	8,890	1,642
	1 " " '09	24,061	13,220	10,841	9,411	1,430
	2 " " '10	52,665	31,677	20,988	17,811	3,177
	2 " " '09	50,354	27,635	22,719	18,315	4,404
BIRMINGHAM, ALA. Birmingham Ry. Lt. & Pwr. Co.	1m., Mar. '10	214,799	113,913	100,886	.....	.....
	1 " " '09	181,571	101,313	80,258	.....	.....
	3 " " '10	636,292	344,321	291,971	.....	.....
	3 " " '09	550,847	304,148	246,699	.....	.....
CHAMPAIGN, ILL. Illinois Traction System.	1m., Feb. '10	394,373	*239,071	155,302	3,906	151,396
	1 " " '09	349,505	*201,873	147,633	5,626	142,007
	2 " " '10	828,871	*492,712	336,158	8,885	327,273
	2 " " '09	735,294	*424,673	310,621	5,626	304,995
CHARLESTON, S. C. Charleston Con.Ry., Gas & Elec. Co.	1m., Mar. '10	67,314	43,724	23,590	13,990	9,600
	1 " " '09	60,394	39,636	20,758	13,917	6,841
CHICAGO, ILL. Aurora, Elgin & Chicago Railroad.	1m., Feb. '10	103,399	63,267	40,133	32,153	7,979
	1 " " '09	94,335	58,218	36,167	28,261	7,856
	12 " " '10	1,063,190	586,167	477,023	241,692	235,331
	12 " " '09	975,017	528,908	446,110	222,928	223,182
CLEVELAND, O. Cleveland, Painesville & Eastern R.R.	1m., Mar. '10	25,070	*12,503	12,567	8,621	3,947
	1 " " '09	20,345	*10,729	9,616	8,311	1,305
	3 " " '10	64,856	*35,180	29,676	25,989	3,686
	3 " " '09	55,813	*31,839	23,974	24,557	†583
Lake Shore El. Ry.	1m., Mar. '10	85,984	*49,142	36,842	34,803	2,039
	1 " " '09	76,680	*47,236	29,444	34,325	†4,881
	3 " " '10	235,854	*144,957	90,898	103,921	†13,023
	3 " " '09	210,742	*136,830	73,912	103,237	†29,324
DALLAS, TEX. Dallas Electric Corporation.	1m., Feb. '10	105,200	71,959	33,240	26,422	6,819
	1 " " '09	94,588	57,953	36,636	28,772	7,863
	12 " " '10	1,347,203	850,451	496,751	333,029	163,723
	12 " " '09	1,193,557	785,464	408,093	346,490	61,603
DAVENPORT, IA. Union Ry. Gas & Elec. Co.	1m., Feb. '10	242,593	139,083	103,510	65,050	38,460
	1 " " '09	231,161	114,181	116,980	64,521	52,459
	2 " " '10	506,468	295,740	210,728	130,160	80,568
	2 " " '09	480,337	237,688	242,649	127,591	115,058
DETROIT, MICH. Detroit United Ry.	1m., Mar. '10	737,306	470,406	266,900	161,871	105,029
	1 " " '09	601,275	360,743	240,532	152,090	88,442
	3 " " '10	2,029,040	1,294,590	734,450	479,669	254,781
	3 " " '09	1,702,597	1,064,151	638,446	460,249	178,197
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., Mar. '10	200,254	101,547	98,708	50,297	48,411
	1 " " '09	158,537	91,982	66,555	50,526	16,029
	3 " " '10	563,681	294,628	269,053	149,774	119,279
	3 " " '09	460,909	267,873	193,036	148,821	44,215
EL PASO, TEX. El Paso Elec. Co.	1m., Feb. '10	53,839	27,753	26,086	8,486	17,600
	1 " " '09	45,373	27,864	17,509	7,911	9,598
	12 " " '10	615,870	359,199	256,671	99,530	157,141
	12 " " '09	540,443	381,217	159,226	88,357	70,870
FAIRMONT, W. VA. Fairmont & Clarksburg Trac. Co.	1m., Mar. '10	44,188	16,989	27,199	12,609	14,590
	1 " " '09	33,085	13,189	19,896	12,309	7,587
	3 " " '10	120,111	46,819	73,292	36,715	36,577
	3 " " '09	93,153	37,934	55,219	36,945	18,274
FT WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., Feb. '10	111,184	60,921	50,262	44,255	6,008
	1 " " '09	99,236	58,290	40,945	40,914	31
	2 " " '10	234,439	129,784	104,654	88,013	16,641
	2 " " '09	208,909	122,563	86,346	82,063	4,283
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., Feb. '10	93,082	52,315	40,767	18,252	22,515
	1 " " '09	82,661	48,090	34,570	17,190	17,381
	12 " " '10	1,286,884	703,551	583,333	206,208	377,125
	12 " " '09	1,106,663	645,103	461,560	195,406	266,154
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., Feb. '10	85,411	61,977	23,434	23,179	255
	1 " " '09	82,552	53,388	29,164	21,561	7,603
	2 " " '10	182,042	129,592	52,450	43,571	8,879
	2 " " '09	173,987	112,387	61,600	40,451	21,149
GRAND RAPIDS, MICH. Grand Rapids Ry. Co.	1m., Mar. '10	86,211	42,520	43,691	19,659	24,032
	1 " " '09	76,136	38,847	37,289	18,923	18,366
	3 " " '10	251,031	127,076	123,955	60,142	63,812
	3 " " '09	225,177	112,924	112,253	56,806	55,446
HARRISBURG, PA. Central Penn. Trac. Co.	1m , Mar '10	63,884	47,214	16,667	.....	.....
	1 " " '09	57,186	44,434	12,702	.....	.....
	3 " " '10	184,117	141,633	42,484	.....	.....
	3 " " '09	167,332	130,446	36,886	.....	.....
HOUGHTON, MICH. Houghton County Trac. Co.	1m., Feb. '10	22,165	13,545	8,620	6,341	2
	1 " " '09	21,869	15,346	6,523	5,297	1
	12 " " '10	322,041	170,170	151,872	75,413	76
	12 " " '09	274,992	153,664	121,328	60,628	60
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., Feb. '10	43,690	22,802	20,888	9,132	11
	1 " " '09	36,793	23,076	13,718	9,382	4
	12 " " '10	502,619	271,677	230,942	112,439	118
	12 " " '09	441,329	257,647	183,683	111,781	71
KANSAS CITY, MO. Kansas City Ry. & Lt. Co.	1m., Feb. '10	553,543	286,728	266,815	150,583	116
	1 " " '09	519,720	294,858	224,862	153,141	71
	9 " " '10	5,339,159	3,007,383	2,331,775	1,415,514	916
	9 " " '09	4,938,293	2,815,049	2,123,245	1,415,276	707
MILWAUKEE, WIS. Milwaukee Elec.Ry. & Lt. Co.	1m., Mar. '10	377,004	270,641	106,362	47,126	59
	1 " " '09	337,801	233,439	104,362	47,235	57
	3 " " '10	1,117,684	805,004	312,680	138,562	174
	3 " " '09	1,001,469	689,850	311,619	139,522	172
Milwaukee Lt., Ht. & Traction Co.	1m., Mar. '10	117,000	47,276	69,724	55,036	14
	1 " " '09	103,539	39,887	63,652	50,150	13
	3 " " '10	339,664	138,079	201,586	166,355	35
	3 " " '09	307,001	117,927	189,074	151,166	37
MONTREAL, CAN. Montreal St. Ry.	1m., Mar. '10	336,197	220,790	115,407	43,068	72
	1 " " '09	298,728	203,832	94,896	38,901	55
	6 " " '10	1,992,236	1,216,984	775,252	214,978	560
	6 " " '09	1,813,343	1,149,584	663,759	198,043	465
NASHVILLE, TENN. Nashville Ry. & Lt. Co.	1m., Mar. '10	149,276	87,719	61,557	.....	....
	1 " " '09	134,132	82,287	51,845	.....	....
	3 " " '10	434,314	248,297	186,017	.....	....
	3 " " '09	404,415	242,387	162,028	.....	....
PADUCAH, KY. Paducah Traction & Light Co.	1m., Feb. '10	18,771	11,777	6,994	7,055	
	1 " " '09	17,807	11,069	6,739	7,034	
	12 " " '10	232,001	138,683	93,318	81,692	11
	12 " " '09	225,099	131,797	93,301	82,574	10
PENSACOLA, FLA. Pensacola Electric Co.	1m., Feb. '10	19,812	11,725	8,086	4,825	
	1 " " '09	19,081	10,124	8,958	4,366	
	12 " " '10	248,219	143,507	104,712	53,467	51
	12 " " '09	214,515	140,448	74,067	51,634	22
PHILADELPHIA, PA. American Rys. Co.	1m., Mar. '10	304,222	.....	.....	.....	....
	1 " " '09	264,348	.....	.....	.....	....
	9 " " '10	2,423,417	.....	.....	.....	....
	9 " " '09	2,260,983	.....	.....	.....	....
PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., Feb. '10	6,597	6,231	366	1,785	†1
	1 " " '09	6,730	5,241	1,489	2,088	
	12 " " '10	130,442	94,725	35,717	21,008	14
	12 " " '09	123,154	86,013	37,141	26,327	10
PORTLAND, ORE. Portland Ry., Lt. & Power Co.	1m., Mar. '10	435,652	192,393	243,259	133,726	109
	1 " " '09	370,730	175,721	195,009	123,708	71
	3 " " '10	1,259,739	545,054	714,685	393,499	321
	3 " " '09	1,064,958	528,974	535,984	360,523	175
POTTSVILLE, PA. Eastern Penn'a Ry.	1m., Mar. '10	50,427	28,905	21,522	.....	....
	1 " " '09	41,601	26,425	15,176	.....	....
	3 " " '10	146,594	86,867	59,727	.....	....
	3 " " '09	124,691	79,255	45,436	.....	....
ST. JOSEPH, MO. St. Joseph Ry., Lt., Ht. & Power Co.	1m., Mar. '10	82,459	46,100	36,359	22,242	14
	1 " " '09	75,511	40,364	35,147	20,938	14
	3 " " '10	251,038	136,425	114,613	66,326	48
	3 " " '09	228,197	120,867	107,330	62,514	44
SAN FRANCISCO, CAL. United Railroads of San Francisco.	1m., Feb '10	570,983	343,879	227,104	.....	....
	1 " " '09	543,638	334,466	209,172	.....	....
	2 " " '10	1,198,649	707,630	491,019	.....	....
	2 " " '09	1,110,011	682,681	427,330	.....	....
SAVANNAH, GA. Savannah Elec. Co.	1m., Feb. '10	45,130	27,365	17,765	17,752	
	1 " " '09	45,855	28,234	17,621	17,414	
	12 " " '10	602,000	390,293	211,707	210,341	
	12 " " '09	601,621	375,126	226,495	207,361	1
SYDNEY, N. S. Cape Breton Elec. Co. Ltd.	1m., Feb. '10	18,454	11,258	7,197	5,034	
	1 " " '09	15,892	11,559	4,332	4,955	
	12 " " '10	246,865	143,307	103,558	60,616	42
	12 " " '09	242,880	141,639	101,241	59,479	41
TACOMA, WASH. Puget Sound Electric Ry.	1m., Feb. '10	131,219	96,883	34,337	50,220	†15
	1 " " '09	125,418	91,065	34,353	44,313	†9
	12 " " '10	1,896,408	1,263,789	632,620	582,137	50
	12 " " '09	1,653,125	1,073,113	580,012	519,675	60
TAMPA, FLA. Tampa Elec. Co.	1m., Feb. '10	56,284	27,256	29,028	4,566	24
	1 " " '09	53,460	29,838	23,622	4,643	18
	12 " " '10	601,509	343,867	257,643	55,949	201
	12 " " '09	563,151	367,233	195,918	44,706	151
TORONTO, ONT. Toronto Ry. Co.	1m., Feb. '10	305,557	166,497	139,060	.....	....
	1 " " '09	275,245	148,860	126,385	.....	....
	2 " " '10	632,265	342,100	290,165	.....	....
	2 " " '09	563,626	301,001	262,625	.....	....