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OUR SEMI-ANNUAL INDEX

Although the electric railway industry is constantly changing, many of the problems remain the same, and it is not infrequent that a question in economical maintenance or some other branch of electric railway work can be settled by a reference to a back number of the ELECTRIC RAILWAY JOURNAL. For this purpose the index which accompanies each volume of this paper is invaluable, and as we pay a great deal of attention to the compilation of this index, a few words of explanation may be of help in its use. The index which appears in this issue is both a geographical index and a subject index. In the latter, an effort is made to index every important subject discussed, whether the statement indexed appears by itself or forms part of a longer article. By this plan a single article may have as many as ten or fifteen entries. The key-words are selected as carefully as possible, and cross references are provided frequently so as to facilitate the work of the reader. We believe that the more the index is used the greater its convenience will be found and that after the subscriber acquires the "index habit" he will find that his back copies have a value of which before he had no conception.

TRAINING OF PLATFORM MEN AND SAFETY

An essential element in the keeping down of accidents is intelligent operation of cars. That this is well understood is evidenced by the increasing attention being given to training motormen and conductors for their duties. A considerable proportion of men hired do not stay long enough to become expert. They decide to take up car work without due investigation of the hardships to be encountered and the responsibilities to be incurred. To the layman the duties of the motorman or conductor appear pleasant and easy; hence the work is apt to appeal to

men who dislike hard manual labor. When they get to work they find that the duties of motormen and conductors are not only onerous but require attention to business and ability to take responsibilities. Those who are not qualified soon drop out. Before doing so, however, their lack of aptitude for railway service is likely to produce accidents; in fact, a large share of the total of all accidents has usually been found to be due to inexperienced men. For this reason the new method of training men which has been employed for a year or more by the New York State Railways at Rochester is of interest. The company has set aside a large area of ground and several thousand feet of track for practice purposes. The track is equipped with all devices used on the road and with special track work. The men are drilled on this track under all kinds of service conditions. This drill is superior to that given on stationary cars, where the men are relieved of the most serious causes of distraction. The advantages of removing service practice from the streets are so obvious as to require no supporting arguments. While the officials of the Rochester Lines are not yet ready to announce the statistics of the results of operation of the new plan, upon which they are now at work, they state that the reduction in number of accidents is remarkable. It is likely also that they will find an increase in the average length of service, for the try-out period will serve as a sort of practical examination and will weed out the applicants who are not fitted for railway work by temperament and mental capacity.

COMPANY BULLETINS IN PUBLICITY WORK

Since electric railways began to appreciate the value of publicity in establishing a better feeling between the public and themselves, many and diversified have been the means adopted to aid in this work. Single advertisements, series of advertisements, car posters, pamphlets and folders—all of these have served to bring to the public a truer realization of the problems, demands and rights of electric railways. When the information which the companies wish to put before the public is sufficient in amount to warrant it, the next step is a regular publication or bulletin. Such a bulletin, although it has its advantages, is in no sense a newspaper. It does not carry advertisements or compete with existing newspapers for news even about the company's own affairs. It simply provides an opportunity for a heart-to-heart talk between the company and its customers, which is in addition to and beyond that which is within the scope of the daily press even if most friendly to the public utility. The distribution of such a paper to the riding public is easily accomplished through the medium of the company's own cars, with a maximum thoroughness and a minimum of expense,

and the passengers sometimes pick up the sheets for a momentary diversion which later develops into a desire for serious home study. There is no doubt that the regular publication of an electric railway bulletin can be often made a very useful bond between the public and the company. It can also largely overcome a hostile attitude on the part of the public, when such unfortunately exists, especially if it maintains an even, moderate tone in the face of all hostile criticism. The point to be understood clearly is that it is much more difficult for an electric railway to regain public esteem than it is for its opponents to load it with public disfavor, and that this handicap can be overcome only by absolute facts and persistent moderation in all details. High-sounding persiflage, baseless countercharges, bitter excoriations of opponents—these are worse than useless—they are harmful to the company's interests. Nothing but a plain, unvarnished, intimate statement of facts is effective, and if this policy is firmly adhered to, the public will gladly listen to the company's story.

RAIL CORRUGATION AGAIN

A most interesting contribution to the literature on rail corrugation is embodied in the article by Charles M. Gidanski, of the Brooklyn Rapid Transit System, published elsewhere in this issue. As responsible head of all surface grinding on a great city system, the author has had splendid opportunities for noting the origin and following the development of corrugation under the most diverse conditions of car operation and track construction. Thus it was possible for him to check the hypothetical causes of corrugation to determine which, if any, answered the dictum of science that a true theory is one that satisfies all conditions. His long series of observations has shown definitively that a sharp distinction should be made between apparent and real corrugations. The former were found to consist simply of irregular streaks and markings, whereas true corrugations on any given length of rail always showed waves of practically constant characteristics.

From these observations Mr. Gidanski argues that any abrupt forces due to excessive braking, trucks out of square, isolated chemical or mechanical defects in the rail, variations in the substructure, etc., must lead to groups of non-related markings and that only a constant force can produce consistent markings. He finds that the only constant force with which rail corrugation is associated is the cold rolling of car wheels over the track and therefore believes that it is the only force which can generate waves of constant periodicity. In short, Mr. Gidanski's argument may be expressed in this sentence: "Surely the uniformity of the phenomenon indicates a corresponding uniformity in the cause."

Nevertheless, the author has not summarily rejected all other theories of corrugation, but has merely relegated some of them to the class of contributory or secondary causes. While he considers cold rolling to be the fundamental reason, he acknowledges that when once begun the process of corrugation, which has been defined as an anvil effect, will be accelerated by a non-resilient roadbed, by hard tires and by rails of deficient elastic limit. From this

it follows that corrugation can be greatly minimized if the rail and its support are so elastic that instead of violently re-arranging the particles of the rail-head to form crests and depressions, the shocks from the cold rolling of the wheels shall be harmlessly absorbed. It may be too soon to say that the primary and secondary causes of corrugation are so well understood that they can be eliminated at this time, but it is surely reasonable to hope that the united data from the studies of American and British operators and from the pending experiments at Berlin of the International Street & Interurban Railway Association will help to reduce rail corrugation to really insignificant limits.

In conclusion, it is well to point out that Mr. Gidanski has not confined himself to the theoretical aspects of the problem. His observation that corrugations on a given section of rail never exceed a certain maximum under a like set of conditions has led to the very practical deduction that it is a waste of money to begin grinding the rail until the known maximum has been attained.

FREQUENT CHANGES IN COMMISSION PERSONNEL

In the study of the practical workings of public service commissions one point which stands out prominently is the importance of experience in the office of commissioner. One of the latest bodies to deprecate frequent changes in these commissions is the executive committee of the Railway Business Association. We heartily indorse this position. When commissioners have once shown their fitness for positions on a regulatory body the success of the institution demands that they be retained as long as is reasonably possible. We have always insisted that public service commissioners should be men of the highest type, and we have at various times criticised appointments that seemed likely to limit the ability or capacity of the whole commission and result in gross inaccuracies of decision. Unfortunately, men acquainted with public utility operation, accounting and finance and possessed of a keen, logical and judicial mind for the application of such knowledge are far from being at one's beck and call. When a man is found, however, who in the refining-pot of experience exhibits such requisites he certainly is too valuable to be dropped from commission work at the first possible moment.

The fact is, as the committee report states, that not even an enlightened public opinion will insure the success of the present regulatory system unless commissioners who have acquired experience and knowledge are retained in service. Security of tenure not only minimizes the waste of time and the danger of mistakes in breaking in new commissioners but also bestows on the older commissioners a stalwart independence and a serenity that promote the efficiency of the organization and the quality of the regulatory work accomplished. Furthermore, a reasonable assurance of retention in office upon the exhibition of the proper capacity therefor is something that enables the appointing power to command the services of men who would never dream of accepting the offer if they believed that the position was one which was periodically open as a reward for activity in party politics.

This question is of vital importance to-day, in view of the fact that many appointments to the Interstate Commerce Commission and various state commissions are to expire with the coming of the new year. Moreover, it brings into greater prominence the problem of the short term of office. Experience points out with unmistakable directness the insufficiency and dangers of a short term, such as the present five-year term of the New York State commissions. Not the most insignificant danger of such a term is the fact that it tempts commissioners to keep several political anchors set and to study and take advantage of the relation existing between themselves and the public, in order to obtain a reappointment. Commissioners often make artificial appeals for public support. It is true that watchfulness on the part of railway men will counteract these to a great degree, as is evidenced by the way in which President Ripley of the Atchison company recently uncovered an error of only \$211,000,000 in the computations of the chairman of the Iowa Railroad Commission in an argument in favor of government ownership.

A longer term of office, however, is the best means of avoiding such evils. The ten-year term adopted under the new Pennsylvania public utility law is a step forward, but a tendency to make appointments, like those of our highest judges, for fifteen years or even for life, would be far from deserving censure. Until such longer terms are put into practice, however, the process of choosing public service commissioners should be one of evolution, with the public weeding out the unfit and insisting on the retention of those of proved worth.

REAL MAINTENANCE

A wise man seeks his tailor when a button begins to loosen and not after it falls off, and he saves his button. How many golden buttons are lost by American electric railways through ignorance of this distinction between maintenance and repair? Scores of dollars will maintain whereas hundred are required to repair. Necessarily those who believe that it is better to repair pay for their blindness in both higher shop costs and lower mileage from equipment. If it is cheaper to tighten a button than to replace it, is it not likewise cheaper to gage the clearance of the armature regularly than to wait until it falls upon the pole pieces?

We regret to say that the fundamental obstacle in the way toward real maintenance is usually this: The financiers who control the property are rarely men who have a practical knowledge of electric railroading. A New York manufacturer of carpets may have a voice in the operation of a railway in China, while the village grocer fixes the policy of the local interurban. Since such owners of a railway property think principally of a quick profit on their investment, they are only too apt to lose sight of the fact that the best ultimate results must be achieved with well-paid specialists.

The first duty of the directors of a road is to offer enough salary to attract a competent shop superintendent, and this means that the manager of men and the guardian of costly equipment must get more than \$75 to \$100 a month. It is fatuous to expect a competent executive and

all-around mechanic for a carpenter's or machinist's wage. The master (?) mechanic who asked in all seriousness why an axle crack could not be tooled out is typical of a class far too numerous.

The second duty of the board of directors is to give the shop manager an absolutely free hand in selecting all his men. Nothing is more demoralizing to discipline than to have the workmen see an inefficient man placed at responsible work at the request of the men higher up. We know of one road where the gardener of one of the directors wintered in the carshops very comfortably at the cost of the railway. On another road, with directors of similar stamp, the shop superintendent conceals his draftsman in a garret and carries him on the payroll as a mechanic, as the aforesaid directors believe that drawings are a needless luxury.

Not only should the shop manager be permitted to select his own men but he should also be permitted to pay them such wages as will secure that degree of maintenance which is the cheapest in the long run. In "A Piecework Dilemma," published in our issue of Dec. 6, we noted an instance where the president of a railway company will not permit a sure reduction of 20 per cent in labor cost because he does not believe that a workman should be allowed to earn more than \$2 to \$2.50 a day. While the electric railway shop does not need watchmakers, it does require conscientious, intelligent men even for the very simple task of measuring the length of a brush or taping the circumference of a wheel. The class of labor obtained by a railway company which insists upon paying 10 per cent to 20 per cent below prevailing rates is usually of a sort that cannot understand plain English.

It is not fair to judge widely different localities on a cost-per-car-mile basis. There is another and a better way, namely, to study the character and number of defects for each class of equipment and the proportion of time lost by cars in the shop. The most efficient shop will be that which presents the lowest rates of repeaters. Almost any workman can learn how to replace a ruined part, but brains are needed to eradicate the cause. A good shop superintendent will soon discover whether the trouble is inherent to the apparatus. If it is, he will be likely to recommend the complete replacement of the motor or other part which may be at fault.

This last thought brings to mind the truly remarkable improvements which have been made during recent years in the electrical equipment of cars. The use of the commutating pole produced a motor which was designed especially to cut down sparking and flash-over troubles. Field control has made it possible to reduce energy consumption, and the new non-platform control systems for city cars mean much in freeing the vestibules from space-stealing apparatus. With all the advantages possible from this trio of improvements, it is up to the user of old equipment to determine its scrapping possibility, along such lines as were brought out by Mr. Thirlwall in our issue of Sept. 27. Then he should keep both new and retained equipment in accordance with the principles of real maintenance, namely, employ the best help and reduce repair by increasing inspection.

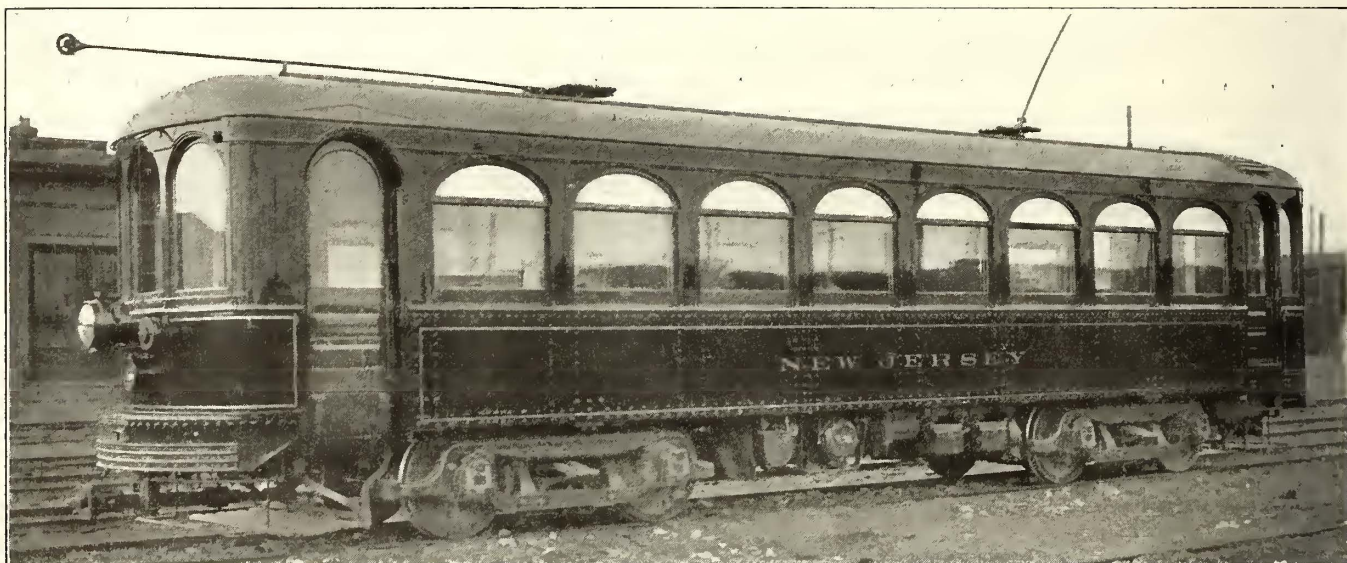
The Private Car "New Jersey"

This Is a Dust-Proof and Sound-Proof Car Built for the Officials of the Public Service Railway, Newark, N. J.—A Number of the Details Are Applicable to Cars for Regular Passenger Service

The Public Service Railway, Newark, N. J., has recently completed at its Plank Road shops the private car "New Jersey," as shown in the accompanying plan and half-tones. This car will be used for inspection purposes by the officers of the company and is fitted with all the conveniences which are provided in an office. It is the second car of that name, the first having been built in 1910 and described in the *ELECTRIC RAILWAY JOURNAL* for June 11, 1910. The older car will be retained under the name of "North Jersey" for service in and about Newark, while the new car will be used for all of the standard-gage track of the system, comprising nearly 700 miles. From a construction standpoint the new car differs from the old in possessing such innovations as a single-arch roof, steel construction up to the window line, disappearing step mechanism and such general construction as is required to make the car suitable for high-speed service. In its interior fit-

glazed upper panels. The side windows are double and are fitted with Edwards fixtures and balanced sash. For these windows the best French plate was selected, while the arch section was fitted with an opalescent copper-ribbed glass which matches the lighting fixtures. The inner opalescent sash is movable to permit the cleaning of all sashes.

Unlike the first car, this one is built without platforms. End doors are provided on both sides, one for the platform men and one for the passengers. The former type of door leads directly into a fully inclosed cab and the latter into one of the two duplicate seating compartments. The motorman enters the cab by the use of a strap-iron step and grab-handles. A feature of the latter is their outward curving at intervals to form steps to the roof and the accompanying use of metal strap facing at such steps to protect the varnished woodwork from foot scratches. Parallel to the entrance door is another of swinging type



Public Service Private Car—General Exterior View

tings it bears evidence of the great improvements which have been made in later years in car ventilation, heating and lighting.

GENERAL DIMENSIONS AND CONSTRUCTION

The new car is 44 ft. over all. Preliminary surveys showed that this length was the maximum for a car that would be capable of traveling over every part of the standard-gage divisions. But roominess has been secured by using a width of 8 ft. 2 in. over all. The height from rail to roof is 11 ft. 10½ in. The underframe is composed of commercial steel sections, covered by two floors of yellow pine with an intermediate noise-deadening layer of ¾-in. felt. Built-up steel bolsters are used. The superstructure of the car comprises wooden posts, steel-plated carlines and 3/16-in. plate up to the window sills. The arch roof was put on as a single piece of duck with no holes except for the small openings through which the wires from the trolley bases are led. Copper flashing is provided at these apertures to prevent the pocketing of water.

WINDOWS AND DOORS

The value of the car for inspection is greatly enhanced by the use of the maximum amount of glazed surfaces. Thus the window posts of the sides are placed 48 in. center to center, and all doors at the ends are furnished with

which leads into the seating compartment. The rear partition of the cab is also glazed, although part of it is used for carrying equipment as hereinafter noted. The motorman is therefore within the view of the passengers in the front compartment. The motorman's cab is so compact that ample observation room alongside is left for the riders.

The passenger doors are operated as part of a trapdoor and step mechanism which was invented by H. A. Benedict, mechanical engineer Public Service Railway. The main feature of the design is that the unhooking of a short, inconspicuous handle, which is set in the side of the car close to the floor line, eliminates the clumsy, heavy levers commonly used on vestibuled cars for similar door and step openings. The return of the handle, of course, serves to close the trapdoor and fold the step within the car line, as illustrated. Solid doors are used for the aisle between compartments, the kitchen and toilet.

EXTERIOR AND INTERIOR FINISH, LIGHTING AND FURNISHING

The exterior is finished in Palmetto green, and this color, with the addition of the simple striping adopted, gives the car a very dignified appearance. Inside, the car is treated with African mahogany rubbed to a dull finish, while the Agasote headlining is tinted in dark old ivory above the windows with a gradual lightening toward the center of the

ceiling. The lighting of the seating compartments is of the semi-indirect type with clusters of five 23-watt tungsten lamps for each lighting fixture. These fixtures, which are of copper-ribbed opalescent glass, were furnished by the Public Service Electric Company. The interior metal trim is of bronze and the floor covering of Saxine carpet.

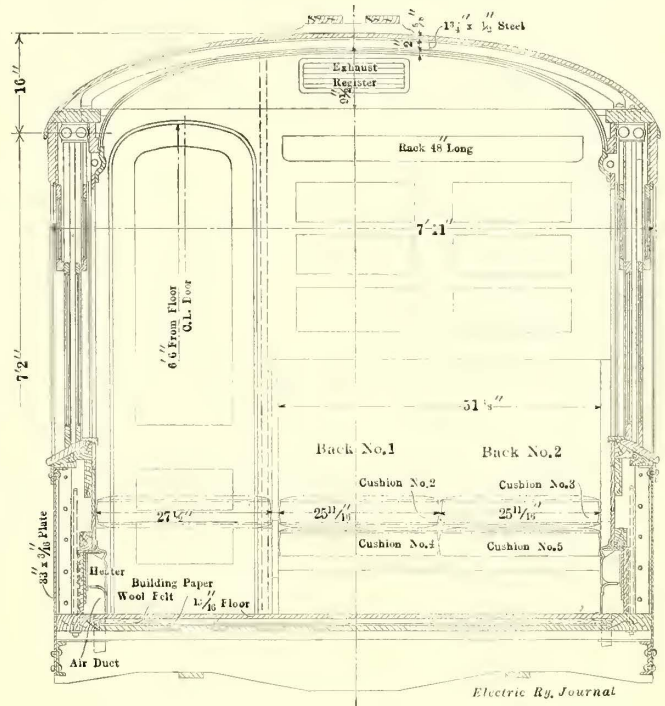
The general arrangement of the car is shown in the accompanying plan. Reference has already been made to the motorman's compartments and to the duplicate seating sections. The kitchen and toilet are placed midway but with a 26-in. aisle for passage along one side. The seating compartments are upholstered in high-grade Spanish leather, aerated removable spring cushions being used both for the chairs and partition seats. Portable tables for the use of sixteen people are provided, in addition to which a similar hinged table can be installed at the front of the vestibule either for dining or observing purposes. The kitchen equipment naturally is of the most advanced character, all pantries being of metal, the iceboxes perfectly ventilated, the stove of alcohol type, etc. Pyrene extinguishers furnish protection against fire.

NOISELESS, DUSTLESS HEATING AND VENTILATING FEATURES

A prime object in the design and equipment of this car was to make it noiseless, dustless and yet perfectly comfortable as to ventilation and heating. The carpeted double floor, the double windows and the general absence of openings to the atmosphere are features that have made the car noiseless. The dustless quality of course, is due largely to the system of ventilation hereinafter described, but it was still further improved by furnishing all doors with weather strips and doing all cleaning with vacuum apparatus. The heating outfit consists of continuous electric heaters of Consolidated type, including thermometers in each compartment. The heaters are carried along the sides of the car at the floor line. When in use they warm the ventilating air as it enters the car. Air is drawn into the car by means of two blowers, each of 500 cu. ft. per minute capacity, through a set of cheesecloth screens which are placed under the eabs close to the strap-iron step, as illustrated. These screens each consist of six V's with the apexes facing outward to expose the largest possible area. The filters are protected by a wire cage, but the whole battery is arranged for easy removal and replacement. After the air has been drawn through the intake duct and over the heaters, it passes into the car, whence it is discharged underneath the car between the trucks by means of a 3/4-hp motor which has a capacity of 1000 cu. ft. per minute. The ordinary rate of discharge is 700 cu. ft. per minute. In the passenger compartments the air is exhausted through a louver in the partition back of the

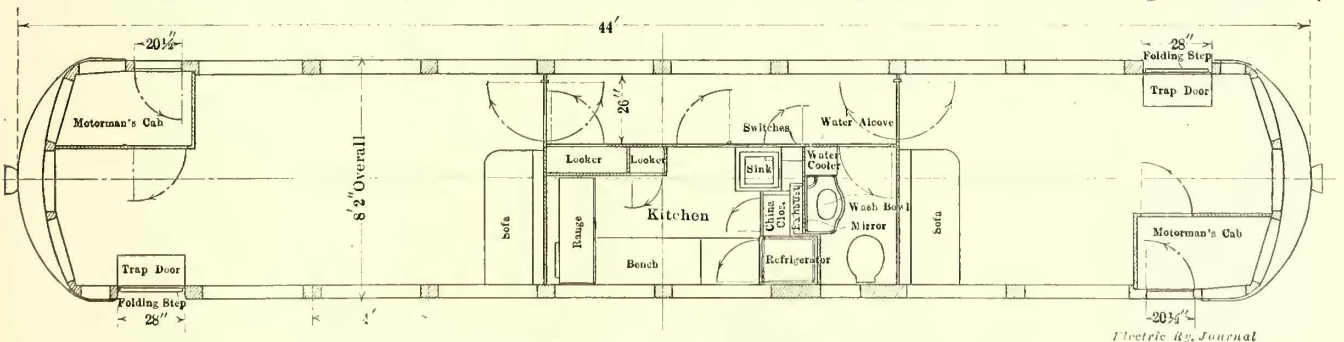
MECHANICAL AND ELECTRICAL EQUIPMENT

The body is carried on two Standard C-55-P trucks of 6-ft. 1-in. wheelbase and furnished with 4 1/4-in. x 8-in. journals. These trucks carry four Westinghouse 310-C-2 motors arranged for field control and HL multiple-unit operation. The motors are geared for a maximum speed of 60 m.p.h., in view of the fact that this car is for use on



Public Service Private Car—Cross-Sectional Elevation

high-speed right-of-way sections as well as on city tracks. The braking equipment comprises the General Electric Company's air brakes with CP-27 compressor and the Pittsburgh hand brake of the Dayton Manufacturing Company. The dashers, which are protected with Hedley anti-climbers, support Knutson No. 5 trolley retrievers, Tomlinson couplers, one GE removable luminous arc headlight for country use and two Golden Glow incandescent headlights for city use. The shim type brake slack adjuster of the National Coupler Company, now standard on this system, is also used. Other outside equipment comprises H-B life guards and Hanlon air sanders. Car replacers are installed behind the bumpers, and a set of wrecking tools and lamps



Public Service Private Car—Plan Showing General Arrangement

stationary seats, but in the kitchen and toilet the exhausts are directly overhead. Even with the aisle doors open, therefore, the car should prove odor-proof.

Special ventilation for the cabs has been provided by means of natural draft. This consists of six copper-screened holes of elliptic form, say 1-in. x 1/2-in., and cut in the base of the window frame, which the motorman can regulate at will by manipulating a sliding shutter.

are placed in a box under the center of the car. Air whistles are used on this car.

CAB EQUIPMENTS, ETC.

The switches for the control of car lighting, heating and ventilation are mounted on a panel set in a compartment along the aisle, but all other control devices are placed in the cabs. The ventilation of the cabs has already been mentioned, and note may also be made of the separate cab

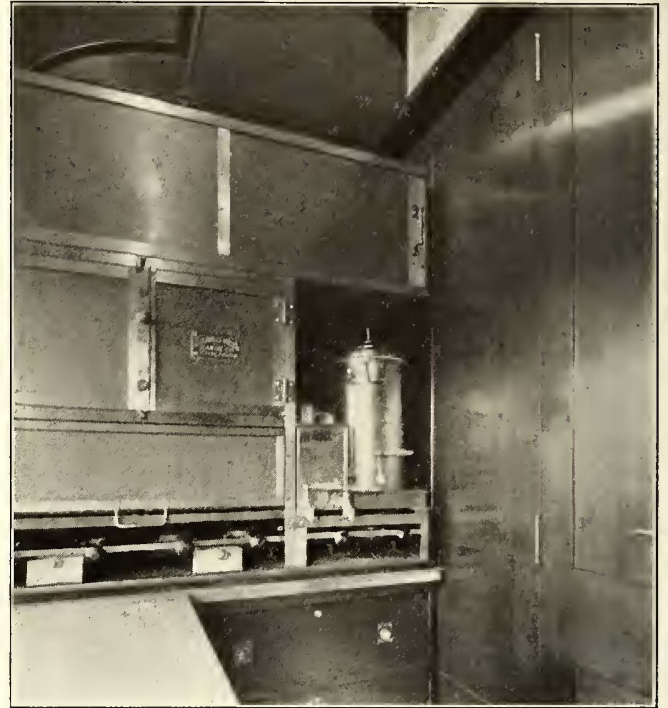
heaters. The motorman (or conductor) has a leather-covered stool, but the partition behind him carries a folding seat for a pilot. The same partition also carries racks for flags and fuses. At night, of course, the motorman is

namely, by means of a speaking tube and single-stroke bell signals. The bell signals, which can be heard only within the cab, are wired in series so that the sender knows positively whether or not the signal has been properly trans-



Public Service Private Car—View Showing Folding Steps Lowered

screened from the illuminated seating compartment by a curtain which he can draw down. Should he desire to read train orders, gages, etc., he can get ample light by drawing back the bottom shutter of a cylindrical lamp cas-



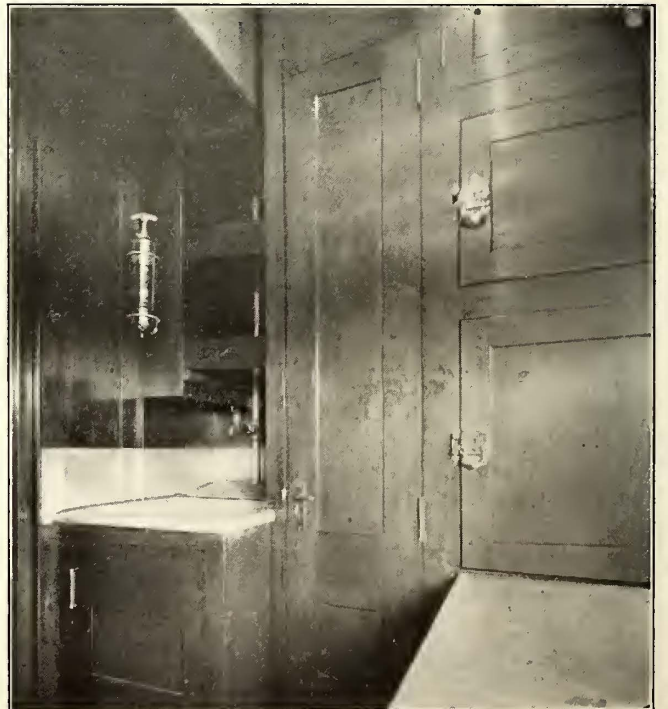
Public Service Private Car—Gas Range and Bench in Kitchen

mitted. The buzzers in each cab are operated by using the upper row of push buttons in the seating compartments; the lower row is used to show signals on an annunciator in the kitchen.



Public Service Private Car—Interior View of Observation Room

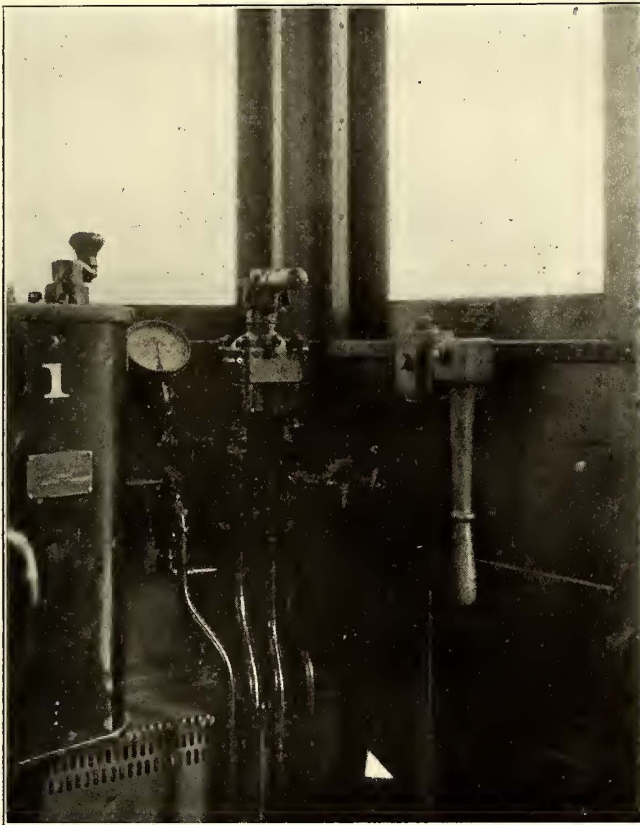
placed just above the control equipment. Communication between the motorman and conductor while they remain in their respective cabs is established in two ways,



Public Service Private Car—Lockers and Sink in One Corner of Kitchen

While this car is not intended to carry specialized equipment to show the condition of line and track, it has been furnished with a speedometer, this device being a volt-

meter graduated in miles per hour and operated by means of a magneto which is chain-driven from one of the car axles. The speedometer is mounted on the vestibule sash.



Public Service Private Car—Motorman's Cab

Just below this instrument it is proposed to place a voltmeter to show the line potential variations as the car travels from place to place.

INTERNATIONAL EXPOSITION OF SAFETY

The first International Exposition of Safety and Sanitation was held from Dec. 11 to Dec. 20 at the Grand Central Palace, New York City, under the auspices of the American Museum of Safety. The exhibits were of a great variety—safety devices for the home and factory, sanitary equipment, first-aid facilities, propaganda material relating to public health.

A number of the exhibits were of interest in the electric railway field, all of them showing how some employers are working on the safety problem for the benefit of their employees. The Southern Pacific company, which was awarded the E. H. Harriman medal for safety work accomplished during the year ended June 30, 1913, had 132 exhibits of safety devices, including many pictures showing accidents that might occur in connection with operation and the way to prevent them. The Pennsylvania Railroad had exhibits including automatic signal stops, efficient and defective tools and a section of single track with third-rail and overhead signal bridge. The New York Central lines displayed photographs of improved practice in operation, of standard safeguards and of the road's efforts to combat the trespass evil.

One of the most interesting exhibits was that prepared by the Brooklyn Rapid Transit Company. Besides extensive models of safety devices used in the shops and the elevated and surface branches of the service, details of the public school safety crusade, such as pictures, bulletin boards, etc., were shown and moving-picture reels illustrating how accidents occur and how to avoid them were

also run off. The exhibit contained a chart illustrating the evolution of the surface car from 1870 to 1912, and models were shown of the new center-entrance car now used by the company and the subway car proposed for use by the New York Municipal Railway Corporation. The company also offered for distribution in its booth pamphlets describing its medical inspection bureau, its welfare policy and future plans and its safety crusade in Brooklyn. A medal was awarded to the Brooklyn Rapid Transit Company for the booth with the best appearance at the exposition.

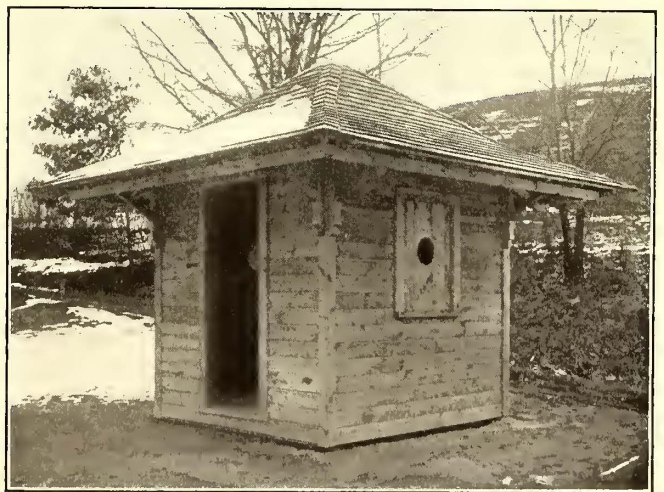
An attractive foreign exhibit was arranged by the Allgemeine Elektrizitäts Gesellschaft, Berlin, comprising safety switches and cut-outs, insulated tools for handling high-tension apparatus, protective clothing and eye shields for electric welders and similar contrivances.

STANDARD SHELTER HOUSES OF THE NEW YORK STATE RAILWAYS, ROCHESTER LINES

An attractive but inexpensive waiting room for inter-urban lines has been used with good results by the New York State Railways, Rochester Lines. The shelter house is 8 ft. square and 8 ft. high inside and can be used to shelter a dozen passengers. It costs less than \$200 to build, and it is so portable that it can be built in the company's shop and taken to its place on a flat car.

The framing is of 2-in. x 4-in. No. 1 hemlock, exposed timbers being surfaced, and is carried on 4-in. x 6-in. mudsills. Walls and ceilings are ceiled with 5/8-in. clear Georgia pine, matched and beaded. Windows and door casings are of 7/8-in. by 3 1/2-in. Georgia pine. The siding is No. 1 common Novelty siding, and door and window frames are of whitewood. The roofing is of 7/8-in. hemlock laid with 1-in. spaces between boards and covered with "Star A" grade shingles laid not to exceed 5 in. to the weather, all hips being double-shingled. The rafters are 2-in. x 6-in. hemlock. The exterior receives three coats of standard depot paint, body yellow and trim maroon. The roof shingles are stained green.

The shelter is lighted from the wire-glass panel in the door, as it has been found difficult to keep glazed window sash intact. Peepholes in the paneled sash permit waiting passengers to see approaching cars. A five-lamp cluster is



Standard Shelter House—New York State Railways

placed above a wire glass sash in the ceiling for artificial illumination, the wire glass giving fairly effective protection to the lamps.

A seat 14 in. wide extends across the rear of the house and half way along the two sides. This is made of a single 1 1/2-in. plank supported by wooden brackets at 2-ft. intervals at a height of 16 1/2 in. from the floor.

Rail Corrugation

The Writer Describes Corrugation on the Brooklyn Rapid Transit System—He Also Develops the Theory that the Principal Cause Is the Cold Rolling of the Rails by the Car Wheels and that Rigid Roadbeds, Rails of Deficient Elastic Limit and Hard Tires Are Accessory Causes

BY CHARLES M. GIDANSKI, WAY AND STRUCTURE DEPARTMENT BROOKLYN RAPID TRANSIT SYSTEM

Corrugation waves in a series show a number of definite characteristic features. These features are evidence that corrugation is an established deformation which results from a perfectly natural, definite stress.

The wave length of early rail corrugations on the Brook-

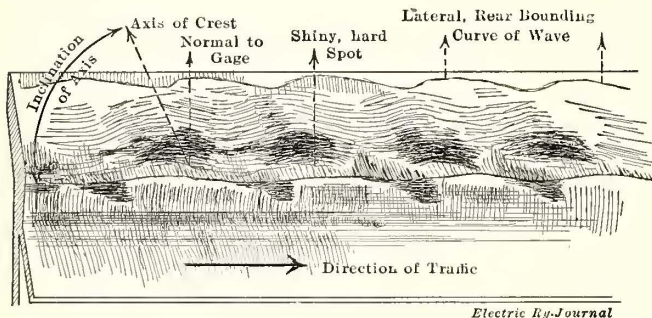


Fig. 1—Rail Corrugation—Well-Developed Corrugation

lyn Rapid Transit Company ranges from the infinitesimal to about 2 in., and of fully developed corrugations from $2\frac{1}{2}$ in. to 6 in. The depth on straight track varies from a thousandth of an inch or less to 0.058 in., which is an extreme case. These depths, of course, are understood to apply to series corrugation as distinguished from the dish which is found opposite or at a joint. It is a notable fact, however, that in any given series on any practically homogeneous rail and roadbed with like traffic the corrugations are remarkably near the same wave length. It has also been found that under given maximum loads at given maximum speeds on a given rail the lengths and depths of the waves do not exceed a certain ultimate maximum but will grow larger only when a heavier load or higher speed is introduced.

Hence, if only the rail is to be considered, it is not economical to grind it until corrugation has been developed fully. When a newly ground surface is subjected to the old conditions, re-corrugation is only a matter of time. But as a corrugated rail is injurious to the substructure, pavement and rolling stock it is our practice to grind out the corrugations before they reach their full stage of development; in fact, we grind the rail when the corrugations reach a depth of 0.01 in. to 0.012 in. This means that grinding should be done just before the effect of corrugation begins to tell on the substructure, pavement and rolling stock.

Fig. 1 shows characteristic well-developed corrugation. In contrast to the rest of the rail surface each crest is marked with a streaky spot of light gray, lusterless color, as shown in Fig. 1. Often this spot extends well down each side of the crest, and all such spots are on one straight line on the rail. Sometimes a secondary series of longer and narrower streaks may also be observed between the gage line and the more prominent series on the head of the rail. These streaks and spots evidently indicate impact from the wheel tread, and in well-developed corrugations they are frequently as well defined as those on the head of the rail. The longitudinal streaky formation of all of these markings is with the axis parallel to the length of the rail, and usually in any one series all

of these shiny spots lie on one straight line without deviation and in regular order. Some of them have even their longitudinal edges on what is very nearly a straight line. The more solid and less streaky the formation of the spot, the more compact is the metal from continued pounding after the complete development of the wave. In old corrugations also the shiny streak extends some distance down the vertical surface of the gage line at each hollow, in each case close upon the following crest, as illustrated in Fig. 1. A corrugated rail may not show these characteristics distinctly at all times, but nevertheless the waves are there. In new corrugations the hardened and shiny spots are sometimes isolated and small, and between these spots and the gage there is often another row or series of longer disconnected streaks.

On old corrugations the width of the wave in some series extends part way, and in others all the way, across the rail head. The crest seldom reaches laterally as near the back of the rail as does the hollow, the latter extending nearer to the back by anywhere between $\frac{1}{16}$ in. and $\frac{3}{4}$ in. Thus there is an accompanying horizontal wave, as shown in Fig. 1, as well as a vertical one. In the old corrugations there is still another wave formation. This is along the gage line where the metal has flowed laterally over the gage line from the hollow and has been pressed down by the wheel fillet and flange. This deformation is present only at the hollows. At the crests the metal does not come beyond the gage line, but there is a polished hard "gage line" surface. This is shown in Fig. 1, but it is noticeable only on mature corrugations.

HOW CORRUGATION GROWS

On some rails wearing, but still non-corrugated, the surface of contact shows a continuous bright and light-colored streaky, skin-surface formation. The width of this surface depends upon the amount of contact of wheel treads. Other rails either show no such streaks at all or very few, the color being the ordinary dull one. While the evolution of corrugation is the same everywhere, it manifests itself more clearly on streaky rails, as shown in Fig. 3.

As soon as the corrugations are at all perceptible, the continuous streaks begin to break longitudinally into de-

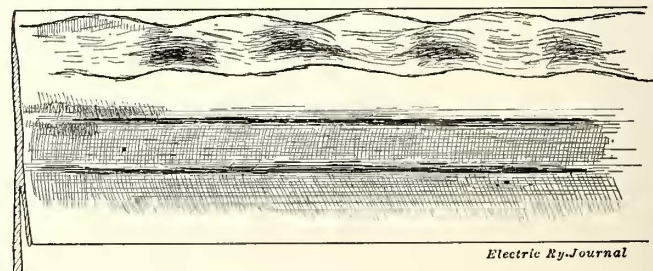


Fig. 2—Rail Corrugation—Corrugation on a Tilted Rail; Wheel Rides on Back of Rail

tached streaks. The depth of the wave at this stage is so small as to be practically immeasurable. While this periodic detachment is going on, the region of detachment still shows thinner and sparse streaks, while the region of isolation appears more solid and brighter. During the process those regular interval regions where parts of the continuous streak are disappearing and becoming narrower

are forming what will eventually be the hollow. Those parts which remain to become denser and wider are forming the crest. The breaking up continues until the continuous streaks have been transformed into a series of distinct and more or less isolated bright spots. The metal is evidently flowing and is being displaced from the hollow to form the crest. The streaks are fast merging into one another laterally to form the solid bright spot on top of the crest. By this time there is a marked difference between crest and hollow, and the wave has assumed that characteristic profile which keeps developing to the maximum. The corrugation is getting worse. That part of the hollow which is the deepest is near the gage and underneath the greatest diameters of contact, as indicated in Fig. 7.

ANGLE OF CORRUGATION

A very important characteristic of all corrugation is that the axis of the crest transverse to the longitudinal axis of the rail is in almost all cases oblique to the gage line in a greater or less degree. The inclination is as shown in Fig. 1. If we assume that the primary cause of corrugation is a cold flowing of the metal under the action of the wheel tread, and the writer has no doubt in regard to this being the correct explanation, this obliquity of the wave axis is easily traceable to the coning of the wheel tread. Hence we should expect to find, as we actually do, that when the wheel tread is wide and makes a contact all or almost all the way across the rail, as on steam railroads, the axes of the crests approach more nearly to right angles with the gage. The greater the contact the nearer the approach. In other words, when the coning presents a full contact, that part of the crest which lies nearer the gage has been extruded further forward than that part of the crest which is further from the gage.

An excellent example for the study of the wave shape of developed corrugation is on a rail so tilted that the back is slightly higher than the gage, the wheel thus riding on the back and middle of the rail only. The result of the metal flow is well seen in Fig. 2. The hollow is wider than the crest, and the winding edge of the wave is traced or generated by the extreme point of pressure of the wheel. If the wave had reached the gage line the result would have been as already described.

IRREGULAR AND REGULAR CORRUGATIONS

When the surface and alignment of track are irregular and uneven or the substructure is loose, the corrugations will not be uniform in appearance, length and depth because the forces at work and their direction are constantly changing. Differences in length will also be found depending upon whether the rail is in straight or curved track. Thus, in Brooklyn, where the corrugation on the inner rail of a curve may show wave lengths of 8 in. or 10 in., those on the outer rail of the same curve may show wave lengths of only 3 in. or 4 in. The gage line of a badly corrugated



Fig. 3—Rail Corrugation—Beginning of Corrugation

inner rail on a curve will also be found to be stripped and torn while wear and corrugation smooth and polish the outer rail. A curve of "corrugation permitting" radius corrugates more quickly and deeply than a tangent on the same line.

EFFECT OF BRAKING

The worst corrugation on straight track is to be found on that part of a run or street where the cars maintain the

greatest speed. This applies to lines operated with single cars. On a street where the stops are at long intervals, as with 600-ft. or 800-ft. blocks, the worst corrugation is on the middle 400 ft. or 600 ft., respectively, of the stretch. In many cases it is almost continuous for this length. That portion of the rail on which the cars are accelerated or retarded has little or no corrugation. It is said that in many cases this result is contrary to that on T-rail used

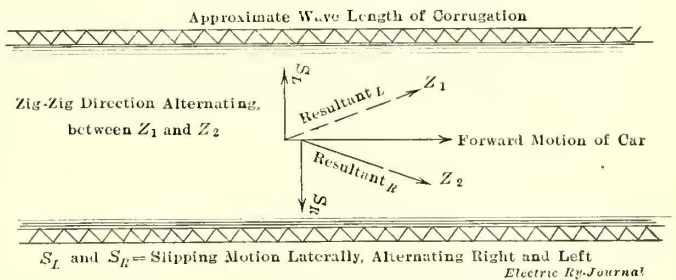


Fig. 4—Rail Corrugation—Theoretical Effect of Side Slip of Car Wheels at Intervals of 3 in. to 4 in.

by trains of cars, where the rail near and at stops is corrugated. The only reasonable explanation is that the marks which appear on the rails as a result of many repetitions of train braking are not of the same kind as true corrugations which are caused by a strictly rolling wheel load. False corrugation is the result of intermittent sliding, of diminished rolling and of jolting. Some of the metal must be dissipated by sliding friction and impact. Thus this action modifies the true shape of what would be corrugation if rolling friction was a greater factor. On a street track with singly operated cars little or no corrugation is noted at starting or stopping places, and very little corrugation exists on lines operated at low speed.

On a street where cars may run at full speed on the down grade without the use of brakes and with minimum slipping or skidding the corrugation on the down track is worse than on the up track; but if the fast cars slide, the corrugation is less than from rolling friction alone. On light grades where cars take the up track at good speed the rails on that track will corrugate more than on the corresponding down track if the latter is subjected to skidding.

As a rule the Brooklyn Rapid Transit system has more and deeper corrugations on the inner rail of straight track than on the outer rail while development is going on, the most likely reason being that only the inner rail is sanded. Probably if both rails were sanded the corrugation would be much less pronounced on each rail than it now is on the inner one alone.

CAUSES OF CORRUGATION

The following are the principal causes to which corrugation has hitherto been attributed: (1) lateral slipping and oscillation due to distortion of truck and play in its parts; (2) wide gage and loose track, vibration; (3) application of brakes; (4) inequality of homologous diameter elements of a pair of wheels on the same axle; (5) rigidity of roadbed; (6) deficiency in elastic limit of rail to resist loading; (7) tires harder than rails; (8) cold rolling by car wheels going over the track.

Attempts have been made to prove each, several or all of these causes responsible for corrugation. Is it not possible that there is but one cause and that the other causes alleged are in reality only accessories which are subordinate to the prime cause?

LATERAL SLIPPING

If lateral slipping, longitudinal slipping or both combined caused corrugation on straight track, not to speak of curved track, such slipping would have to be in the form of a transverse vibration of the car wheels across the rails. Yet, in some cases, the corrugation occurs first on one rail, with none or hardly any on the opposite rail, but a little beyond this place a series of corrugations are found on the

opposite rail. If transverse and longitudinal slipping was the cause, why did it not simultaneously produce the same effect on the opposite rail? The wheels which we are asked to believe vibrate transversely on one rail are rigidly attached to their axles, and their mates are likewise; and if one wheel fixed on an axle vibrates and produces a certain effect the wheel fixed on the other end of the axle would vibrate in unison in the same manner and produce the same effect on the opposite rail.

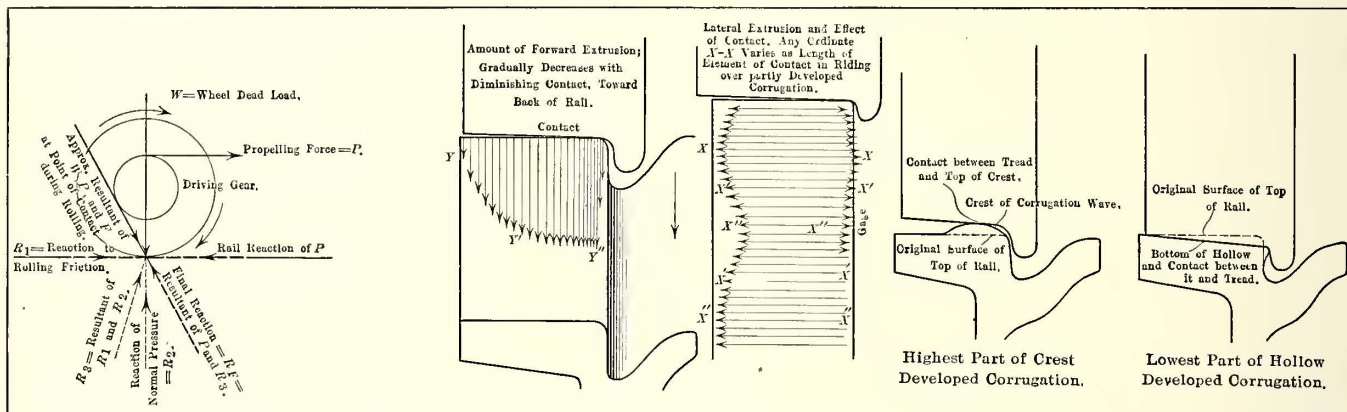
Besides, in order to create the remarkably persistent uniformity and periodicity of waves, the vibratory slipping would have to be of perfectly uniform occurrence and of constant wave length and interval in the one series of vibrations. This would have to occur not only with one set of wheels or occasional sets, but with almost every set of wheels. Can such a singular action be possible? Is the amount of wear and play in all trucks, journals and wheel gages, respectively, equal on all cars? Do corresponding diameters of one pair of wheels vary the same on all or on almost all pairs operating on a line?

No doubt there is occasional slipping, but this merely modifies the form of corrugation wherever such slipping may occur. In fact, slipping actually tends to remove incipient corrugations, thereby retarding their development.

nues, Brooklyn, furnishes an excellent example. Between Fourth and Sixth Avenues the grade is one of the steepest in the city. Sixth Avenue is the top of the hill. East of Sixth Avenue to Thirteenth Avenue the track is almost entirely level. On the heavy down grade derailing switches were placed at intervals. Cars run down grade under brake control and have to stop before passing the derails. Of course, in climbing the grade to Sixth Avenue, the cars cannot get full speed out of full power. No corrugation exists on this steep grade on either track between the bottom and top, although a few holes have been burned or gouged into the rail by the friction of spinning wheels that made no forward headway on the up-grade. These holes must not be mistaken for nor confounded with corrugation, as there is no regular interval between them. They are not depressions nor is there any uniformity in their size. But on the level stretch between Sixth and Thirteenth Avenues, where cars run free and fast, corrugation is plentiful. The brakes and the sliding and rolling friction of cars at practically uniform speed contribute toward rubbing out what little corrugation might be started on the grade sections.

INEQUALITY OF WHEEL DIAMETERS

Inequality of wheel diameters is related to causes Nos.



Electric Ry-Journal

Rail Corrugation—Fig. 5—Diagram of Forces and Their Reactions Composing the Resultant Force and Reaction Which Cause Corrugations; Fig. 6—Generation of the Lateral Curves of the Corrugation Waves Due to Coning of the Wheels; Fig. 7—Exaggerated Cross-Section at Hollow and Crest

Furthermore, the wave length of the curve generated on straight rail in such oscillation by a coned wheel 30 in. in diameter is far greater than the 3-in. or 6-in. wave length of corrugation. The lateral play in gage which will permit oscillations might be 1/8 in. to 1 in. Given these two varying conditions and also the forward variable speed of a car, the resulting wave length is anywhere between 6 ft. and 15 ft.

But even if the interval of vibration during transverse slipping on straight track was short enough to produce 3-in. to 6-in. corrugation waves, it is impossible to imagine that every car, in traveling in a straight line along a straight track, would follow exactly the same staggered course of 3-in. to 6-in. zigzags (Fig. 4).

WIDE GAGE AND LOOSE TRACK; VIBRATION

Wide gage of track would bring about the same effect as the narrow gage of a pair of wheels, if either could produce corrugation. But well-developed corrugation occurs in about two years on a new track of uniform gage, and the corrugation becomes bad long before the gage can widen appreciably. The only effect that wide gage has upon corrugation is to modify the shape of occasional wave lengths, thereby tending to some extent to prevent uniformity and periodicity of the waves.

APPLICATION OF BRAKES

Argument against this "cause" has already been given. Thirty-ninth Street, between Fourth and Thirteenth Ave-

1 and 2, and the arguments already stated against them apply to this theory. The coning of wheels does not cause corrugation, but it does give to the waves part of their peculiar shape. If the wheels were not coned, corrugation would still occur, but the form would be a little different.

RIGIDITY OF ROADBED

The rigidity of the roadbed does play a very important part in the production of corrugation. It is really the vehicle for the primary force which creates corrugation. The less the rigidity, the less rapid the start and subsequent development of corrugation.

DEFICIENT ELASTIC LIMIT OF RAIL

Most naturally any deficiency in the elastic limit of rail will also contribute to the production of corrugation. It does not require argument to show that any body of matter which has been dented or permanently deformed by a given force has not sufficiently resisted that force so far as elastic limit is concerned. The effect itself is proof enough.

HARD TIRES

Hard tires also contribute toward corrugation as they constitute the transmitting medium of the causing force.

COLD ROLLING BY CAR WHEELS

Cold rolling by car wheels is the cause which will be the theme of the remainder of the discussion. It is responsible for true corrugation wherever that corrugation is seen. The question is: Why does a new, electrically

operated, straight track, with a thoroughly substantial though rigid substructure and with first-class surfacing and joints, corrugate in about two years? At the start the rail surface is perfectly smooth, no joints have begun to pound, and there are no "bumps," however small, to cause slipping from unequal wheel pressure and stressing of trucks.

The complete corrugation force is the resultant of three forces which act in a fixed straight line. Under certain conditions this resultant is counteracted by other forces, but the fact that the effect when matured is almost universal shows that this resultant force alone is of greater magnitude than the counteracting ones. If still other forces through the mediums of certain alleged causes collectively produced corrugation, or rather acted so as to leave an impression on the wearing surface, the result would not be corrugation as we see it. It would not be uniform and periodic with similar and recurring characteristics. As previously stated, it would be a medley, because the lines of action of these forces are constantly changing, their points of application are scattered and variable and their coincidence or concurrence is so remote as to be an impossibility.

Before proceeding further, the writer wishes to acknowledge that the well-known British engineer, W. W.

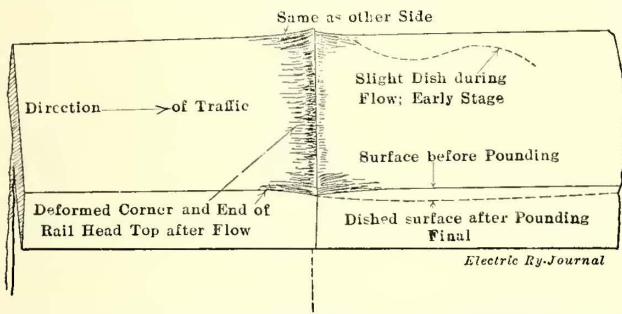


Fig. 8—Rail Corrugation—Effect of Cold Rolling Which Leads to Dished Joint

Beaumont, and G. E. Pellissier have already described the correct cause of corrugation. But that their assertions are capable of demonstration is being shown.

Assume a loaded wheel which if at rest on an area of contact on the rail would transmit a static, compressive stress through that contact area. When the loaded wheel rolls forward at a high enough speed two other new simultaneously acting forces are introduced, as shown in Fig. 5. One of these is the force of rotary motion, and the other that of translation. We have then three concurrent forces acting simultaneously at every infinitesimal instant and on every infinitesimal element of area during the rolling of a car wheel over the track. Of course, there is a certain variable amount of independent forward sliding or skidding, but this is working against the resultant of the other three forces.

But, to make matters worse, the area of contact at any instant approaches a theoretic line or spot, as G. E. Pellissier* and Mr. Beaumont have shown, and the resulting unit stress is far beyond the elastic limit of the rail. In consequence, the metal will flow because the surface of the rail is malleable. Moreover, where the rail is laid on a foundation more or less rigid, the bed acts as an anvil upon which the malleable rail surface may be hammered.

As the rolling load advances, the surface metal on the railhead in the area affected is compressed, and most of it "creeps" forward under the action of the rolling, advancing load. Since the wheels are more or less coned, the intensity of contact and pressure, and therefore the

extrusion stress, increases nearer the largest diameter of contact, which is near the gage. Consequently, the metal nearer the gage which is subjected to the greatest and most frequent stresses creeps forward further than the metal of less contact. For this reason, the crest axis is made oblique to the gage line. When the tread makes full contact the obliquity is almost absent. This result is shown in Fig. 6.

As the metal creeps forward it is compacted, becomes denser and harder, and is piled up into a minute crest. This creeping and piling goes on until it has acquired compactness enough to resist the one given load rolling at given velocity over the roadbed of given elasticity. The load then rolls over the minute hard crest and tends to repeat the process and effect upon the next interval of area, leaving another minute hollow with a succeeding crest. After many such rolling loads at high enough velocity have repeated this process, the effect becomes marked enough to be visible as corrugation. Most of the extruded metal forms the crest that is seen on each wave. Some of it flows toward the gage and the back, and can be seen there at each hollow in well-developed corrugation. After the hollow and crest have become developed to an appreciable degree, the wheel tread rolls a full contact in the hollow, whereas it rolls only a partial contact in the crest. As it travels from the lowest part of the hollow to the highest part of the crest the width of contact across the rail diminishes, and in going from the crest into the next hollow the amount of contact again increases as shown in Fig. 7. This variance of contact and flow (after the waves have already become partially established) produces the horizontal boundary curve along the back of the rail side of the corrugation and another along the gage side. That phase of the curve which is in the hollow is concave to the gage line; at the crest it is convex to the gage line. The location of any point of this bounding curve referred to the gage line is a function of the amount or length of contact on which the point lies, as shown in Fig. 6.

If the elastic limit had not been exceeded from the very start, there would have been no corrugation. Sliding friction has rubbed out some corrugation in its first stage of development when the internal resistance of the small amount of extruded metal was not equal to the friction stress. One car caused the initial minute corrugation wave, and the following car, if it happened to skid over it, rubbed it out; but if that following car rolled instead of skidding over it the minute wave was enlarged.

Of course, there is also corrugation on street tracks not laid with or in concrete, although not so much. After the track has been down for some time and loaded often enough, the hard earth under the tie becomes more compacted in some places than in others and loses much of its resiliency. Hence the "anvil" condition arises eventually, although the corrugations will be less and shallower than on hard, unyielding roadbeds. Manganese rail is malleable and consequently is affected in the foregoing way.

There is a reason for the almost uniform length of waves in a series of corrugations on a rail. The wave length is a function which varies directly as the force or load, velocity and malleability of the rail, and inversely as its density. The extent to which corrugation is retarded, prevented or kept down to a minimum is determined by the extent to which the counteracting force of elasticity of roadbed opposes the force which persists in producing corrugation.

CAUSE OF DISHED JOINTS

The cause which is instrumental in producing corrugation is also the primary cause of the dishing of a well-laid joint. Take a perfect substantially spliced joint in city track when it is new. The heads butt well and coincide horizontally with perfect evenness. Under the early stressing some of the metal flows in front and some to the

*See "A New Theory of Rail Corrugation," *ELECTRIC RAILWAY JOURNAL*, Sept. 30, 1911.

sides of the wheel. The joint has not yet begun to dish or pound. The loaded wheel rides perfectly smoothly over it. The continued course of the displacement of the metal during flow, as shown in Fig. 8, is broken, partly, at the end of the "delivering" head of such a joint, owing to the fact that there is a seam in the tightest joint unless it is perfectly welded. Since the transmission of flow is thus broken, the end of the delivering head is deformed to a certain small extent laterally and vertically, as shown in Fig. 8. Even then there is no appreciable sign of dishing, but there is a flow with slight deformation. The impact of the rolling load is gradually, though very slightly, increased at the area of flow due to the flow itself, and subsequently it begins to affect the receiving head by its increased momentum. The normal flow on the receiving head is thereupon increased beyond the normal amount. After a short time the joint begins to dish on the receiving head. The dish causes a pounding on that head, and this pounding in turn makes a worse dish. At the same time the pounding produces a dish on the other rail opposite the joint.

Very often there is a secondary dish right next to and beyond the principal dish at the joint. This secondary dish is the result of the continued abnormal flow and consequent pound brought about by what remaining energy there is left in the rolling load immediately after the pounding into the first dish. The rolling caused flow; the flow caused a slight dish; the slight dish then caused pounding. Thereafter the pounding made the dish much worse, without affecting the solidity of the joint.

TIME REQUIRED FOR RAIL CORRUGATION

Frequently, almost or quite before the tangents of a new track have begun to show corrugation a curve on the same line is already well affected. The centrifugal force of the cars rapidly rounding the curve, and the rolling impact increased thereby, increases the stress upon the riding surface of the curved rails. Thus, as the corrugating force on the curve is naturally greater than on the straight track, the curved rail corrugates much sooner and worse. Of course, there is oscillation or appreciable sidewise vibration on some curves, but that alone does not cause the corrugation on curves. It is the rolling process that corrugates the top of the rail.

Corrugation is very slow in developing, and very little of it is to be seen on straight T-rail, which is laid on ballast embankment or over steel elastic structure. If it does develop at all, the rail does not corrugate beyond what might be called the maximum for the governing conditions.

On the Brooklyn Bridge trolley tracks the T-rail and girder rails laid on rigid roadbed on the approaches and anchorages are well corrugated. The T-rails lying on the elastic framed roadway of the bridge span and used by still more cars are corrugated very little or not at all. The little corrugation that does exist is in shorter wave lengths. The bridge tracks used by the elevated railway trains are corrugated, but not by any means so much as they would be if they were not on an elastic structure. The depths of waves on the elevated tracks of the bridge vary from about 0.001 in. to about 0.010 in., the shallowest depths predominating. The traffic here is the heaviest elevated service on the system. The trolley car traffic is also the heaviest of its kind.

On outlying surface roads which bear elevated trains and which are laid on partly elastic cinder or stone ballast corrugation develops very slowly, if at all. The waves are 0.001 in. or less in depth where they do occur.

CONCLUSION

The writer believes that the ordinary cold rolling by car wheels is the only cause of corrugation. That this cold rolling may be effective, there must be an anvil upon which to roll the rails. The problem, therefore, is to design a roadbed which will make this anvil effect insignificant.

INSPECTION SHOP BONUS SYSTEM

BY P. V. SEE, SUPERINTENDENT OF CAR EQUIPMENT HUDSON & MANHATTAN RAILWAY

If an efficiency engineer ever attempted to get high efficiency out of the car equipment department of a railroad, his main stumbling block would be the inspection pit. As every railroad man knows, there is no way of "speeding up" this class of work. The usual method is to have a foreman follow the men more or less closely and look over the cars after the inspector is through. The foreman has not enough time to examine all work done by the inspectors, so that the real criterion of efficiency of car inspection is usually summed up in the old saw: "The proof of the pudding is in the eating." In other words, the question is, how common are pull-ins or detentions and other delays to cars reported defective? This criterion is often supplemented by various means of producing interest or fear among the men, such as a comparison of the results of different carhouses and of the delay records of the same months of different years.

The Hudson & Manhattan Railroad has combined two schemes into a bonus system that is producing inspectors who do follow details closely. On the theory that money talks, seven of the men who are responsible for those parts of the work that are most liable to produce road troubles were offered a bonus of 25 cents per day. This bonus is contingent on a week's operation and special weekly inspection to show that not a single detention on the cars passed by each man is chargeable to his work. The men were informed that this was not a raise in pay but a bonus given by the company for careful inspection. The weekly efficiency test referred to is made by a man who is not in the inspection shop organization. This man gets the cars before they come in to his shop and sets a variety of traps to catch the careless inspector. Below is a list of one week's test:

EFFICIENCY TEST—NOV. 18, 1913.

Car No. 1954	
No. 7 finger in controller not making contact No. 1 end.....	O. K.
Bottom disk bent on No. 9 contactor.....	O. K.
One train line terminal bent out of shape, No. 2 end.....	O. K.
Cover off marker snap switch, No. 1 end.....	O. K.
Finger on reverser board No. 2 not making contact.....	O. K.
Lock washers loose on nuts holding axle cap-bolts, top of No. 2 motor.....	O. K.
Heater switch bent.....	O. K.
Clamp holding bell cord, No. 2 end, loose.....	O. K.
Screws loose holding brass rods swing sash, No. 2 end.....	O. K.
Eye off ventilator, No. 2 side of car, No. 2 end.....	O. K.
Car No. 358.	
Screws missing top hanger end door, No. 2 end.....	O. K.
Bolt missing cab seat, No. 2 end.....	O. K.
Wire loose on coil, No. 1 door.....	O. K.
Cotter key missing, brake rod T.T. off slack adjuster.....	O. K.
Screws holding rheostat, connection loose on No. 3 block.....	O. K.
Dirty cab, No. 1 end.....	O. K.
Lock washer on tripper nut bent off T. T.....	O. K.
Car No. 331.	
Safety device bent, No. 1 end.....	O. K.
End door bumper missing, No. 2 end.....	O. K.
Red hand off gage, No. 1 end.....	O. K.
Car No. 203	
Seal on brake cylinder cock broken.....	O. K.
Screws loose holding wire on coil of No. 11 contactor.....	O. K.
Screws loose holding cable top of No. 14 contactor.....	Missed
Screws loose holding No. 10 finger in controller, No. 1 end.....	Missed
Car No. 331	
Screws missing holding snap switch for markers, No. 1 end.....	Missed

On this list only three tests out of twenty-five were missed. This means an inspection efficiency of 88 per cent. All the tests made were for defects that might occur in service. Some of them, as cutting out a triple valve, are of great importance, while others are such small matters as a loosened screw in the woodwork. As the men never know on what car or at what time the test is to be made, they must exert constant vigilance to prevent being caught.

The inducement to secure the extra \$1.50 per week has proved very great. The men show more interest in their work and are keener to suggest improvements and run down reported troubles.

The Board of Railway Commissioners has approved the fares of the Montreal & Southern Counties Railway, on the basis of 2½ cents a mile south of the St. Lawrence.

Choice of Electrification for a Concrete Case

This Is a Supplement to W. S. Murray's Discussion Before the Canadian Society of Civil Engineers on A. H. Armstrong's Paper Entitled "The Engineering Problem of Main-Line Electrification"

[The ELECTRIC RAILWAY JOURNAL for Dec. 20 contained a telegraphed report of the discussion by W. S. Murray, formerly electrical engineer New York, New Haven & Hartford Railroad, on the paper "The Engineering Problem of Main-Line Electrification" which was presented and read by A. H. Armstrong before the Canadian Society of Civil Engineers at Montreal, Que., on Thursday evening, Dec. 18. Owing to the date of the meeting it was impossible to publish other than a condensation of Mr. Murray's remarks. The following paragraphs give a full account of this part of his discussion.—Eds.]

MR. MURRAY'S COMPARISON FOR A CONCRETE CASE

"Having shown the application of single-phase traction to extremely heavy and dense traffic on the New York, New Haven & Hartford Railroad, let us make a study of

The graphs themselves are perfectly self-descriptive in that they are segregated into the major factors going to make up a complete electrification, such as power station, transmission line, substations, feeder, trolley and locomotive costs, with, finally, a summation of the details. It is interesting to note the parallelism of the two lines which represent the total costs for the two systems. However, the grand economic advantage of the a.c. over the d.c. system of train propulsion is graphically expressed by the curve lying above the investment cost for the two systems, for this curve represents the capitalization of the difference in operating cost in favor of a.c. which can properly be charged against the d.c. system of train propulsion. This advantage, although great, is not comparable to that shown in Fig. 2, in which the relative advantages of the two systems are presented upon the very essential operating basis of

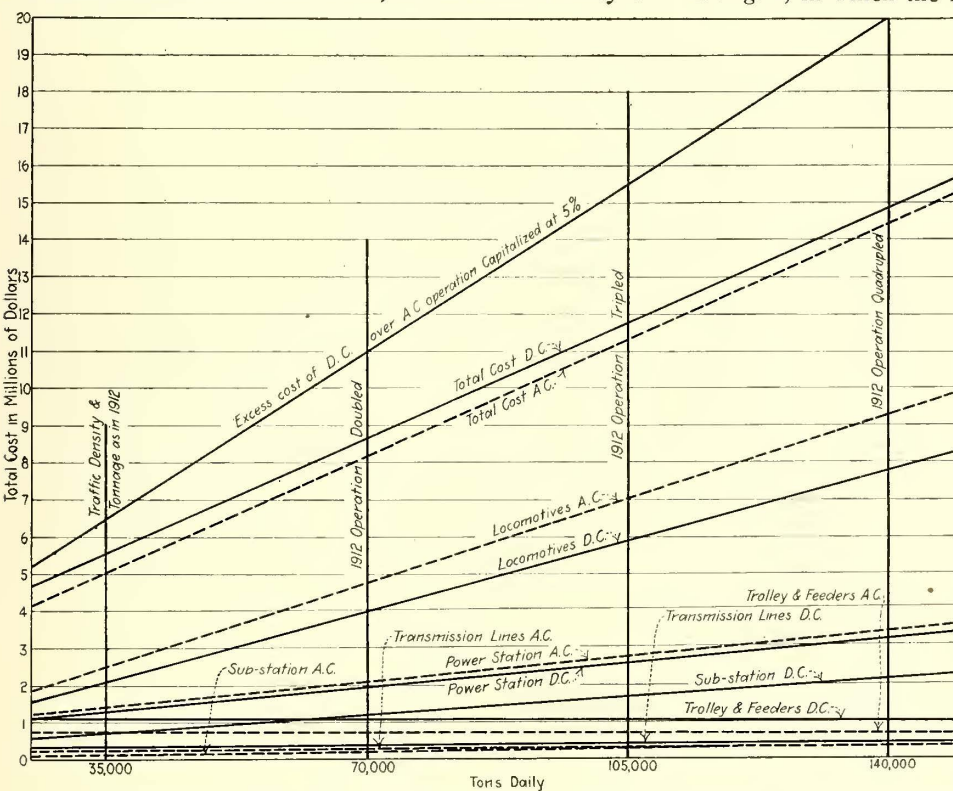


Fig. 1—A.C.-D.C. Comparison—Relation Between Capital Costs and Traffic Density

the relation of electrification costs to the density of traffic.

"We must again resuscitate the single-phase system in order to compare it to d.c. working, and to avoid being charged with generalizing, an actual case will be selected. This concrete example is offered by a Western railway where the electrification territory comprises a route distance of 119 miles, or a total of 260 miles of single track, including a summit grade rising 3700 ft. with a maximum grade of 2.4 per cent for a length of 12 miles.

"The application of known cost constants of construction was made, and the efficiencies of generating, line and motive power apparatus were included in the consideration of this case. This comparison between the a.c. and the d.c. systems of train propulsion was made upon the basis that the total costs of electrification necessarily increase in proportion to the density of traffic. The curves developed in Fig. 1 start with the translation of 35,000 tons a day over a road 119 miles between terminals. These curves indicate the investment which is required to take care of an increase in density of traffic up to 140,000 tons per diem.

Let us refer now to Fig. 2, remembering that the train speeds are entirely dependent upon the amount of voltage that is supplied to the current collectors of the electric engines, that we are dealing with a given weight of train over a given amount of track with a stated number of a.c. or d.c. substations and that the investment cost of the d.c. and a.c. substations is arranged in accordance with the intersection of the lines that represent an equality of cost for investment of apparatus versus cost of power. The average voltage curve of the line as one, two, three or four trains are operated can be plotted for the a.c. and

d.c. contact wire. Thus, this diagram develops the average voltage of the line for the increase from the operation of a single train to the operation of four trains, and in turn it shows the decrease of speed which occurs in proportion to the drop in line voltage. It is, therefore, a simple matter to develop from the relative speed relation of the two systems the relative capacity of tonnage delivered per mile of track per hour for each system. This relative rate of tonnage delivered is made clear in the examination of the lines so marked in the figure. An inspection of the curves shows that for single-train operation the capacity of the a.c. system is four and one-half times that of the d.c. system, but that if the operation is increased to four trains in flight, the capacity of the a.c. system rises to six and four-tenths that of the d.c. system. In the consideration of these tonnage capacity curves, it should be emphasized that they apply to the field of heavy traction from which Mr. Armstrong has now so ruthlessly taken the single-phase system.

"Still holding to this specific case, it is interesting to

refer to Fig. 3, in which the general efficiency of the two systems between the driving wheels of the electric engines and the generators of the power station is compared from two points of view. The first comparison reverses this order by tracing the cost of the electrical energy from the driving wheels of the electric engines to the generators of the power station. The reverse order offers a better opportunity to see the effect of efficiency at its various points of application in the chain. Ordinarily, if serial efficiency between two systems is stated at, say, 15 per cent, it is natural but erroneous to assume that the energy loss in one system is 15 per cent more than that of another. For example, it is noted on the curve in Fig. 3 that the serial efficiency of the a.c. system is 67 per cent, while that of the

watt-hours required at each step for each system to produce the same train schedule, then on arriving at the power house we find that the generating requirement of the d.c. system is 55,000,000 kw-hr., whereas that of the a.c. system is only 45,000,000 kw-hr. From the ratio between these two amounts, it is seen that the power station which furnishes direct current to the locomotives will have to generate 22 per cent more energy than the power station

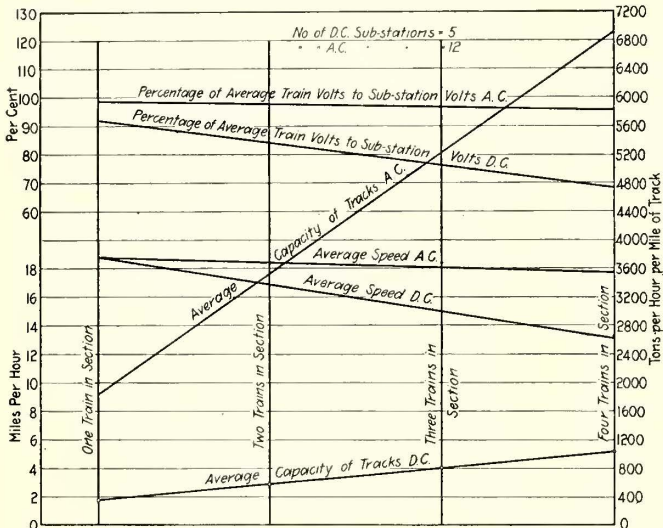


Fig. 2—A.-C.-D.-C. Comparison—Effect of Voltage Drop on Speed and Capacity of Trains

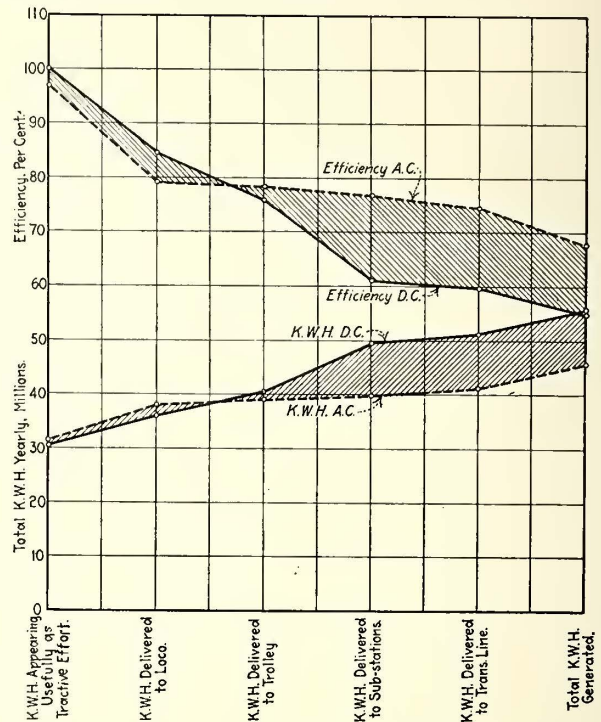


Fig. 3—A.-C.-D.-C. Comparison—Efficiencies Between Power House and Locomotive

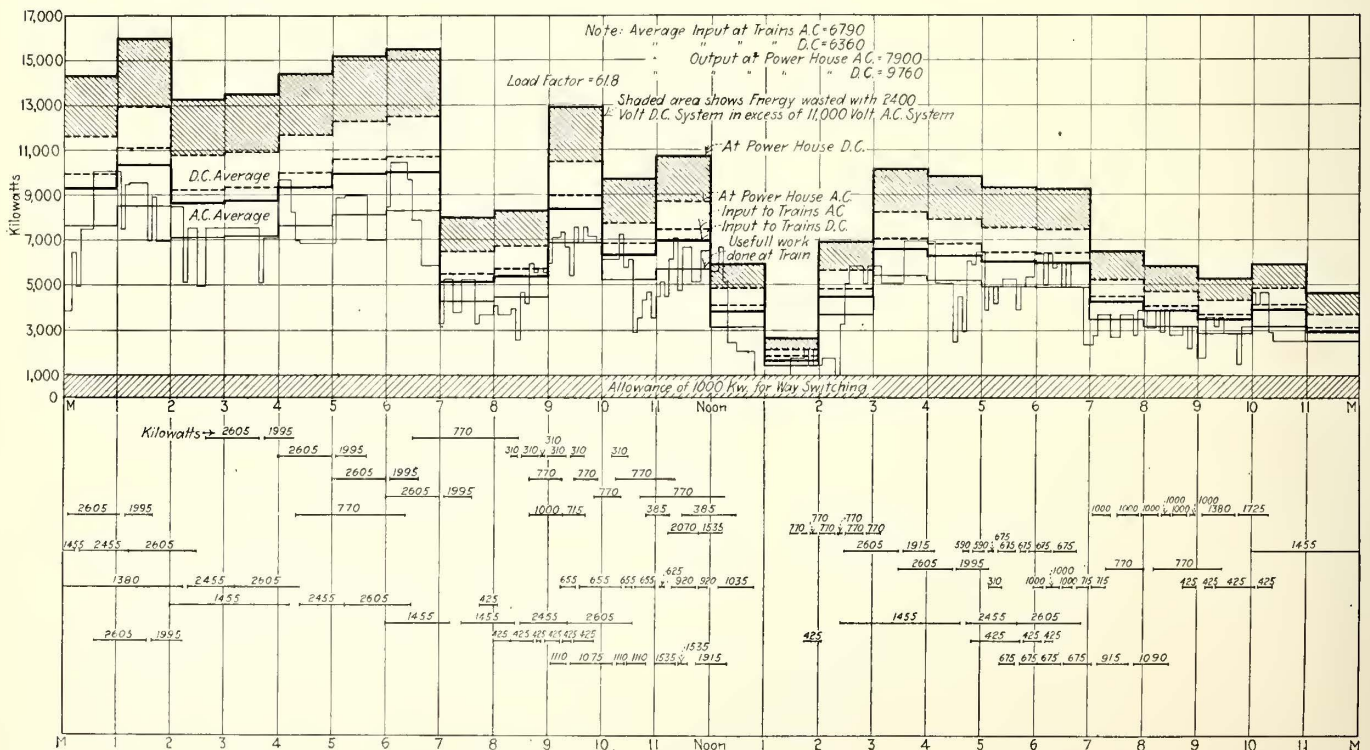


Fig. 4—A.-C.-D.-C. Comparison—Comparison of Train Energy Requirements for Given Schedule

d.c. system is 54 per cent. Apparently there is a difference of 13 per cent. But now observe that the a.c. system is really much more than 13 per cent superior, for if we refer to the area of the lower curve, which starts at the driving wheels of the locomotives, and integrate the kilo-

which furnishes a.c. energy to the locomotive. These figures are based upon the translation of 35,000 tons per diem between terminals 119 miles apart.

“The principles used in Fig. 3 may now be applied to another point of view, as recorded in Fig. 4. By referring

to the lower part of this figure, the train schedule on the 119-mile section will be found indicated. With the weight and speed of trains known, the actual amount of wheel energy is developed and indicated. It is seen that the difference in weights of the a.c. and d.c. engines is credited in favor of the d.c. The demands for the two systems are so built up that the curve limiting the bottom of the shaded area represents the amount of energy which must be generated for a.c. train propulsion, while the curve limiting the top of the shaded area represents the amount of energy which must be generated for d.c. train propulsion. The area represented by the shaded section indicates the energy loss to which the railroad is subjected because of the use of d.c. train propulsion.

"While Fig. 1 indicates that the power station investment for the two systems is very nearly equated, it can be readily seen from Fig. 4 that a large amount of energy may be saved by using the a.c. system. For example, in the concrete case at hand there is a maximum machine difference of 3000 kw, which could well represent the size of one generating unit.

"To summarize, these curves show that the single-phase system of distribution of power provides a means whereby the railroad manager may feel the highest assurance that trains can be dispatched on time irrespective of track con-

is at present offered by the Butte, Anaconda & Pacific Railway. The development of large sixty-cycle central stations cannot possibly be an argument against the application of single-phase to railway electrification, for it is entirely feasible to change sixty cycles to a lower periodicity for railway application at a cost comparable to, if not less than, that required to transform it to direct current. It might be interesting to have Mr. Armstrong explain the insuperable difficulty in turning sixty-cycle into twenty-five-cycle energy when he eliminates with such ease the difficulties of its transformation into direct current. We admit that the rotary converter is more efficient than the motor-generator set, but we should be assured of Mr. Armstrong's conjoint admission that a.c. is more efficient than d.c. distribution. Strangely enough, however, he specifies motor-generator sets for the substations of 2400-volt d.c. systems, and these machines may well be fairly matched against the frequency changers with the advantage of higher efficiency for the latter."

CONSTANTINOPLE ELECTRIC RAILWAY

On Aug. 4, 1913, the first electrified line of the Constantinople Street Railway was opened with an experimental service. This line, known as Tunnel-Chichli, is single track

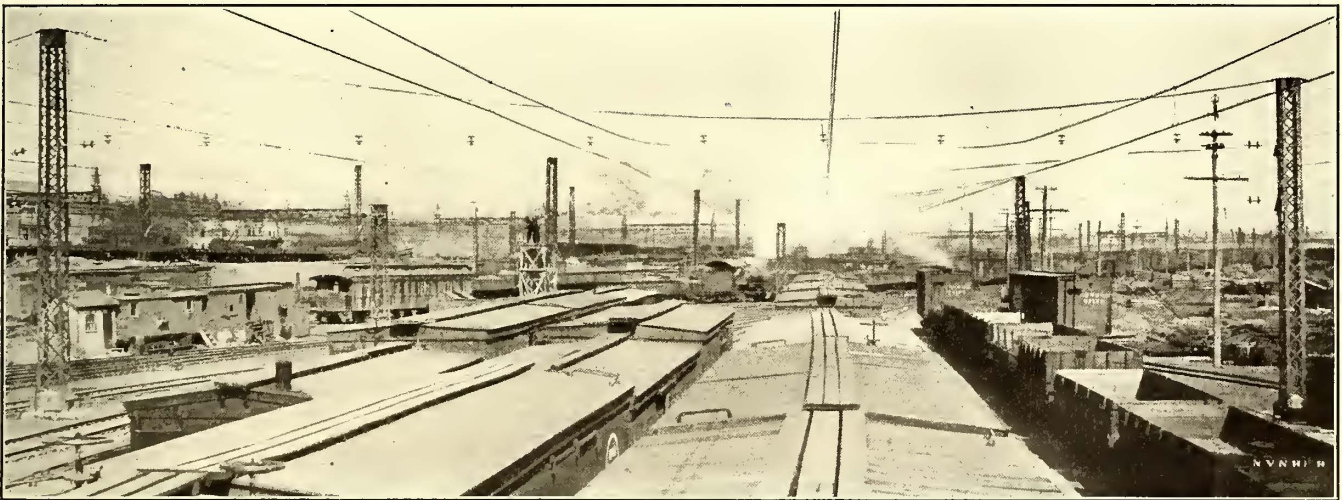


Fig. 5—A.-C.-D.C. Comparison—View of Westchester Yard, New York, New Haven & Hartford Railroad, Showing Simple Overhead Single-Phase Construction

ditions, for it is shown that flights of trains may be dispatched from one up to four with insignificant effect upon the transmission system. On the other hand, the d.c. system of train propulsion, in the absence of proper spacing and resulting congestion, will have its capacity of tons delivered per hour per mile of track lowered to impracticable limits and thereby prove a severe handicap rather than an advantage to the railway operator. It follows, then, that for an equality of heavy traffic conditions the a.c. system of train propulsion can be installed for a lesser investment and with a very much higher economy of operation.

"It should be added here that the estimates made for the 119 route miles in question cover the use of three-phase generators supplying single-phase current and that the extra size of generators due to this practice was taken fully into account. Further, as to telegraph and telephone circuits, experience with single-phase lines has now indicated the method whereby they may be constructed to provide at no extra cost the automatic elimination of electromagnetic induction.

"I do not doubt that there may be isolated cases of short roads in localities with extremely favorable prices for sixty-cycle energy where the high-voltage d.c. system of train propulsion is applicable to heavy trains. Such an example

and gives a four-minute service with trains consisting of a motor car and two trailers. The company now has available forty single-truck motor cars for first-class passengers and seventy single-truck cars for second-class passengers; also twenty new trailers and thirty-one trail cars converted from horse service. The motor cars have cross seats for eighteen passengers and standing room for sixteen more. A movable partition isolates women passengers in accordance with Mohammedan custom. The electrical equipment per car includes two 40-hp commutating pole motors. The total weight of a motor car exclusive of the load is about 12 tons. On account of the grades, which are as high as 7.3 per cent, and the sharp curves all motor cars are equipped with track brakes and hand brakes, while trailers have hand and solenoid brakes. The complete system, comprising three routes with a total of 29 miles single track, will be supplied by a power station transmitting three-phase current at 9600 volts, fifty cycles, to three substations. One of these substations is equipped with two 400-kw rotaries and each of the others with three 400-kw rotaries. These were furnished by the French Thomson-Houston Company, the electrical equipment of the cars by the Siemens-Schuckert and Allgemeine companies and the overhead construction by the Allgemeine Company alone.

The Economic Aspect of Benefit Association Work at Montreal

This Article Shows the Sources of Revenue and Character of Disbursements of the Montreal Tramways Mutual Benefit Association and Includes Abstracts from an Actuary's Report Which Indicates That the Income of the Association Should Suffice to Keep It in Good Financial Condition

The Montreal Tramways Mutual Benefit Association was founded in October, 1903, and therefore is among the oldest electric railway organizations of the kind. Unlike most other benefit societies, its financial policy has always been dictated by the vital statistics used by life insurance companies. Exceptional interest should attach, therefore, to the following data from an actuarial report on the condition of the Montreal association as of April 30, 1912, prepared by B. Hal Brown, president and general manager Prudential Trust Company, Montreal. Before these figures are presented, however, it will be illuminating to summarize the sources of income and the character of the disbursements of the association. Its clerical expenses are borne by the company. Accounts of the scope of the association were published in the *STREET RAILWAY JOURNAL* for Sept. 23, 1905, and Feb. 17, 1906. Patrick Dubee, secretary Montreal Street Railway, has been secretary-treasurer of the association since its beginning.

SOURCES OF INCOME

The association was organized with 1152 members, but by the year 1913 the membership had increased to 3200. The regular source of income consists of an initiation fee of \$1 and monthly dues of 50 cents, to which the company contributes amounts equal to 100 per cent of the initiation fees and 50 per cent of the monthly dues. The company also makes a gift of \$4,000 at Christmas. The remaining regular source of revenue is the annual picnic, which in recent years has added \$8,000 to \$10,000 to the funds, or, roughly, \$3 per member. This picnic is Montreal's most popular event and, in fact, it has reached such dimensions that larger park grounds must be sought if previous records are to be exceeded. During the week of Aug. 11 to 17, 1913, 150,000 10-cent admissions were sold to Dominion Park, and on the concluding Sunday 45,000 people were in attendance. These enormous figures are due to the popularity of the event and to the encouragement of ticket sales through employees by means of prizes and lotteries. Publicity is assured to the picnic by a reception given to the press on the first night, and this is followed by receptions to other influential bodies.

CHARACTER OF DISBURSEMENTS

The disbursements of the association for sick members are as follows: 60 cents a day for the first ninety days and 30 cents a day for the next ninety days. The death payment is \$500, plus \$50 for funeral expenses. A pension of 50 cents a day is granted to all retiring employees who have reached the age of sixty-five years and served for not less than twenty-five years. The other expenses of the association comprise medical supplies and salaries for five physicians who spend one hour a day at each car center and visit patients at their homes. Of course, this medical attention and the necessary supplies are furnished to the members without charge. Employees injured in the course of their duties receive some aid, starting from the first day of their disability, and in addition are cared for by the compulsory compensation act of the Province of Quebec.

It may be noted that if men resign after five years' membership they are entitled to one-third of all dues paid in by them less the cash benefits received; after ten years' membership this proportion is raised to two-thirds.

An abstract follows the report made by Mr. Brown in compliance with a request from Mr. Dubee.

NUMBER OF MEN EMPLOYED BY YEARS OF SERVICE

The data on the number of men employed by years of service reveals the interesting condition that a large proportion of the men stay longer in platform service than is customary in other large American cities. Of the total membership of 2795, comprising practically all of the employees, 369 had been in service for one year, 312 for two years, 219 for three years, 173 for four years, 154 for five years, 164 for six years, 140 for seven years, 149 for eight years, 188 for nine years and 109 for ten years. Excluding the first year as one during which discharges and resignations are most frequent, it is found that 1608 men, or 57.5 per cent of the members, have served from one to ten years. To this number of experienced men should be added 818, or 29 per cent, embracing members who had served from eleven to forty-two years. Of men in their second decade of employment, the number for each year ranged from forty-eight to eighty-seven.

AGES OF RESIGNING MEMBERS

Since the association was formed 2877 members out of an enlistment of 5705 have resigned. It is unnecessary to quote their ages in detail as they correspond very closely to the resignations from the service of the company. However, the figures show that the number of resignations among men twenty-one to thirty-one years of age was more than 100 for each age.

SERVICE PERIODS OF RESIGNING MEMBERS

The service periods of resigning members showed that, out of the total of 2877, 1010 resignations, or 35.5 per cent, came from men who had been in the association one year or less; 676, or 23.5 per cent, from two-year men; 319, or 11 per cent, from three-year men; 243, or 8.4 per cent, from four-year men, and 159, or 5.5 per cent, from five-year men, the remainder, or 16.1 per cent, being scattered among men who had been in the association from six to twenty-one years.

YEARS OF SERVICE OF MEMBERS BY AGES

The statement covering years of service of the members by ages showed the following proportions for each age of men who had served less or more than one year: twenty-one years, thirty less and sixteen more; twenty-two years, thirty-nine less and fifty-three more; twenty-three years, thirty-eight less and seventy-seven more; twenty-four years, thirty less and ninety-three more; twenty-five years, eighteen less and 107 more, etc. The proportion of one-year men naturally tend to decrease among the greater ages because they include men who entered the service some years younger and also because older men are less likely to seek a change in position. Platform men are not accepted unless more than twenty-one years and less than forty years old.

MATURING OF PENSIONS

The number of members who will be entitled to pensions will not exceed twenty-five per annum until the year 1925 and will not exceed fifty until the year 1934. Of the remaining years, 1937 will be the heaviest, with 457 pensions. All other years remaining are much lighter.

DEATHS OF MEMBERS

Since the association was organized the total number of deaths has been 141 out of an enlistment of 5705. Fifteen deceased members had been in service one year or less, fourteen two years or less and five ten years or less. For

all other periods of service the deaths were less than ten each.

INSURANCE CONTRACTS IN FORCE

The insurance contracts in force April 30, 1912, and the average age of groups is shown in Table I.

TABLE I—INSURANCE CONTRACTS IN FORCE APRIL 30, 1912

Class	Number	Total Amount Due for Insurance	Total Amount Due for Burials	Grand Total	Average Age of Group, Years
A. Value of certificate, \$500	2374	\$1,187,000	\$118,700	\$1,305,700	32.25
B. Value of certificate, \$250	205	51,250	10,250	61,500	49.68
C. Value of certificate, \$166.66	107	17,833	5,350	23,183	63.49
Total	2686	\$1,256,083	\$134,300	\$1,390,383	34.82
Total amount in reserve at credit of death and burial fund, \$9,219.33.					

SICKNESS AND INJURY FUND

Statistics relative to the sickness and injury fund are shown in Table II.

Table II is interesting as showing the variations from \$10.77 to \$18.58 in the average amount paid per claim, which fairly parallel the range of 18.23 to 33.09 days paid per claim. The members are not paid for the first seven days of disablement. The average amount paid per member ranged from \$2.68 to \$5.32 per annum.

ACCOUNTS WITH RESIGNED MEMBERS

Since the organization of the association 2877 members have resigned. Since the year 1910 the average membership period of those resigning has ranged from 1.55 years to 2.13 years, their mean age 27.93 years to 28.26 years and their mean period of service 1.67 years to 3.06 years. From these men the association has received \$28,230, plus \$15,360.75 from the company, in return for which it expended

TABLE II—STATISTICS RE SICKNESS AND INJURY FUND, 1904 TO 1912

	1904	1905	1906	1907	1908	1909	1910	1911	1912	Total
Average membership during year	1,137	1,416	1,776	1,832	1,891	2,196	2,367	2,565	2,625	2,095
Total number of claims paid	283	520	638	584	497	209	487	603	613	4,734
Total amount paid for sickness and injury	\$3,049.95	\$6,239.10	\$8,706.70	\$9,737.00	\$7,321.30	\$9,457.40	\$8,874.90	\$10,035.00	\$10,278.30	\$73,699.65
Average amount paid per claim	\$10.77	\$11.99	\$13.64	\$16.67	\$14.74	\$18.58	\$18.20	\$16.64	\$16.77	\$15.57
Average number of days disabled per claim	22.60	24.84	27.70	34.12	30.46	37.09	36.44	34.46	35.04	31.88
Average number of days paid per claim	18.23	20.79	23.87	29.72	26.59	33.09	32.56	30.23	30.54	27.86
Gross amount paid per day	\$0.48	\$0.48	\$0.49	\$0.49	\$0.48	\$0.50	\$0.50	\$0.48	\$0.48	\$0.48
Net amount paid per day	\$0.59	\$0.58	\$0.57	\$0.56	\$0.55	\$0.56	\$0.56	\$0.55	\$0.55	\$0.56
Average amount paid per member	\$2.68	\$4.40	\$4.90	\$5.32	\$3.87	\$4.31	\$3.75	\$3.91	\$3.92	\$4.14

\$17,930.85 for sickness and injury and \$2,769.99 for medicine. The sum of \$680.30 was refunded in accordance with the conditions previously quoted.

FINANCIAL CONDITION IN 1912

Table III shows the revenues and expenses of the association for the fiscal year ended April 30, 1912, while Table IV shows its resources and liabilities.

TABLE III—REVENUE AND EXPENSES FOR YEAR ENDED APRIL 30, 1912

Revenue		1912	
Accumulated reserve from preceding years			\$82,685.01
From members:			
Fees	\$611.00		
Dues	15,201.00		15,812.00
From company:			
Fees	\$611.00		
Dues	7,600.50		
Special donation	4,000.00		
Expenses of management	6,704.11		18,915.61
Picnic	\$8,149.20		
Interest on investments	4,603.60		
Interest on bank deposits	173.69		12,926.49
Total			\$130,339.11
Expenses			
Sickness and injury	\$10,274.10		
Medicine	1,725.95		
Deaths and burials	12,533.35		
Medical attendance	2,720.00		
Medical examination	331.00		
Pensions	354.50		
Withdrawals	310.64		
Expenses of management	6,704.11		\$34,953.65
In bank		\$3,696.70	
Invested		86,688.76	
Total			\$130,339.11
Accumulated reserve:			
To 1911		\$82,685.01	
For 1912		12,700.45	
Total accumulated reserve			\$95,385.46

The revenue of the association was apportioned during

the fiscal year ended April 30, 1912, on the following basis: sickness and injury fund, 30 per cent; pension fund, 40.5 per cent; death and burials fund, 2.65 per cent, and withdrawals reserve, 0.03 per cent.

TABLE IV—RESOURCES AND LIABILITIES OF ASSOCIATION, APRIL 30, 1913

Resources		Liabilities	
Cash	\$8,844.30	Sickness and injury fund	\$6,157.36
Investments	86,688.75	Pension fund	73,652.03
		Death and burial fund	9,219.33
		Withdrawals reserve	6,371.07
		Accounts payable	133.26
Total	\$95,533.05	Total	\$95,533.05

CONCLUSIONS

Mr. Brown concludes his report in the following terms:

"The provisions advised in 1903 were calculated upon the estimates supplied by the Montreal Street Railway Company, the average experience furnished in actuarial tables being relied upon as the underlying basis. In advising the provision necessary to be set aside annually for certain benefits more or less deferred, it is well known that averages must be employed and, further, that large numbers are dealt with in ascertaining the same; consequently when such are made to apply to comparatively small numbers, as we are doing, it must be expected that the experience realized will vary considerably, either favorably or adversely, necessitating periodical expert examinations, enabling revisions and adjustments to be made which will cause a satisfactory status to be maintained.

"The methods which have been followed in conducting the affairs of the association and recording the experience realized reflects great credit upon those in charge.

"The results of the operations since organization, are, speaking generally, quite satisfactory and lead to the conclusion that the receipts have been sufficient to provide for the payment of the amounts representing the benefits set forth under the following four headings: (1) sickness and injury; (2) deaths and burials; (3) pensions; (4) withdrawals, the conditions pertaining thereto being fully set forth in the rules and by-laws of the association.

"At date of organization the membership enrolled numbered 1152. In 1912 the membership numbered 2625, and the average membership throughout the period under review numbered 2100. The receipts per capita have averaged \$14 per annum. If interest and the variable revenue from the annual picnic be omitted, the per capita receipts have averaged \$11 annually. In the latter case the amount is slightly, and in the former considerably, in excess of the contribution advised as necessary, which was \$10.96.

"The three sources from which augmented receipts have been obtained are rate of interest, the annual picnic and withdrawals, the returns in each case being greater than was assumed in the original estimate.

"The disbursements for sickness and injury and for deaths and burials have been considerably heavier than expected, while the amounts paid for pensions and withdrawals have been found less than the percentages of revenue allocated thereto and are quite sufficient at least, and probably more than sufficient in the pension fund, to meet requirements for some time to come.

"A reference to the foregoing tabulated statements will show more fully the position and the detailed experience realized which have all been considered in the examination carried on and furnish the bases of this report.

"It is unnecessary to extend in this report the tables which I have deduced from the recorded experience and have on file for future reference, setting forth the results of the calculations employed, inasmuch as you are interested more in the results arrived at than the methods employed.

"The revenue has been allocated for some time past as set out below and has been sufficient to satisfy the expenditures presently arising as well as to create reserves as noted in the subsequent paragraph: to sickness and injury, 30 per cent; to death and burial fund, 26.5 per cent; to pension fund, 40.5 per cent; to withdrawal fund, 3 per cent.

"The financial position at the close of the last fiscal year, April 30, 1912, shows that an apparent surplus has been created amounting to \$95,533.05 after providing for all expenditures applicable under the various classes, and this is held as a reserve to meet future requirements.

"I am of the opinion that, assuming receipts from all sources are proportionately maintained in the future, having regard to the number of members, the same will be sufficient for the purposes of the association and provide for the contingent benefits undertaken. Carrying out the principle enunciated in 1903 respecting the interdependence of the classes and the provisions therefor, I beg to advise a readjustment of the reserves held.

"Table V sets forth the present percentages, the amounts held in reserve and the proposed allocation and readjustment both by percentages and amount reserved for each class, taking the revenue of the year 1912 as amenable thereto at \$40,950.

TABLE V—RE-ALLOCATION OF FUNDS

Class	Present Method		Readjustment	
	Percentage	Amount	Percentage	Amount
Sickness and injury ..	30	\$6,157.36	35	\$8,204.86
Death and burial	26.5	9,219.33	52	19,661.58
Pension	40.5	73,652.03	10	61,162.28
Withdrawals	3	6,371.07	3	6,371.07
	..	133.26	..	133.26
	100	\$95,533.05	100	\$95,533.05

"The percentages shown under the heading 'readjustments' in the above table should be continued in allocating the revenue to the four funds respectively, until a subsequent examination of the affairs of the association, which should be made within a period not exceeding three years."

THE TRANSANDINE RAILWAY

The Transandine Railway, which connects the railways of the Argentine Republic with those of Chile, starts from Mendoza and runs along a valley formed by the Rivers Mendoza and Cuevas, which presents many difficulties for railway construction owing to its tortuous course, its narrowness in many places and the steep rise of the valley bed. There are numerous side streams, and the slopes of the mountains on either side of the valley are at such an angle that location work was exceedingly difficult.

The highest point on the line is in the Summit Tunnel, under the Uspallata Pass, where a height of 10,521 ft. is reached, this being some 6700 ft. higher than the St. Gothard summit, but it is considerably lower than other railways in South America; for instance, the summit of the Galera Tunnel of the Central Railway of Peru is 15,583 ft. above sea level. Although the construction of the railway was commenced in 1887, for financial reasons the work was not pushed on with and the line was only completed throughout in 1910.

It was found impossible to locate an adhesion line for the whole length of the line and, therefore, it became necessary to employ a rack system. The locomotives used are four-wheeled, coupled with a leading axle and trailing axle. There are two rack cogwheels engaging with the rack. The hind cogwheel axle is worked by outside cylinders 13 in. in diameter by 18-in. stroke. The front cogwheel runs free and is used only for braking purposes.

SYSTEM OF DISCIPLINING TRAINMEN AND RECORDING TURN-INS AT MUSKOGEE, OKLA.

The system of disciplining trainmen of the Muskogee (Okla.) Electric Traction Company for failure to conform to the rules is original, for instead of discharging or suspending men for violations of the rules, R. D. Long, general manager, instituted a schedule of fines. In many instances the suspension of a trainman for several days cripples the transportation department of small companies and then does not accomplish the desired reformation. Under the fine system, the trainman violating the rules is forced to work for a reduced compensation per hour, depending on the seriousness of his offence. This novel method, after two years' trial, proved equally satisfactory to the men and the management.

Before instituting fines Mr. Long considered the subject of discipline from the quality-of-service standpoint. It was his desire to pay the efficient trainman more wages than the inefficient. According to the usual scale of wages, after a trainman has been in the service five years he receives the maximum wage, and his weekly or monthly income is not affected unless he is suspended. Under the fine system, trainmen guilty of petty violations which would not be subject to a period of suspension under the old system are assessed a small amount.

Prior to the time that this system of disciplining trainmen was adopted, the scale of wages ranged from a 17-cent per hour minimum to 22 cents per hour. This rate was increased to 19 cents per hour minimum and 25 cents per hour maximum at the end of five years' service. Since its inception these results have been observed: Inefficient men automatically discharge themselves when the total fines assessed equal the wages received. The total amount of money collected annually for fines was very small for the first year, and the effect of the discipline was quite marked in that but few men were fined, and new rules as well as the old were carefully observed.

In determining the amount of the fines, the general manager considered every form of violation carefully and then based it on the effort required on the part of the man to bring on the penalty. The table of the fines assessed and effective one full month has not been changed since the system was inaugurated and is as follows:

GENERAL

- Ten cents per hour for drinking on or off duty.
- Ten cents per hour for failing to report accident on trip when accident occurs and securing all available witnesses.
- Ten cents per hour for gambling on or off duty.
- Ten cents per hour for failing to flag railway crossings.
- Five cents per hour for smoking cigarettes on or off duty.
- Five cents per hour for colliding with vehicles or animals.
- Five cents per hour for impoliteness.
- Five cents per hour for chewing tobacco while on duty.
- Two cents per hour for backing car without changing trolley.
- Two cents per hour for failing to wear a full uniform.
- Two cents per hour for leaving wearing apparel on cars.
- Two cents per hour for failing to pull trolley off wire when cars are turned in.
- One cent per hour for failing to report for duty on time.
- One cent per hour for not displaying proper destination sign.

CONDUCTORS

- Five cents per hour for failing to collect and register all fares.
- Three cents per hour for failing to enforce the "Jim Crow" law and properly display marker.
- Two cents per hour for failing to call streets.
- Two cents per hour for failing to keep car clean.
- Two cents per hour for failing to give proper signals.
- One cent per hour for accepting old transfers.

One cent per hour for failing to punch transfers properly.
MOTORMEN

Five cents per hour for failing to ring gong on approaching street intersection.

Five cents per hour for sitting down while car is in motion.

Two cents per hour for starting a car on one bell.

Two cents per hour for passing passengers who wish to board car.

Two cents per hour for talking to passengers or trainmen while car is in motion.

Two cents per hour for arriving at end of run more than one minute ahead of time.

TURN-IN SYSTEM

The turn-in system of the company also is quite original and has proved very satisfactory in operation. A combination dispatcher's and cashier's office is maintained at a central point where all cars pass. This office is located so that the one man in charge has a clear view of street traffic and may know what car is approaching. Essentially the turn-in system includes the exchange of transfer pads every round trip, a complete record of the busi-

and the recording of the number of the pad as well as the number of transfers issued. In many instances the company has been able to produce evidence which could not be refuted by a complaining passenger, and as a result the misuse of transfers has been, for all practical purposes, eliminated.

The cashier furnishes every conductor with \$10 change when he takes out his run. When he receives his supplies for the day—that is to say, tickets, pad of transfers and the turn-in envelope—this change accompanies it. As a form of acknowledgment for the change the conductor must punch the individual record sheet which the cashier prepares. When the change is returned at the close of his day he punches the record sheet again, the second punch mark serving as his record of money returned to the cashier.

This system of checking the receipts for each round trip permits the work of compiling office records and checking cash in the fare box against the register record to be distributed over the entire day. Hence when the last car reports in at the end of the last trip at night all bookkeeping is complete and the cash is wrapped and

CON. <u>Brown</u>		CAR No. <u>65</u>		REG No. <u>1242</u>		LINE		DATE						
TRIP	TIME	BOOK NUMBER TRANSFERS OUT	Book No. Transfers In	Transfers Issued	CASH	5c Fares	5c Tickets	School Tickets	Comp.	Trans.	HIGHLAND PARK PASSENGERS In	HIGHLAND PARK PASSENGERS Out	REMARKS	PUNCH HERE
1														
2														
3														
4														
5														
38														
39														
40													Cash	
41													5c Tickets	
42													School Tickets	
43													Comp. Tickets	
44													Transfers	
Total														

Individual Turn-in Record of Muskogee Electric Traction Company

Electric Railway Journal

ness transacted on each car for each round trip and the compilation of a complete record of this information, along with reports of accidents and causes of delays, for each round trip. In other words, it is a complete operating performance record to which the manager may refer at any time during the day it is being compiled, and it also forms a valuable record for future reference. The form of this record is shown in the accompanying illustration. One sheet is maintained for each crew. The information recorded is the exact time at which the crew passes the office, the book number of transfers, the number of transfers and the statements contained in the turn-in envelope.

The turn-in envelope is handed to the cashier each round trip, and the conductor in turn is supplied with a new pad of transfers and turn-in envelope. The envelope which the cashier receives contains the tickets and transfers collected as well as a record of the register reading at the dispatcher's office and at the end of the line for both the out and in trips. This system reduces the conductor's calculations to a simple subtraction of his register readings. As this company uses a recording fare box on all its cars, the cash collected is not turned in until a crew has completed its run. An accurate check which may be used in cases of complaint is obtained by requiring an exchange of the transfer pad with each trip

ready for the bank. In addition to compiling the performance record, the cashier answers all questions of service, keeps the trouble man informed as to where he is required and takes charge of the accidents reported, making such arrangements as their seriousness may require.

Two men serve as cashiers, one reporting for duty at 5 a. m. and the other relieving him at 3:15 p. m. The second man completes his day when the last car has reported at night. Each cashier checks the other's reports. A third man receives the cash boxes and checks the receipts against the daily reports. At the close of each day a recapitulation of the data shown in total at the bottom of the individual reports is made on a separate report form. This transfer of each record also includes everything which may come under the general head of remarks.

The Cincinnati Traction Company is grinding both steel and chilled-iron wheels. It has been found that the cost of restoring a pair of steel wheels to normal by grinding instead of turning is approximately 20 cents where the cost of turning was 75 cents. All new wheels both chilled-iron and steel are pressed on the axle and ground before being placed in the truck. The new chilled-iron wheels are ground for twenty minutes and the new steel wheels reduced about 1/16 in. in diameter.

INDIANAPOLIS TRACTION & TERMINAL COMPANY'S METHOD OF INDEXING PATTERNS

Every electric railway, whether it manufactures its own castings or not, is called upon from time to time to prepare patterns for different parts of its rolling stock. This may be due to the fact that the part required is of an old design

Pattern No. Shelf No.						
Name						
Where used						
DEPARTMENT	METAL CAST OF	APPROX. WT. ONE CASTING				
GATED OR LOOSE PATTERN		CORE BOXES				
NO. GATED	LOOSE PIECES	MATERIAL MADE OF	NO.	PCS.	MATERIAL	CORES TO CASTG.
Remarks						
Pattern held by						

Record of Pattern Kept in Office

and is not carried in stock by the manufacturers or that it is possible to obtain quicker delivery from local firms or from the railway company's own foundry. As the number of patterns increases from year to year, the question arises as to whether certain patterns are in stock. When the number is large, it is very difficult to pick out the pattern required unless it has been properly indexed or cataloged.

The shop of the Indianapolis Traction & Terminal Com-

this purpose. The first is the requisition which is issued by the different department heads when patterns are required. The requisition is turned into the office to the master mechanic, who approves it and turns it over to the storeroom in case the records show a pattern is on hand. If the pattern has not been made, the requisition is forwarded to the pattern shop. When instructions were issued in connection with the use of this requisition considerable stress was laid on the fact that the correct name of the part must appear on the requisition. These correct names may be obtained from diagrams and tables of various parts of equipment prepared by the mechanical department.

In case the pattern is in stock, the second form, which is called the pattern report, is employed. This report accompanies the pattern to the department requesting it and is an acknowledgment of its receipt by the department head. This receipt is forwarded to the master mechanic's office and affords a record of the disposition of the pattern until it has been restored to the pattern stockroom. From this form, as shown in the reproduction, it will be noted that, in addition to the correct name, the pattern is listed as one of two types, gated or loose pattern. In case it is of either type, the number of gates or number of loose pieces is shown as well as the material from which the pattern is made. A statement of these details is also required for the core boxes accompanying a given pattern.

The office record, which is shown on form three, contains details not only of the make-up of a pattern but the metal from which the casting should be made and the approximate weight of one casting. This form is also a record of the location of a pattern at any given time. In order

FORM 224-10-17-18

INDIANAPOLIS TRACTION AND TERMINAL COMPANY
REQUISITION FOR PATTERNS

MR. 19

PLEASE MAKE THE FOLLOWING PATTERNS AND CHARGE ALL LABOR AND MATERIAL AS SHOWN BELOW:

MATERIAL	NAME	WHERE USED	DEPARTMENT	CHARGE

PROBABLE NUMBER OF CASTINGS REQUIRED

APPROVED: _____ ORDERED BY: _____

MASTER MECHANIC. FOREMAN

Requisition for Patterns

FORM 224-10-17-18

INDIANAPOLIS TRACTION AND TERMINAL CO.
MASTER MECHANIC'S DEPARTMENT
PATTERN REPORT

Mr. M. M. 19

I have received your order and completed the following Pattern, including Core Boxes, Gates, Etc.

Name: No.

Where used:

Ordered by: Date ordered:

GATED OR LOOSE PATTERNS			CORE BOXES			
NO. GATED	LOOSE PIECES	MATERIAL MADE OF	NO.	PCS.	MATERIAL	CORES TO CASTG.

FOREMAN

Pattern Report

FORM 205 10-17-18

INDIANAPOLIS TRACTION AND TERMINAL COMPANY
PATTERN NO.

NAME:

MATERIAL:

WHERE USED:

DATE SENT TO FOUNDRY: 19

GATE OR LOOSE PATTERN			CORE BOXES				SHELF NO.
No. Gated	Loose Pcs.	Material	Number	Pieces	Material	Cores to Castg.	

REMARKS:

RECEIVED BY:

PATT. NO.

SHELF NO.

FO'Y SENT TO

DATE SENT

ORDERED BY

Tag Used with Patterns Sent to Outside Foundry

pany at Indianapolis, Ind., has passed through this period of accumulating patterns and has experienced the difficulty of a lack of knowledge of just which ones it had in storage. In order to eliminate the delay and errors made in selecting the proper patterns from the stock L. M. Clark, master mechanic, has devised a scheme for requisitioning and indexing his patterns. Four forms have been prepared for

to make this record complete, it was necessary to arrange the pattern shelves in the storeroom so that the shelves could be divided by partitions and numbered. It was also necessary to give to each pattern an index number which would correspond to the correct name.

In a number of instances it is necessary to send the pattern to an outside foundry for casting. In this case a

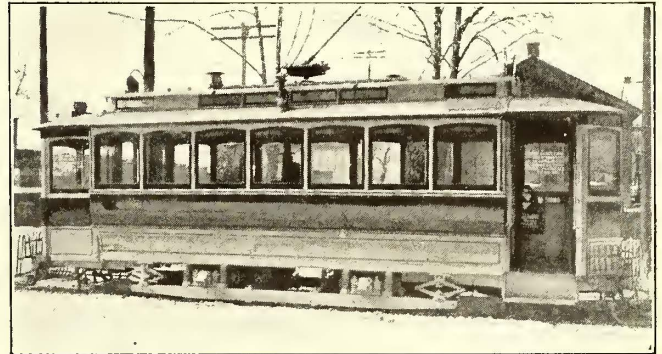
special tag, which consists of three coupons, is applied to each. When the pattern is prepared for delivery to the foundry the first coupon is detached at the storeroom. This forms the record of the pattern sent as well as the party to whom it was delivered. It also contains the date of delivery as well as the name of the foreman ordering it sent. The second coupon is detached by the foundry receiving the pattern. It requests that the foundry check the number of pieces according to the memorandum attached on the third coupon, and that it receipt for the patterns on delivery. The remaining coupon remains with the pattern and is a correct record of the type, number of parts and number of core boxes as well as the correct name and the material to be employed in the casting.

The first coupon, which is detached by the storeroom keeper, is sent to the master mechanic's office and the record it contains is copied on the permanent office record. This permanent office record is changed from time to time and the latest card inserted in the card index. From this it will be seen that not only is a record of the patterns on hand available at any time, but its location in the company's shop or outside foundry is a matter of record. The system is comparatively simple and is working to the entire satisfaction of the Indianapolis Traction & Terminal Company's mechanical department.

ONE-MAN CARS OF THE DETROIT UNITED RAILWAYS

A combination of the one-man operation and pay-as-you-enter principles for lines where the service requires only a single-truck car has been put into successful practice by the Detroit United Railway at Ann Arbor, Mich., a city of 15,000 population. The change from two-men cars was made to reduce the cost of operation and yet give better

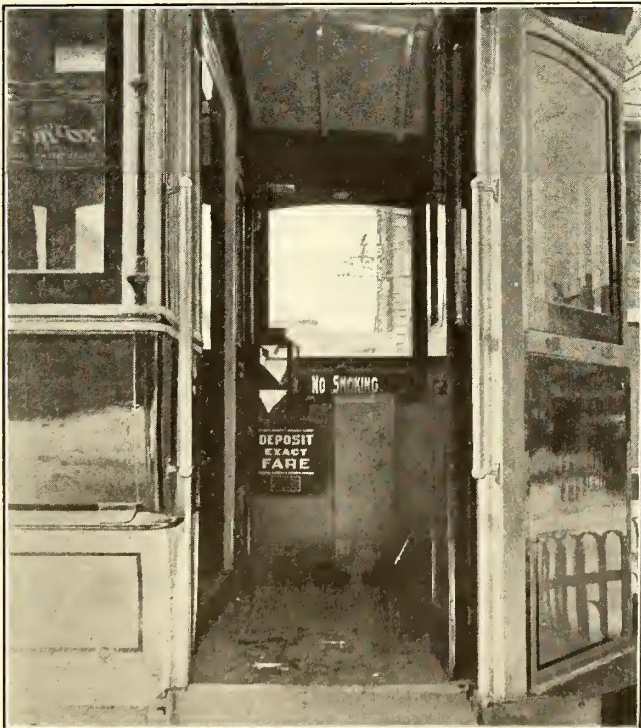
involved only a small outlay for overhauling compared with the saving in operation. In making the change, it was necessary so to arrange the vestibules that the doors could be opened and closed mechanically by the motorman at one end and locked at the other. The usual manual door-



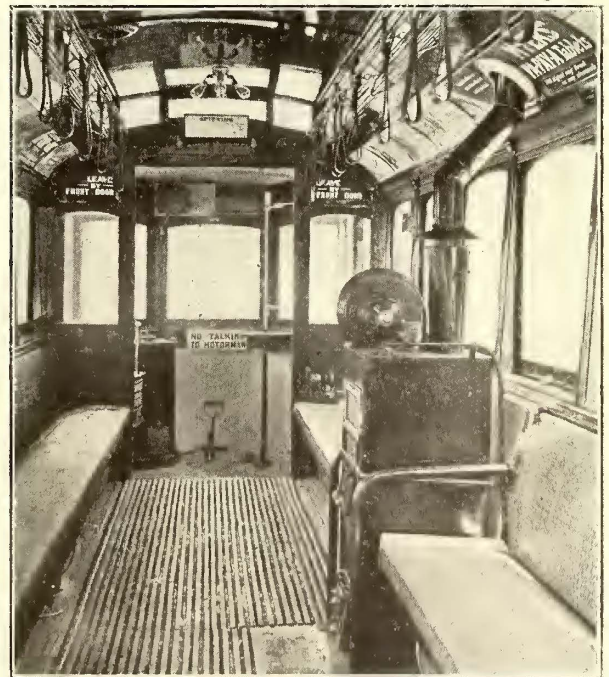
Detroit United One-Man-Operated Car—General Exterior View

operating mechanism is applied, but the handle can be readily removed for use at the opposite end when the car is turned.

Thus it is practically impossible for a passenger to open the rear door. The removal of the bulkhead, except for a portion as wide as the longitudinal seats, gives the motorman a clear view of the car interior, while a system of push buttons enables passengers to signal for a stop. A non-counting fare box of the Cleveland type is installed in the corner of the vestibule just back of the controller, which is situated on the left side, opposite the entrance doors. This arrangement is convenient for the motorman in observing fare collections, and also leaves a clear aisle for boarding and alighting passengers. In addition to the fea-



Detroit United One-Man-Operated Car—View Showing Platform Arrangement



Detroit United One-Man-Operated Car—View of Interior Showing Platform Arrangement

service than before. While the single-truck, double-end car shown in the three accompanying illustrations had become obsolete for city service in Detroit, it was still serviceable for some of the smaller communities served by this company.

The application of the one-man and prepayment features

mentioned the car is equipped with a forced-draft heater and globe-type ventilators. Two "Golden Glow" headlights have been mounted at the extreme ends of the monitor deck. The cars have been rebuilt for this service by the Detroit United Railway at its shops located in Detroit.

NEW INSTRUCTION METHODS AT ROCHESTER

The Rochester Lines of the New York State Railways have recently devoted considerable attention to the instruction of trainmen, both during the breaking-in period and after they have entered into regular service, an effort being made to reduce to a minimum the amount of verbal instruction given and at the same time to insure that new men are made familiar with all the details of their work. To accomplish these results the company has built 2000 ft. of track on a part of its property on Blossom Road, on which an instruction car is operated. As the track is situated entirely on private property, its operation does not interfere in any way with the schedule of regular cars, and the public is protected from danger due to the handling of cars on the streets by inexperienced men.

Along the instruction track are erected standard signs to designate passenger stops, safety stops, fire-house stops, ends of line and circuit-breakers. The track is laid out to include a curve of 300 ft. radius, a branch-off and a standard loop, of which the switch tongue is sufficiently loose to be thrown from the rear end of a car as it leaves the loop. The instruction car is one of the older cars taken from regular service, with the same equipment as other cars of the same type that are in regular operation. It is proposed to add to the equipment of the track a number of movable dummies to represent vehicles and pedestrians that may be made to cross over or approach the track in front of the instruction car.

At the time of employment the company requires a deposit of \$12.50 from conductors and \$10 from motormen and a fee of \$1 for a physical examination. Applicants must also purchase a cap and make a first payment of \$5 on their uniforms, making a first cost of \$19.75 for conductors and \$17.25 for motormen. While this large cash requirement may prevent a number of desirable men from entering the service, the company considers that it also reduces the number of "floaters." The deposit with the company may be made in instalments when such procedure is desirable in the opinion of the employing official.

After making their deposits and receiving the necessary badges and equipment, students report to the instructor at the school. Here they are shown how to copy their time from the blue-printed schedules, the use and importance of which are explained. They are then sent out to the instruction car and make a number of trips back and forth on the track. The conductors are drilled in working up trip sheets, registering fares, punching transfers, giving bell signals, changing trolleys and other details. They are also taught how to stop a car with air and hand brakes. At the same time the motormen are instructed on the equipment of the car and how to locate trouble and are drilled in the use of the controller and the air and hand brakes. They are also taught to examine facing switch points and how to operate past the standard circuit-breakers, stop signs, etc. After the men have become familiar with their work on the instruction track they are sent out on cars in regular service to learn the lines of the division to which they are assigned. Students are kept at work on the instruction car until the instructor is satisfied that they are thoroughly conversant with their work. They are, therefore, able to commence active work on their first day of practice on the road, and the time that is usually spent watching the regular men and finding themselves on a car is considerably reduced. This method of preliminary instruction has this advantage over instruction on dummies in a schoolroom that some visible result follows each effort of the student in his work. For instance, the motormen will not start on bell signals improperly given, which demonstrates to the conductor the necessity of giving his signals distinctly, and the motorman learns by actual test that he cannot start a car with the trolley off or the rear brake set. These facts can be much more firmly impressed

on the mind by a few minutes of actual demonstration than by several hours of verbal instruction.

The time spent on the instruction track varies with each individual, ranging from five hours with very bright students to three days with others. From the way the men pick up their preliminary work it is possible to form some opinion of their capabilities and of the amount of attention which they must receive later when they engage in regular service.

Experience during the past year has shown that when students are sent out on the road after this instruction they are familiar with the mechanical part of their duties and therefore are able to devote more attention to the operating rules and other details of their work in actual service. Motormen, for instance, know how to handle their brakes and controllers and can therefore concentrate on watching vehicular traffic, operating electric switches, locating section insulators and so forth, while conductors can pay particular attention to learning streets, collecting fares and issuing transfers, being already familiar with the entries on trip sheets, bell signals, etc.

Conductors average seven days of practice on the road, and motormen are required to practise ninety hours before returning to the instruction department for final examination. Motormen are questioned on details of the equipment, cutting out motors, schedules and operating rules, and conductors on trip sheets, transfers, fare collection and registration, accident prevention and accident reports. The instructor also goes over the rule book and bulletin book with all men and discusses various features of operation on individual lines, such as where to watch trolleys, what kind of a load to expect, where to begin collecting fares, how to make up time, when to run carefully and so on.

After this examination and instruction, trainmen are put to work on the extra list and are followed up by the traveling instructors, who ride with them four or five times a day during the first week and less frequently as they improve in their work. Reports are sent in daily to the supervisor of instruction, who thereby keeps in touch with the performance of the men and can call them in for additional instruction if necessary. He also investigates accidents of men under six months in service, putting them back on the road for additional practice or giving such other supplementary instruction as may seem advisable. By keeping in as close personal touch as possible with the men, he endeavors to instil a feeling of loyalty to the company and to promote co-operation between the men themselves. All men are given to understand that the instructors are not directly concerned with the administration of discipline and that no demerits, under the merit and demerit system, are given on account of any report made by them. While it is a part of the instructors' duties to note violation of rules and warn the new men at fault, their chief endeavors are directed toward helping and encouraging the new men and making their work as easy and as interesting as possible. The company thereby hopes to be able to keep the men in the service and reduce to a minimum the continual change in the personnel of the operating department.

The instruction department is in charge of the supervisor of employment and instruction, George Lawson, who also investigates reports of accidents and violation of operating rules of men under six months in the service. He is assisted by a chief instructor and five traveling instructors, one of whom is assigned to the motormen of each of the divisions, one to the conductors and one to the instruction car.

Manager Anderson of the Sandwich, Windsor & Amherstburg Railway, Windsor, Ont., notified all street car crews recently that beards would no longer be tolerated by the company. Furthermore, each man is required to report for duty with his shoes shined and a clean collar.

LETTER TO CONGRESS BY AMERICAN ASSOCIATION
COMMITTEE ON MAIL COMPENSATION

The committee on compensation for carrying United States mail of the American Electric Railway Association has sent a letter to Congressman Moon, chairman of the House committee on post offices and post roads, as stated previously in the *ELECTRIC RAILWAY JOURNAL*. An abstract of the letter follows:

INDEPENDENT CAR SERVICE

"As to the criticism of Second Assistant Postmaster-General Stewart, it is principally that the compensation to the carriers will be increased. As the present rate for independent cars is 1 cent per linear foot of inside measure, and as the proposed rate is 1½ cents, the Second Assistant Postmaster-General is correct in his conclusion that the cost would be increased 50 per cent, or approximately \$198,331.43 per annum; 25 per cent additional equipment must be held in reserve to allow for inspection, maintenance and accident.

"A minimum mileage of 30,000 per car for each car required to perform the service would undoubtedly in some instances cause a further increase in the cost, but the Second Assistant Postmaster-General fails to take into consideration in his criticism salient features of this independent car service.

"The carrier in order to perform the exacting service of the Post Office Department must keep the equipment in the very best physical condition to avoid failures and delays. A right-of-way must be accorded mail cars over all others. To perform the service efficiently the best class, and therefore the highest paid class, of operators must be assigned to the mail cars. Each of these items imposes expenses in excess of the expense incident to the operation of passenger cars, the prime object and duty of the carrier.

"The service of carrying mail by electric or cable cars is a substitute in cities and interurban districts for wagon or automobile service. If the carriers discontinue the service by cars, what would have been the increase in cost due to wagon or auto service before the parcel post law became effective, and what will be the increased cost of wagon service now that the parcel post law is in effect?

"The cost of wagon transportation, as shown by the reports of the Postmaster-General, is approximately 30 cents per mile (without the facilities for 'make up' and 'pouching' accorded by car service), while the cost per mile for car service will be, for a 16-ft. car at 1½-cent rate, but 24 cents, and for a 20-ft. car 30 cents per mile, and for the proposed maximum cars—30-ft.—45 cents. The capacity of a 16-ft. car is equal to the largest wagon or automobile, and the 20-ft. and 30-ft. cars are proportionately larger.

"Detailed data as to the cost of equipment, depreciation and operation have been furnished by the Boston Elevated Railway and the Brooklyn Heights Railroad, two of the carriers making the greatest mileage, and under conditions which should make their operating expense as low as, if not lower than, the expenses of smaller carriers. These data show conclusively that the service of the roads is rendered to the United States government at an actual money loss to the carrier. In these data no account is taken of the liability to loss due to accident to pedestrians and general street traffic. The mail-car schedules are all shorter than the passenger schedules and therefore require a greater speed and a consequent greater hazard to life and property, followed by a greater money loss in payment of damages.

POUCH SERVICE

"Three pouches (maximum 50 lb.) are the equivalent of the average passenger, 150 lb., and the space occupied is somewhat greater. The passenger fare is 5 cents for a varying distance, therefore the compensation is not disproportionate for the service rendered. When the number of mail pouches in a consignment is increased, the carrier performs an increased service and there should be an in-

creased compensation paid. Business throughout the world is conducted upon this basis.

"The criticism of the Second Assistant Postmaster-General complains that the proposed law is impracticable because the Post Office Department cannot tell in advance what its expenses are to be. This, if correct, is unfortunate from the Post Office Department standpoint, but should not be advanced as a reason for not properly compensating the carriers for the service they render. The Post Office Department used as its yardstick a mile of travel regardless of the bulk or weight. We ask that, in using the yardstick of a mile of travel, limitation of the bulk and weight be fixed for the protection of the carrier, particularly with the increased amount of mail being thrown upon the carrier because of the parcel post law. There is one road in the far West that at times has such a bulk of mail matter thrown upon it for delivery under the pouch service that passengers cannot get on the cars on account of the amount of mail. In several instances on the Brooklyn Heights Railroad the amount of mail matter was so great as to prevent the motorman from properly operating his car, and thereby endangered the lives of every passenger on the car. It would be eminently unfair to expect the carrier to exclude the passengers and operate the car at a rate of 3 cents per mile.

"The intention of the bill is that each consignment be paid for at the rate of 5 cents per mile for the first three pouches within the limit of 5 miles; for each mile beyond the 5-mile limit, 3 cents per mile is charged for the consignment of three pouches. Each pouch in the consignment over three would require 1 cent per mile for its transportation.

"The proposition of the Post Office Department to pay the carriers on the basis of 6 per cent upon the capital invested is not believed to be a practicable proposition, as it is not believed that the Post Office Department and the carriers could ever agree upon the valuations involved.

"We therefore again respectfully refer to the report of the committee dated May 14, 1912, which states very briefly the position of the companies which this committee represents in regard to proper compensation for carrying mail, and which recommends the rates shown in the accompanying table.

RECOMMENDED RATES

CLOSED POUCH CITY OR SUBURBAN SERVICE	
Carried on passenger cars—	Per Annum
For one to three pouches (inclusive), maximum weight 50 lb. per pouch, carried on passenger cars—	
For 2000 miles or less.....	\$150
For 2000 miles and up to 3500 miles.....	\$175
Over 3500 miles for each consignment moving 5 miles or less, 5 cents per mile; each mile in excess of 5 miles, 3 cents per mile.	
All pouches in a consignment in excess of three, 1 cent per mile per pouch additional.	
Deliveries to and from the car to be made by the Post Office Department.	

CLOSED POUCH INTERURBAN SERVICE

Maximum compensation paid steam railroads for like service.

RAILWAY POST OFFICE SERVICE

For independent cars or compartments in cars—	
City service: 1½ cents per linear foot of interior length per car mile.	
Interurban service: Maximum compensation paid steam railroads for like service.	
Minimum mileage either city or interurban service to be 30,000 miles per year per car required in service.	

"The condition of the companies two years ago was onerous, and therefore, as a result of the passage of the parcels post law and the increased cost of labor and material, is now very much more so. A great many of the companies represented by this committee are considering, in justice to the interests which they represent, the advisability of discontinuing their mail service, and of this number a few, we understand, have directly notified the Post Office Department within the comparatively recent past of the discontinuance of all or a portion of their railway mail service.

"It is eminently proper that the electric railway companies of the United States, occupying the unique position they do, should be of inestimable value to the postal service and to the public, and it is the desire of these companies

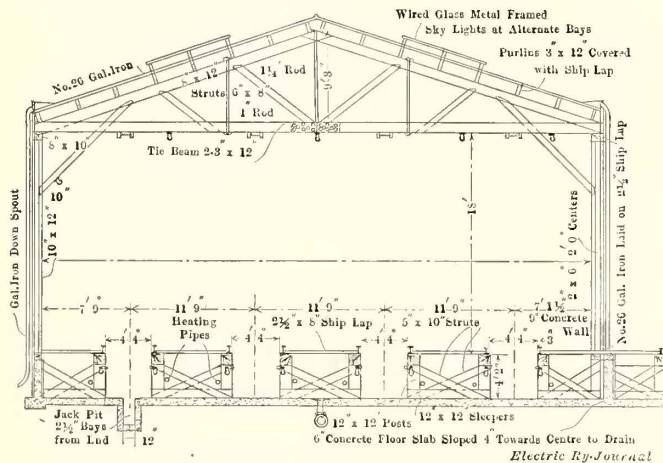
that they shall have more of this work to perform, with the assurance from them to the Post Office Department of their earnest co-operation in maintaining the highest kind of efficiency to the service, but it is absolutely unfair and inequitable that they should be called upon to render this service, not only without a fair return, but absolutely at a loss."

The letter is signed by the chairman of the committee, Matthew C. Brush, second vice-president Boston Elevated Railway.

An exhibit sent with the letter is a copy of the report made on May 14, 1912, to the committee of Congress by a sub-committee of the association committee.

AN INEXPENSIVE CARHOUSE

A carhouse which has just been completed for the British Columbia Electric Railway Company in Kitsilano, one of the outlying districts of Vancouver, B. C., has been designed to require the absolute minimum initial expenditure compatible with a layout which can be readily extended for a much greater capacity. At the time of construction storage room sufficient for sixty-four city cars had to be provided as speedily as possible, but the necessity for housing was not urgent, and consequently half of the



Elevation of Closed Section of Kitsilano Carhouse

proposed building area was inclosed and the remainder was left open. In the open section, however, the construction below the rail level was exactly the same as in the inclosed portion, so that the housing could be extended at any time without any change in foundations. Open and inclosed sections each have plan dimensions of 52 ft. x 400 ft.

A distinctive feature of this carhouse is that all the tracks, both indoors and out, are supported on timbers so that the rail base is 4 ft. 2 in. above the depressed floor level. The rails are laid on 12-in. x 12-in. stringers, supported every 8 ft. by 12-in. x 12-in. posts, as shown in the sectional drawing. Thus on each side of the track there is a clearance of 3 ft. 2 in. between floor and the lower side of the stringer, affording easy access to the under side of the car.

In the work of erection the site was first excavated to a depth of 4 ft. 8 in. below base-of-rail level, and by a steam shovel the cost of this work was kept down to 35 cents per cubic yard. The site was practically all underlaid by hardpan, and after the surface was carefully leveled and rolled a concrete floor slab 6 in. thick was poured, and 9-in. walls were built up to the street level. The floor slab has no expansion joints but is reinforced with wire cloth to take care of temperature stresses. It has a slope of 1 in. in 6 ft. toward the center line of indoor and outdoor sections alike. Beneath the center line of each section an 8-in. vitrified tile drain was placed into which rain water is

conveyed through the floor slab by downspouts placed 20 ft. apart. Lines of 4-in. agricultural tile are placed laterally on 20-ft. centers to drain the subsoil. These empty into the 8-in. drains on the center lines. The only break in the continuity of the floor slab is that made to provide for a jack pit, 1 ft. wide and 3 ft. deep, extending for 200 ft. under the track nearest the west wall. In order to distribute the loading on the floor slab in some parts where the quality of the foundation is not quite up to standard, 10-in. x 12-in. sills are placed beneath each pair of stringer posts. In this connection it may be said that a carhouse was recently constructed by this company on similar lines at a site where the foundation was comparatively soft, and in this case piles were driven at such points that a pair of piles came under each sill.

When the housing is extended to cover that part of the carhouse which is being left open for the present, a concrete partition is to be built between the two halves to serve as a fire wall. For the present this wall consists of a timber frame covered with galvanized iron. Special provision was made for the future construction of this fire wall by covering the framework of the present wall with ship-lap before the galvanized iron was put on, the idea being that the galvanized iron could be removed and the ship-lap used as half of the formwork when the concrete was placed. The roof truss is the simplest form of wood construction and supports a galvanized-iron roof.

Fire protection is provided in the inclosed section by a sprinkler system and on the outside by five monitors mounted on towers. These monitors are placed at the outer edge of the exposed trackage so that they will be on the center line of the ultimate yardage when the present outdoor area is doubled. The monitors are spaced 50 ft. apart and serve an area with a maximum radius of 65 ft. Their maximum range is 70 ft. when a 2 1/2-in. nozzle under the normal pressure of 100 lb. per square inch is used. The monitors are about 20 ft. high, having a base set in cement, and they are constructed as self-supporting 6-in. standpipes, to which are attached iron ladders and grid platforms, the latter being just large enough for the operators.

Lighting for the inclosed section will be effected by 100-watt metal-filament lamps attached to the roof-truss tie-beams, which are 18 ft. above the rail level. The lights are placed over the aisles between the tracks, one lamp being provided for each 192 sq. ft. of floor area. Sockets are provided on the timber work beneath the rails for the repair lamp plugs. All wiring for lighting purposes is in galvanized conduit. The inclosed section is to be heated by low-pressure steam pipes 3 1/2 in. in diameter, which are attached to the stringer posts under the rails. In zero weather it is planned to use a steam pressure of 5 lb. and to keep the pipes at a temperature of approximately 40 deg. Fahr.

The inclosed section complete, including all construction and material costs, except heating and sprinkling systems, was 2 1/2 cents per cubic foot. The carhouse was designed by R. Lyon, architectural engineer for the British Columbia Electric Railway Company, and it was constructed entirely by day labor under supervision by the company's regular engineering force.

Three pamphlets have been recently issued by the Forset Service, United States Department of Agriculture, in regard to the wood-using industries of Florida, Iowa and Minnesota. A page in each report is devoted to a description of the extent and kind of wood used for car construction in each of these three states, respectively. Tables are given showing the quantity in feet, average cost per 1000 ft. and total cost of each kind of wood in each state. Of the 4,146,600 ft. used annually for car construction in Iowa it is estimated that 1,000,000 ft. is employed for street car construction.

DRIVING SYSTEMS OF ELECTRIC LOCOMOTIVES*

BY F. LYDALL

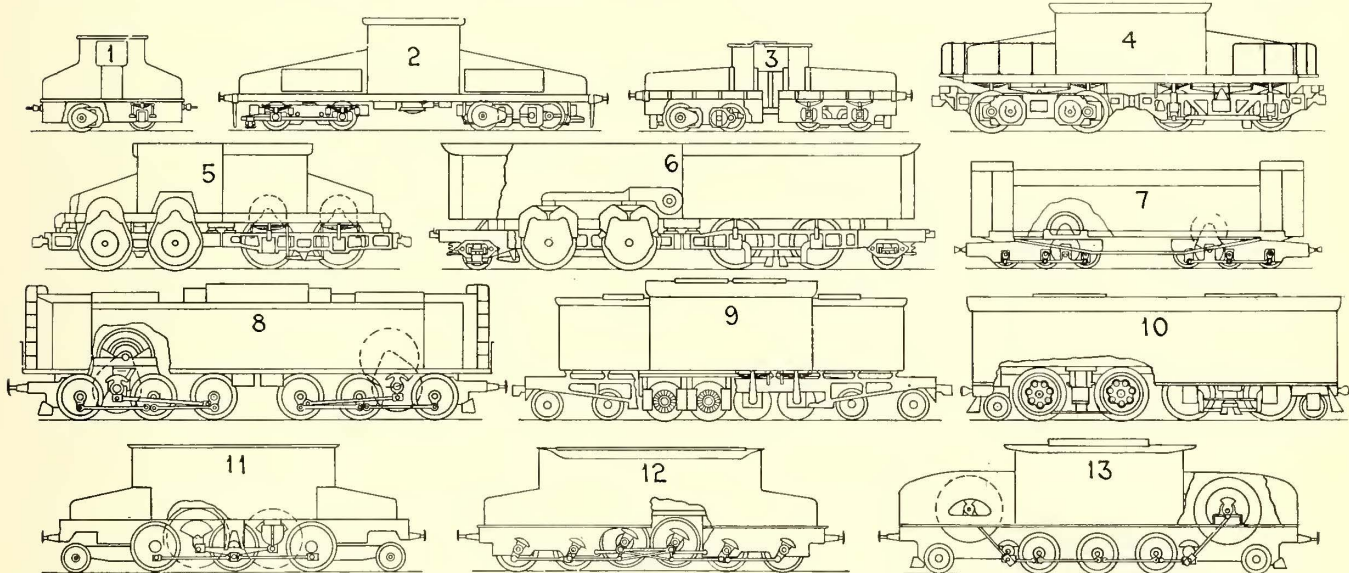
I propose to give a few details of the drive of various electric locomotives actually in service or in course of construction. The list does not pretend to be exhaustive, but it is intended to give an example of each different class of locomotive.

Fig. 1—Simple type of two-axle locomotive with central cab and sloping ends. The motors are supported with the tramway type of suspension and are geared to the driving axles.

Fig. 2—Simple locomotive. The body is built on a frame of steel channels, etc., and usually consists of a central cab between sloping ends. The body rests on a pair of four-wheel trucks, each equipped with two motors geared and suspended as on street cars. The illustration shows the freight locomotive supplied to the North-Eastern Railway by the British Thomson-Houston Company. This class can

radiate. The locomotive body, which in this way is not required to transmit any draw or buffing stresses, is carried by the trucks in the ordinary way and provides accommodation for the driving equipment, the control gear and the brake apparatus. The drawing shows the Detroit River tunnel locomotives of the Michigan Central Railroad. Similar locomotives are in use in the Baltimore & Ohio Railroad tunnel, Baltimore. To insure easy riding the spring suspension system is specially designed with a view to flexibility. The bearing springs on one truck are equalized longitudinally; on the other truck the bearing springs of one axle are suspended from fixed points, those of the other axle being equalized transversely.

Fig. 5—Locomotive with raised motors. The general arrangement of a locomotive of this class is shown in the drawing of the New York, New Haven & Hartford Railroad. The motors are geared to the driving axles, but instead of being in the usual position they are vertically above the axle. To allow the ordinary vertical movement of the axle boxes without any corresponding movement of



Figs. 1 to 13—Locomotive Drives—Diagrams of Arrangements

also be constructed with a sunk cab, provided there is sufficient space between the trucks.

Fig. 3—Articulated four-axle locomotive. Under certain circumstances the foregoing locomotive may fail when used for hauling trains round very sharp curves. Under such circumstances it is very probable that the buffers of the locomotive will get locked with those of the wagons. To overcome this difficulty there are two possibilities: first, to put the buffers and drawgear on the trucks; second, to construct the locomotive in halves articulated together with links, each half having two fixed axles with motors geared to them in the usual way. The latter alternative, at all events for moderate-sized locomotives, leads to a cheaper and simpler construction, but where powerful engines running at fairly high speeds are required the former alternative is probably to be preferred. The locomotive shown is one of those supplied to the Harton Coal Company by the Siemens Brothers Dynamo Works.

Fig. 4—Articulated locomotive. The difficulty of constructing a double-truck locomotive capable of exerting a tractive effort equal to the strength of standard drawbars, in such a way that the truck centers are not subjected to excessive stresses, can be met by articulating the two trucks at their inner ends and fitting buffers and draft gear on the outer ends. One truck center is fixed and the other is free to move within small limits so as to allow the trucks to

the motors the wheels are driven by spring couplings attached to spiders carried by hollow shafts surrounding the axles. The gear wheels which mesh with the pinions on the armature shafts are mounted on these hollow shafts.

Fig. 6—Locomotive with twin geared motors. The drawing shows the articulated locomotives of the New York, New Haven & Hartford Railroad. This is a modification of the type shown in Fig. 5, each single motor being replaced by a pair of smaller motors gearing on to the same gear wheel on the hollow shaft. As the maximum speed is fairly high, each truck is fitted at its outer end with a pony axle.

Fig. 7—Locomotive with geared motors and connecting rods. The drawing shows the locomotive on the St. Pölten Mariazell Railway, Austria. The body is carried on two three-axle unsymmetrical trucks, each equipped with a single motor geared to a countershaft. The countershaft which carries the gear wheel is slightly above the driving axles and is connected with them by cranks and slotted connecting rods. The brasses of the crank pins on the countershaft cranks fit in the slots in the connecting rods, so that the driving axle boxes are free to move up and down without transmitting their vertical movement to the countershaft. The motor is mounted on the top of the truck frame and is situated between the center and the inner end of the truck, the truck pivot being displaced from the geometric center toward the outer end. The locomotive was designed for a narrow gauge, the special advantage of the construc-

*Abstract of paper on "Electric Locomotives" published in the *Journal of the Institution of Electrical Engineers*, London, October, 1913.

tion being that the motor is not limited in width by the space between the wheel flanges.

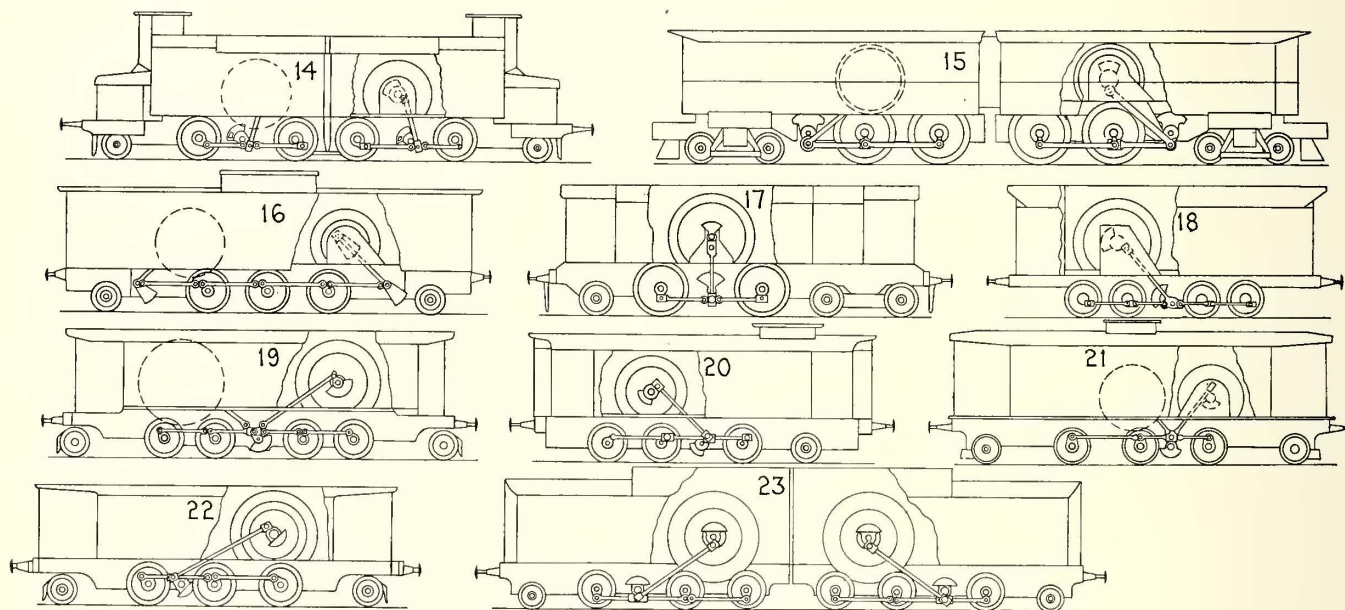
Fig. 8—Bogie locomotive with geared motors and connecting rods. The drawing shows the locomotive supplied by the Oerlikon Company for the Lötschberg Railway. This is very similar to Fig. 7, the principal difference in the mechanical arrangement being the substitution of the slightly inclined connecting rod between the countershaft and the inner driving axle of each bogie for the slotted connecting rod already described.

Fig. 9—Gearless locomotive with armatures built on the driving axles. The principal example of this construction is the d.c. locomotive of the New York Central & Hudson River Railroad. The special feature of this design is the construction of the motor as a two-pole motor, the armature being built direct on the driving axle and revolving between two vertical pole pieces. The pole tips are chamfered off just sufficiently to allow the axle with the armature and the wheels to be removed without in any way interfering with the field magnets. The field-magnet system of the four motors forms part of the frame of the locomotive. The

ture of this design is the arrangement of the leading and trailing driving axles that are allowed to radiate and yet are coupled up with the other driving axles by standard connecting rods.

This is effected by mounting the outer pairs of wheels on hollow shafts surrounding the actual driving axles. The latter run in fixed bearings and are coupled up by cranks and connecting rods to the other driving axles. The hollow shafts are fitted at their centers with flexible half-couplings engaging with similar half-couplings on the fixed axles passing through them, so that the wheels are driven by the fixed axles but are at the same time free to radiate. The drawing shows the Brown-Boveri locomotives for the Simplon tunnel.

Fig. 13—Class I-C-I locomotive with two jackshafts, and two motors mounted in the ends of the body. The drawing shows the locomotive of this class built by the Maffei Company, Munich, and equipped by the Siemens-Schuckert Company for the Wiesental line of the Baden State Railways. Ten locomotives were ordered, but the one shown was built first in order that the design might be



Figs. 14 to 23—Locomotive Drives—Diagrams of Arrangements

locomotive has a leading and a trailing four-wheel truck to permit high-speed service.

Fig. 10—Gearless locomotive with motors built on hollow axles concentric with the driving axles. The drawing shows a New York, New Haven & Hartford single-phase d.c. locomotive of this class. The hollow axle, or quill, on which the motor is built is bored with sufficient internal clearance to permit the usual vertical movement of the axle boxes in their guides without actual contact between the quill and the axle. The quill carries at each end a spider which forms a flexible coupling with the driving wheel. The locomotive is arranged as a double-truck machine, each truck having two driving axles and a single-axle sub-truck at its outer end.

Fig. 11—Class I-C-I locomotive with two motors coupled to three driving axles by one pair of slotted connecting rods and two pairs of ordinary connecting rods. This design has been worked out on the Continent, by Kando, and is used on several railways, including the Valtellina Railway in Italy and the Simplon tunnel line connecting Switzerland and Italy. A similar arrangement is used on the Giovi Railway locomotives, except that all five axles are coupled together. The drawing shows the Valtellina locomotives.

Fig. 12—Class o-D-o locomotive with two motors driving four axles by ordinary connecting rods. The principal fea-

ture of this design is the arrangement of the leading and trailing driving axles that are allowed to radiate and yet are coupled up with the other driving axles by standard connecting rods. The tests were carried out on the electrified line between Dessau and Bitterfeld with very good results. The remaining nine locomotives are now being built to a slightly modified design, shown in Fig. 21.

Fig. 14—Class I-C-I locomotive with two jackshafts and two motors mounted near the center of the locomotive body. The drawing shows the locomotive supplied by the Allgemeine Elektrizitäts Gesellschaft to the Chemin de fer du Midi in France. This experimental locomotive is one of six ordered in 1909 from six different electrical firms and set to work in 1912.

Fig. 15—Class I-B + B-I articulated locomotive with one motor and one jackshaft in each half. The motor is mounted in the body, nearly but not quite vertically above the jackshaft, the latter being coupled to the motor shaft and the driving axles by cranks and connecting rods in the ordinary way. The drawing shows the locomotive ordered from the Allgemeine Elektrizitäts Gesellschaft for the Lötschberg Railway.

Fig. 16—Class 2-B + B-2 articulated locomotive with one motor and one jackshaft in each half. In this case the jackshaft is not immediately below the motor, but is between the driving axles and the leading bogie and is connected to the motor shaft by connecting rods inclined at about 45 deg. to the vertical. The drawing shows the ar-

range of the Pennsylvania Railroad locomotives as supplied by the Westinghouse company.

Fig. 17—Class 2-B-1 locomotive with a single motor and a single jackshaft vertically below the center of the motor. Three locomotives of this class have been supplied for the Dessau-Bitterfeld line of the Prussian-Hessian State Railways. The three locomotives are similar in many respects, the motor capacity of the different locomotives being as follows; Siemens, 1100 hp; A. E. G., 1200 hp; Bergmann, 1500 hp. The drawing shows the arrangement of the Siemens locomotive.

Fig. 18—Class 0-D-0 locomotive with single motor and single jackshaft. Five locomotives of this class have been supplied for freight service on the Dessau-Bitterfeld line. Three of these have single motors of 600-hp capacity, the remaining two having motors of 800 hp.

Fig. 19—Class 1-D-1 locomotives with two motors and a single jackshaft. Two locomotives of this class have been constructed for the Lauban-Königszell line, Prussian-Hessian State Railways, one by the Siemens-Schuckert Company and the other by the Allgemeine Elektrizitäts Gesellschaft. The two motors are mounted in the body of the locomotive symmetrically about the center line, and their shafts are coupled by cranks and connecting rods approximately at right angles to the single jackshaft, which occupies a central position midway between the two pairs of driving axles. The drawing shows the Siemens-Schuckert locomotive. The Allgemeine locomotive is similar but has two 900-hp motors and driving wheels of 1500 mm (59 in.) diameter.

Fig. 20—Class 1-C-0 locomotive with one motor and a single jackshaft. Nine locomotives of this class have been built by the Allgemeine Elektrizitäts Gesellschaft for the Mittenwaldbahn, Austria, and eight are under construction by the same firm for the Vienna-Pressburg line. The loco-

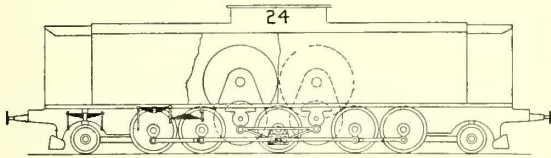


Fig. 24—Locomotive Drives—Lötschberg Railway Standard

motive has three driving axles with a single jackshaft about the center of the locomotive coupled to the motor, which is mounted in the body of the locomotive above the middle driving axle.

Fig. 21—Class 1-C-1 locomotive with two motors unsymmetrically placed in the body connected to a single jackshaft midway between them. Nine locomotives of this class are under construction by the Siemens-Schuckert Company for the Wiesental line, Baden State Railways, in Germany.

Fig. 22—Class 1-C-1 locomotive with a single motor and a single jackshaft. A number of these locomotives are under construction for the Prussian-Hessian State Railways. Three are equipped with a 1000-hp motor in each, one with a motor of 1250 hp and one with an 1800-hp motor. The last mentioned, which is a Siemens locomotive, is shown in the drawing.

Fig. 23—Class 1-C + C-1 articulated locomotive with one motor and one jackshaft in each half. Thirteen locomotives of this class intended for heavy freight service on the Kiruna-Riksgraensen Railway are under construction by the Siemens-Schuckert company.

[Fig. 24—Class 1-E-1. This drawing was not a part of Mr. Lydall's paper, but is added to show the latest Oerlikon locomotive which has been made standard on the Lötschberg Railway. It is of the geared jackshaft type with a drive composed of a double helical gear, two jackshafts, a joint triangular yoke and crank connections to five pairs of driving wheels.—Eds.]

CHICAGO, MILWAUKEE & PUGET SOUND ELECTRIFICATION

The management of the Chicago, Milwaukee & Puget Sound Railroad has definitely decided to electrify the Deer Lodge-Three Forks section of its Rocky Mountain division, using 2400-volt d.c. propulsion current. This division contains 113 miles of main line, or the equivalent of 168 miles of single track including sidings and yard tracks. Overhead trolley, suspended from mast arms on wooden poles, will be used on tangent track and span-wire construction on wooden poles over curves. This type of construction will be changed to steel poles and overhead bridge trolley construction in yards containing four tracks or more. It also has been definitely decided that the transmission voltage will be 100,000 volts a.c., feeding five substations ranging in capacity from 3000 kw to 4500 kw, depending on their relative location to heavy grades. Essentially, the entire electrification, including the rolling stock, will conform to that installed by the Butte, Anaconda & Pacific Railroad. C. A. Goodnow, assistant to the president Chicago, Milwaukee & St. Paul Railway, authorizes the statement that no contract for the equipment has been let.

BROOKLYN RAPID TRANSIT INSURES ABROAD

The Brooklyn (N. Y.) Rapid Transit Company has transferred all its fire insurance—\$22,000,000—on which the premiums have been about \$100,000 a year, from the companies represented by the New York Fire Insurance Exchange to Lloyds, of London, thereby saving about \$27,000 a year. President Timothy S. Williams of the transit company says that this was done because the higher rates recently prescribed were discriminatory and unjust.

President Williams makes the following statement: "Our insurance was placed last year through the companies represented in the New York Insurance Exchange at an average rate of about 34.7. This insurance expired Nov. 15 last. Early in September we were suddenly notified that the Fire Insurance Exchange had increased the average rate from 34.7 to 62.3. This came as a great surprise to us, for in ten years we had paid the insurance companies over \$1,000,000 in premiums and had called upon them to pay in losses only about \$27,000.

"Feeling that, in view of our experience and the condition of our risks, the new rate promulgated by the New York Fire Insurance Exchange was discriminatory and unjust, we sought for several weeks to procure a reduction, and were able, if certain changes were made, to get the average rate reduced to about 43.8. This decision did not come until about nearly a month after the policies taken out last year had expired, and in the meanwhile our agents took the usual form of binder subject to the fixing of a satisfactory rate. The rate finally fixed at 43.8 was not satisfactory, and we therefore placed the entire schedule of \$22,000,000 in London Lloyds, saving \$27,000 in premiums. We regretted the necessity of going outside our own country for insurance, but there was no other proper course."

President Williams also disclosed the fact that the Brooklyn company for several years past had been gradually setting aside an insurance fund of its own and that it eventually hoped to carry its own insurance. The accumulations in the fund now amount to over \$600,000.

Willis O. Robb, manager of the Insurance Exchange, in defending the higher rates, says that there would have been no raise in rates if the Brooklyn Rapid Transit Company had not failed to make improvements which were promised. Although the transit company has not replied to this statement, it is believed that the basic charge is that the rate reduction received, even if the improvements referred to had been made, would have amounted to but a fraction of 1 per cent. The ease with which the low rate was obtained abroad speaks well for the character of the risk.

TESTING TROLLEY INSULATORS IN PLACE

BY G. H. M'KELWAY, ENGINEER BROOKLYN RAPID TRANSIT SYSTEM

One of the duties that fall to line engineers whose companies use metal instead of wooden poles is that of periodically testing the insulators between the trolley and span wires and between the span wires and the poles. The same necessity for this does not exist with wooden poles because the pole itself is so good an insulator, but the iron pole is a conductor, and a leak to it will go directly to the ground unless the pole is set in an insulating foundation like rock or concrete. If the latter is the case, the pole is even more dangerous than if it completes a dead ground because persons or horses are liable to receive shocks from it. When set in concrete but a very small leak is required to make the pole alive and dangerous. Nevertheless, the insulations have to be badly damaged before they will pass enough current to burn down the trolley wire even if the pole itself is well grounded. As nearly all iron poles are set in concrete, they must be considered as being possibly, if not probably, insulated from the earth surrounding them and therefore as affording a chance to shock anyone who would touch them "hot."

While such a shock is seldom dangerous to a human being, many horses have been killed by contact with charged poles and sometimes merely by stepping into pools of water surrounding the poles. Even if the shock received by a person is not severe, it is often enough to cause a claim for injuries. If, in reply to such a claim, the railway can show that its poles are regularly inspected, that testimony will go far toward refuting any assertions of negligence, although the inspection may be nothing more than the sending of a man over the line to feel all poles with his hand and report any "hot" ones.

While the hot-pole test locates the charged poles it does not prevent them. A better test is one that will locate the trouble when only one of the insulators between the pole and the trolley wire has broken down and, therefore, ere the pole has been made alive. To do this properly both insulators, the hanger and the strain insulator, must be tested. As these tests are conducted in different ways, it is difficult to make both at one time. In each test the span wire is wiped by a wire attached to a voltmeter or lamp, but as one test is to see if the span is alive and the other to learn if it is grounded, the wire through the voltmeter must be differently connected for them. In one test the lead goes through the voltmeter to a source of power and in the other to the ground.

On lines with comparatively few poles to be tested this work can be done by one man with either one or two long light rods and a lamp or voltmeter, but on large systems the work can best be done from a special car which is run over the tracks.

TESTING HANGER INSULATORS

When the hangers are to be tested a long light rod can be used. At the upper end is a piece of old trolley wire or an iron rod which is placed against the span and which connects through an insulated wire with a voltmeter or lamp installed about 5 ft. from the ground and consequently fairly in line with the tester's eyes, thus permitting him to observe results with the least trouble and delay. The circuit is extended from the lamp or meter through insulated wire to an iron rod attached to the bottom of the pole and which is to be placed on the rail while the test is being made. While, of course, the voltmeter is much more sensitive than the lamp, yet the latter will light up enough to show against a black background if only 25 volts or 30 volts are impressed upon it. To make the apparatus as sensitive as possible the inside of the box which contains the lamp should be painted black. It may be thought dangerous to place a circuit containing only one

incandescent lamp against a span wire which may have full trolley voltage on it, as will be the case if the insulator has broken down entirely. However, full voltage is seldom impressed if the span is merely touched with the end of the wiping wire as a preliminary to holding the rod more firmly against it if necessary. Still, the voltmeter is the more desirable as well as safer, and the pocket-size instruments are small and light enough to be easily attached to a rod.

TESTING STRAIN INSULATORS

To test the strain insulators at the poles two test poles should be used or else one with a Y at the top. Here one lead must touch the trolley wire and the other the span as the test is to learn whether or not the span can be grounded through the insulator at the pole. It is much safer to use a voltmeter than a lamp, because a damaged insulator may pass the very small quantity of current which serves to shock a man without being enough to heat visibly the filament of a lamp.

APPLIANCES, ETC.

When many poles are to be tested the use of a car supplies the only satisfactory way, as the hand apparatus is too slow. By running a car over the line tests of either hangers or strain insulators can easily be made on 50 miles of line a day.

Owing to the different character of the tests applied to the two types of insulators it is difficult to test both at the same time, especially where there is much special work, because there is a chance that the grounded lead of one voltmeter will touch one part of a bridle at the same time that the live lead from the other meter comes into contact with another part. The connections inside of the car are the same as for the hand tester, and the wiping wire is either attached to the trolley pole of the car or is held in the hand of a man sitting on the roof of the car. While the former plan requires one man less than the latter, it has the disadvantage that in heavy special work the wiper is liable to be caught and pulled off or at least cause a delay until it can be cleared.

Generally the wiper is made of trolley wire, the leads to the meter being insulated, but on one line where the spans were very rusty it was thought better to use a hack saw blade because the insulating effect of the rust was great enough to make accurate readings impossible so that many spans which should have been reported as defective were passed as good.

When a span is found to be grounded or when a hanger fails on a double-track line it is necessary to remove both insulators and replace them with good ones as the test cannot determine which is defective while both are in the circuit. Later, both insulators can be tested out separately and the good one returned to stock while the other is scrapped.

Tests such as these will be found especially important during the summer months when thunderstorms subject the insulation to a much more severe test than at other times. Furthermore, insulators are liable to break down at any time, so that tests should be made oftener than only once or twice a year, although inspection at other seasons of the year need not be so frequent as in the summer.

The number of passengers transported by the Paris subway in 1912 was 310,782,098, or an average of 850,000 per day. The tickets collected were divided into the following categories: Workmen's, 79,877,382; first-class, 32,773,335; second-class, 198,060,192; collective (school), 71,189. To these should be added the return coupons of the workmen's tickets (79,877,382), making the total passenger traffic for the year 390,659,480. The number of tickets delivered in certain of the last ten years was: 1903, 100,090,833 tickets; 1905, 148,700,821 tickets; 1907, 194,823,182 tickets; 1909, 254,445,992 tickets; 1911, 305,442,992 tickets.

COMMUNICATIONS

PREDETERMINATION OF TRAIN ENERGY

IMPARTIAL STUDY OF ELECTRIFICATION

NEW YORK, Dec. 23, 1913.

McHENRY & MURRAY, CONSULTING ENGINEERS
NEW HAVEN, CONN., Dec. 23, 1913.

To the Editors:

I have naturally read with a great deal of interest the editorial on main-line electrification in your issue of Dec. 20. It is my intention to supplement my discussion of Mr. Armstrong's paper before the Canadian Society of Civil Engineers in a pamphlet which will be placed in the hands of those railroad executives who are vitally interested in the facts concerning railroad electrification.

I will therefore only refer to your excellent suggestion regarding the appointment of a committee. Such a committee should logically be appointed by the executive committee of the American Railway Association and should set forth the fundamental requirements and conditions to which any and all electrical systems should conform in order that specified conditions of passenger, freight and switching service be met. This suggestion comes by virtue of the fact that the service requirements are best understood by the railway officials themselves. This committee should have the freest access to all sources of information, data, etc., having reference to investment cost and operation, inclusive of maintenance of power stations, lines and locomotives. So far as it is possible for me to assist, I will most cheerfully contribute all the facts on this subject in my possession.

W. S. MURRAY.

ELECTROLYSIS TESTS

NEW YORK, Dec. 19, 1913.

To the Editors:

I have read with interest Carl Hering's "Errors in the Interpretations of Tests for Electrolysis" in your issue of Nov. 20. Many of the tests to which he points as erroneous have been repeatedly brought forward by the writer in articles appearing from time to time in this journal during the last twelve years. I think that Mr. Hering's use of the word "static" in reference to a potential existing between structures under ground is unfortunate because such a potential is not a bound charge but a potential that can exist only by virtue of the earth's resistance, which is low compared with what is classed as insulation.

The measurement of current and voltage between buried structures to discover their electrical relation is important and useful in electrolytic investigation. It does not directly give the resistance, but where the resistance is varied by known quantities in the ammeter circuit it does help in the analysis, and when the results obtained are taken in connection with the potential gradients on the structures relative to the zero of the system of negative distribution, they have an analytic value in clarifying this complex problem. The cause of warpages of the pipe contours from the superimposed rail contours can be discovered from these tests whether they are caused by shuttling or earth resistances.

The measurement from plug to plug shows the extent to which the pipe line is acting as a conductor. This action will be immediately detected when connections are made between discontinuous conductor systems and the resistance in the ammeter circuit is varied. The drop in volts divided by the flow in amperes would not give the same results. The effect of open pipe joints along the section tested or of poor connections between main and lateral to plug are eliminated when these records are analyzed. The diversion method is useful and is of sufficient accuracy to give results in practical work. Finally, these methods were adopted by me after employing a great many others, and they have proved successful after a trial of many years.

ALBERT B. HERRICK.

To the Editors:

We were greatly interested in Dr. Hutchinson's letter of Dec. 15, discussing our article on the "Predetermination of Train Energy," published in your issue of Nov. 15. We beg to take exception, however, to Dr. Hutchinson's statement that his method involves one less assumption than ours, because the principles of dynamics require certain data to go into the problem in order to get the answer. No matter how they may be disguised, these assumptions must be used. The real difference between Dr. Hutchinson's method and ours is that the former assumes the rate of braking retardation, while the latter assumes the length of run with power on.

We believe that our method, by dividing the energy into four items relating respectively to acceleration, friction, grades and curves, has the advantage of keeping the dynamical elements of the problem in sight throughout the calculation. This enables one to ascertain immediately the effect of changing any of the fundamental variables.

We further beg to take exception to Dr. Hutchinson's statement that the approximate methods of predetermining train energy devised by himself and by us are not of much value because neither leads to a determination of motor capacity or best initial acceleration. This criticism is based on the conception that the predetermination of energy consumption and of motor capacity are parts of the same problem. Doubtless this is true in a theoretical sense, but we consider that in practice they are entirely different. The problem solved by the methods under consideration is the approximate determination of power station, substation and feeder capacity, and of the power station output. This problem has generally to be solved independently of the determination of motor capacity. In fact, it is usually solved by the engineers of railway companies, while the motor capacity is usually determined by the manufacturers from data supplied by the railway engineers.

We are highly appreciative of Dr. Hutchinson's contributions to this subject, and while we prefer our method to the approximate one devised by him, we do not offer it as a substitute for the more elaborate one so ingeniously worked out by him in his now classical paper. It is merely offered for use where the uncertainty of the given factors do not warrant the use of the more accurate methods devised by him and Mr. Mailloux.

W. A. DEL MAR,
D. C. WOODBURY.

GASOLINE CARS ON THE EAST INDIA TRAMWAYS

The East India Tramways, a small company operating a system of gasoline trams in Karachi, and which was described a year ago in an article of the *ELECTRIC RAILWAY JOURNAL*, recently held its annual meeting. Formed in 1882, this company appears to have solved the problem of instilling the habit of traveling into the poor native population by means of moderating capital cost and reducing operating expenses to a point to enable an adequate profit to be made on the money invested. More than 5,500,000 passengers were carried last year; profits have increased in the last four years by 380 per cent.

The gross receipts for the year ended July 31, 1913, amounted to \$109,214, as compared with \$94,930 in the preceding year and \$71,704 in 1910-11, while the net receipts have increased from \$22,210 in 1910-11 and \$41,504 in 1911-12 to \$47,210 in the year just ended.

The improvement in the company's fortunes is attributed entirely to the adoption of the gasoline motor cars, which for the fourth year of operation are said to show an average cost for working expenses of 10 cents per car mile, inclusive of 1.64 cents per car mile for depreciation.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES, FRANCHISES

Kentucky.—Jim Crow Law Applicable to All Passengers.

The separate-coach law (Ky. St. 795-800) applies alike to both white and negro passengers, the latter being entitled to the same redress as the former for injuries growing out of its violation. (*Conley v. Central Kentucky Traction Co.*, 154 S. W. Rep., 41.)

Louisiana.—Street Paving—Liability for Cost of More Expensive Kind.

While, under a provision in a street railway franchise providing that when any street shall be paved or repaved the company must pay the cost of paving or repaving between the rails of its tracks and for 1 ft. on the outside of each rail, the company is not primarily liable for a more expensive kind of paving covered by such space than that ordered for the entire street, it is estopped to deny responsibility for the cost of such paving or repaving where it permits the work to be done without giving notice to the city that it will not pay the excessive cost thereof. (*Southern Bitulithic Co. v. Algiers Ry. & Lighting Co.*, 58 Southern Rep., 588.)

Maine.—Street Railroads—Operation—Defects—Piling Snow Outside Track.

A street railway which was required by its charter to maintain its railway so that the part of the highway occupied thereby should be safe for travelers cleared snow from its roadbed and piled it up at the side. Held, that if the slope thus created was sufficient to overturn a cab driven with due care the company was liable. (*Mansell v. Lewiston, A. & W. St. Ry.*, 85 Atlantic Rep., 473.)

Massachusetts.—Street Railroads—Collision—Crosswalk Over Reservation—Rights of Railroad.

Where an electric railway has been built under authority of Statutes 1894, Chap. 324, Sec. 1, upon a reservation in the middle of a street, and this reservation is intercepted by crosswalks for pedestrians, such excepted parts are for the common use of pedestrians and street cars, like other parts of the street. Hence a street railway company in running its cars over such a crosswalk has no rights which are either exclusive of or paramount to the rights of pedestrians thereon. (*Welch v. Boston Elevated Ry. Co.*, 100 N. E. Rep., 1069.)

Pennsylvania.—Liquidated Damages for Failure to Construct—Breach of Bond.

Where a street railway company acquires from a borough the right to occupy its streets and gives a bond for \$5000 conditioned to lay its tracks and connect them with others 2 miles away within a specified time and fails so to do, the borough can recover the \$5000 as liquidated damages. (*Ambridge Borough v. Pittsburgh & B. St. Ry. Co.* et al., 82 Atlantic Rep., 1105.)

Wisconsin.—Transportation of Repair Parts Not Freight—Fellow Servants.

Under a street railway's franchise which provides that it shall be used for no other purpose than to transport passengers and their ordinary baggage the tracks and cars may be used to carry repair materials to various portions of its line.

The motorman of a repair car of a street railway company and the custodian of the tools therein were fellow servants, so as to preclude recovery by the latter for the act of the motorman in negligently moving the car whereby plaintiff was injured. (*Waskiewicz v. Milwaukee Electric Ry. & Light Co.*, 133 N. W. Rep. 596.)

LIABILITY FOR NEGLIGENCE

Alabama.—Carriage of Passenger Beyond Destination—Actions—Damages.

A street railway is liable for damages for carrying a passenger beyond her destination going out and where, on the return trip, the conductor again failed to stop at her stopping place. (*Birmingham Ry., Light & Power Co. v. Arnold*, 60 Southern Rep., 988.)

Alabama.—Duty to Passengers—Opportunity to Safely Alight.

When a car is at a regular stopping place for letting off

passengers it is the duty of the conductor to know whether passengers are in the act of leaving the car and so in a position which would be rendered perilous by putting the car in motion. (*Birmingham Ry., Light & Power Co. v. Mayo*, 61 Southern Rep., 289.)

Indiana.—Collision with Vehicle—Last Clear Chance Doctrine.

To establish negligence against a street railway company in a collision under the last clear chance doctrine, it must be shown that immediately before the collision plaintiff was in imminent peril, that the employees on the car saw him and his danger in time to have avoided the collision in using reasonable care, or that, by using ordinary care, his danger could have been discovered and the injury prevented or mitigated. (*Schilling v. Indianapolis & C. Traction Co.* et al., 96 N. E. Rep., 167.)

Indiana.—Injuries to Child on Track—Last Clear Chance.

A child between eleven and twelve years old was struck by a street car. She understood and appreciated the danger of being injured by street cars in crossing the tracks. She walked across the street looking straight ahead, and walked on the track 3 ft. or 4 ft. in front of the car. Held, as a matter of law, that she failed to use due care in view of her age and experience, which were sufficient to make her carelessness unreasonable.

To hold a street railroad company liable under the last clear chance doctrine, it must appear that the company's opportunity of preventing injury to plaintiff struck by a car was later in point of time than that of plaintiff, and that the company failed to take advantage of the last clear chance. Where the situation of the parties just prior to the injury was such that the company by the exercise of due care should have prevented the injury and plaintiff could not, the rule applies, but where the opportunity of plaintiff to avoid the injury was as late as or later than that of the company the rule is inapplicable.

Where a person walked across a street in plain view of an approaching street car moving at a rapid rate and stepped on the track 3 ft. or 4 ft. in front of the car, his negligence was concurrent and not antecedent to that of the motorman in failing to observe the danger and avoid the accident, and there could be no recovery under the doctrine of last clear chance.

An instruction, in an action against a street railroad company for injuries to a child struck by a car, that if the motorman saw plaintiff and her peril, or could have seen it by due care, and failed to stop the car or failed to take other precautions to prevent injuring her, she was entitled to recover, was erroneous for failing to state that some appreciable time must intervene after the motorman saw plaintiff's danger and before the injury occurred within which time some precaution could have been taken to prevent the accident. (*Indianapolis Traction & Terminal Co. v. Croly*, 96 N. E. Rep., 973.)

Kentucky.—Defective Condition of Apparatus.

If the defective condition of appliances on a street car, which caused a derailment, was not known by the employees and could not have been known by the highest degree of care, the company was not liable for resulting injuries, unless, by the exercise of such care, the car could have been stopped and the accident prevented by other available means. (*South Covington & C. St. Ry. Co. v. Barr*, 144 S. W. Rep., 755.)

Massachusetts.—Team on Track.

The driver of a team moving ahead of a slowly moving street car may assume that the motorman will sound the gong before changing the course of the car and crossing the path of his team. (*Morrissey v. Boston Elevated Ry. Co.*, 97 N. E. Rep., 83.)

Massachusetts.—Injury to Passenger from Door Mechanism.

That while plaintiff was entering a street car a door, which was operated by levers under control of the car employees, was closed, causing plaintiff's injury, shows prima facie negligence of the street railway company, though a passenger may have intentionally started the mechanism by which the door was closed. (*Craft v. Boston Elevated Ry. Co.*, 97 N. E. Rep., 610.)

Massachusetts.—Passengers' Assumption of Risk on Overloading Crowded Car.

It is not negligence for a street car company to permit passengers to enter cars which are already crowded, and a passenger who voluntarily enters a crowded car and has to stand on the rear platform assumes any risk of injury from being crowded or pushed from the car when it stops. (*Seale v. Boston Elevated Ry. Co.*, 100 Northeastern Rep., 1020.)

Massachusetts.—Master and Servant—Doctrine in Car-house.

One in charge of the controler used in moving a shifting table was a fellow servant of plaintiff, who was injured while engaged in holding the trolley while a car was shifted, so as to preclude recovery for injuries resulting from the former's negligence in starting the table without warning. (*Ridge v. Boston Elevated Ry. Co.*, 100 Northeastern Rep., 667.)

Massachusetts.—Dress Caught in Sand Plunger.

In a street car passenger's action for injuries by falling by her dress catching upon the sand plunger in the vestibule, which projected above the floor, evidence held to sustain a finding of negligence by the motorman in not taking precaution for plaintiff's safety, either by removing the plunger or guarding it with his foot or warning her of its presence. (*Martin v. Old Colony St. Ry. Co.*, 98 Northeastern Rep., 579.)

Massachusetts.—Injuries While Attempting to Board Car.

Where plaintiff, as she was about to board a street car at a terminal, was gradually encompassed by other passengers moving toward the same car until she was pushed over the platform and into a pit, receiving injuries complained of, and no measures were taken by the carrier to protect her or control the press of people seeking to board the car, it was guilty of actionable negligence. (*Kelley v. Boston Elevated Ry.*, 96 N. E. Rep., 1031.)

Massachusetts.—Loss of Personal Property of Passengers—Refusal to Stop.

Where plaintiff, a passenger on a subway car, lost his violin because of a jerk of a car, not due to the carrier's negligence, the carrier was under no obligation to accede to plaintiff's request to stop the car that he might get the instrument, such a stop between stations being fraught with danger of collision with the following car. (*Bursteen v. Boston Elevated Ry. Co.*, 98 Northeastern Rep., 27.)

Massachusetts.—Personal Injuries by Ejection of Another Passenger—Liability.

A carrier is bound to protect a passenger from personal harm at the hands of its servants whether the injury is wilful or negligent, and proof that it ejected another passenger with no more force than was reasonably necessary does not relieve it from liability to a passenger whom its method of ejection forced from the car to the ground. (*Thayer v. Old Colony St. Ry. Co.*, 101 Northeastern Rep., 368.)

Massachusetts.—Trespassers on Cars—Liability.

A boy a little more than ten years of age boarded a car of an elevated railway company to steal a ride. The conductor, on observing him, ordered him to get off, shaking his fist at the same time. The boy either lost his balance or fell in attempting to jump off. Held, that the boy was a wilful trespasser, the company owed him no duty except to refrain from wilfully or wantonly and recklessly exposing him to danger, and the act of the conductor did not show a cause of action. (*Shelly v. Boston Elevated Ry. Co.*, 98 Northeastern Rep., 575.)

Massachusetts.—Injuries to Persons Near Track at Sharp Curve from Rear End of Car.

Where a street railroad track turned a sharp curve and the rear end of a car rounding the curve projected toward the curb so as to leave insufficient room for vehicles at the point where the car was passing, the motorman of a car was guilty of negligence when he proceeded on the curve knowing that there was a vehicle with which the rear of the car might collide, and the street railroad company was liable for injuries to a pedestrian on the sidewalk who was injured by the vehicle being thrown against him. (*Bryant v. Boston Elevated Ry. et al.*, 98 Northeastern Rep., 587.)

Michigan.—Injury to Conductor, Master and Servant.

Absence of a step which belonged at the rear end of an electric car through which the conductor in descending from its top after ascending by another way was injured being obvious to ordinary observation, or to even the most casual observation, his failure to discover and avoid the danger was contributory negligence. (*Leary v. Houghton County Traction Co.*, 137 Northwestern Rep., 226.)

Michigan.—Distance at Which Approaching Car Could Be Seen.

Where, on a former appeal, the court held that the plaintiff could have seen the car by which she was struck when it was 400 ft. or 500 ft. from her last point of safety and that a verdict should have been directed for defendant, the testimony of a witness on a new trial that an unobstructed view could be had of an approaching car for 217 ft. from the same point, not being in conflict with the previous showing, did not relieve the court from its duty to direct a verdict. (*Folkmore v. Michigan United Rys. Co.*, 136 Northwestern Rep., 442.)

Missouri.—Imputed Negligence—Driver of Vehicle.

The negligence of an employee while driving a vehicle obtained by third persons from the employer is not imputable to the third persons, who only directed the employee to drive to a particular place. (*Farrar v. Metropolitan St. Ry. Co.*, 155 Southwestern Rep., 439.)

Missouri.—Riding a Bumper.

While a street car passenger permitted to ride on the bumper because of the crowded condition of the car assumed the risk of riding in that position, he did not assume the negligence of the carrier and may recover for injuries resulting from such negligence. (*Kirkpatrick v. Metropolitan St. Ry. Co.*, 143 S. W. Rep., 865.)

Missouri.—Alighting from a Car in Motion.

It is not negligence per se for a street car passenger to attempt to alight from a car in motion, unless the risk involved in the act, because of the speed of the car, appears to be so great that an ordinarily prudent person would not incur it, and the question of negligence is for the jury. (*Haskell v. Metropolitan St. Ry. Co.*, 142 S. W. Rep., 1091.)

Missouri.—Commencement of Relation of Carrier and Passenger.

One becomes a street car passenger the instant he starts to board a car, and it then becomes the duty of the operators of the car not to start it until he has had a reasonable opportunity to reach a place of comparative safety. (*Conway v. Metropolitan St. Ry. Co.*, 142 S. W. Rep., 1100.)

Missouri.—Injury to Passenger Preparing to Alight.

Where a passenger on a street car, after signaling for a stop, went to the platform to alight when the car which was slowing down stopped, she was not guilty of negligence, for the car company permitted persons to ride on platforms and in the aisles and for the further reason that if passengers were not ready to alight when cars were stopped traffic would be delayed. (*Anderson v. Metropolitan St. Ry. Co.*, 141 S. W. Rep., 461.)

Missouri.—Collision with Fire Hose Wagon—Care Required of Drivers.

An ordinary traveler must approach a street railroad track cautiously with his vehicle under control, looking and listening, ready to stop and give way to street cars, and must exercise reasonable prudence to avoid injury according to the facts. But a driver of a hose wagon of a city fire department need not proceed with the deliberation of an ordinary traveler and need only drive with the care which a prudent person would exercise in view of the circumstances, such as municipal ordinances giving fire department wagons the right-of-way and the constant signaling of the approach of such wagons. (*Green et al. v. United Rys. Co. of St. Louis*, 145 Southwestern Rep., 861.)

Missouri.—Escape of Electricity—Intervening Cause.

Where defendant railroad company negligently permitted the escape of electricity to and through a guy wire attached to a supporting post in a street and thence to a private wire attached to the guy wire by a third person, the fact that the private wire intervened

and conducted the electricity and caused the injury to plaintiff, who came into contact therewith while walking in the street, did not relieve defendant from liability for its own actionable negligence in permitting the electricity to escape. (*Campbell v. United Rys. Co. of St. Louis*, 147 Southwestern Rep., 788.)

New Jersey.—Collision with Noisy Wagon.

An instruction to the effect that if the plaintiff drove along and upon the street railway track in a noisy wagon, so that he could not hear the gong of defendant's car approaching from behind, the plaintiff cannot recover, is erroneous, because the driving of a noisy wagon along and upon a street railway track does not in itself necessarily constitute such contributory negligence as will relieve the defendant from responsibility for an accident which might have been avoided by the exercise of due care upon the part of the defendant. (*Luby v. Morris County Traction Co.*, 83 Atlantic Rep., 184.)

New York.—Speed of Car When Passing Standing Car.

It is gross negligence for a street railway company to run a car at nearly 30 m. p. h. past another car standing to discharge passengers. (*Provost v. International St. Ry. Co. et al.*, 136 New York Sup., 131.)

New York.—Injuries to Boy Ten or Eleven Years Old—Presumption of Sense of Danger.

A boy ten or eleven years of age, not shown to be deficient mentally, must be presumed to know of the danger to be anticipated from crossing in front of a moving street car. (*Byrnes v. Brooklyn Heights R. Co.*, 133 N. Y. Sup., 243.)

New York.—Master and Servant—Safety of Place of Work.

An employer's duty to provide a reasonably safe place of work does not involve the following up of the details of work and seeing to it that the conditions brought about by progress of the work are at all times such as to afford a reasonably safe place. (*Edgar v. Brooklyn Heights R. Co. et al.*, 131 N. Y. Sup., 286.)

New York.—Crossings—Rights of Parties.

The rule that neither a street car crossing a street nor a vehicle on such street has a paramount right but that the right of each must be exercised with due regard to the right of the other applies to a vehicle coming out of a street which meets but does not cross the street on which cars are operated, and where it is necessary for the vehicle to cross the tracks to obey the law of the road. (*Moore v. Rochester Ry. Co.*, 97 N. E. Rep., 714.)

New York.—Injuries to Passengers—Starting Subway Train.

Where a subway train was stopped at a regular station for the purpose of taking on passengers the employee in charge thereof was chargeable with notice that passengers were getting on, and before starting was bound to look and see if he could shut the doors and start the train with safety to those boarding it. (*Lang v. Interborough Rapid Transit Co.*, 134 New York Sup., 627.)

New York.—Boarding Car in Motion—Doctrine of Last Clear Chance.

One intending to become a passenger on an electric street car who attempts to board the car while in motion and when the gates are closed is chargeable with negligence as matter of law, which will bar recovery from the company for an injury received by striking or being struck by another car while so outside the gates, unless, after his peril was apparent, defendant negligently failed to protect him when it was within its power by the exercise of reasonable care to do so. (*Norfolk & A. Terminal Co. v. Rotolo*, 191 Fed. Rep., 4.)

New York.—Excessive Damages.

Where plaintiff had his collar-bone broken and sustained various lacerations and contusions, which confined him to the hospital from Aug. 17 to Sept. 12, and which interfered with his work until Oct. 24, and at the time of the trial in April he complained of slight difficulties, but there was no evidence of any permanent injury, and he showed a loss of earning power of \$16 or \$17 per week for about eight weeks, \$3,500 damages was excessive and will be reduced to \$2,000. (*Crantz v. Nassau Electric Ry. Co.*, 138 New York Supplement Rep., 966.)

New York.—Negligence and Contributory Negligence—Basis of Doctrine.

The doctrine of contributory negligence does not rest on the maxim that no one shall be permitted to take advantage of his own wrong, but on the fact that the law will not undertake to apportion the consequences of concurring acts of negligence, and when an injury is caused by the concurring negligence of two or more persons the law will not hold either liable to the other. (*McKay v. Syracuse Rapid Transit Ry. Co.*, 101 Northeastern Rep., 885.)

New York.—Carrier's Assault on Passenger—Contract or Tort—Death to Party—Survival of Action of Contract.

A passenger's action against a carrier for its violation of its contract to carry him as a passenger, by assaulting and ill treating him, is an action of contract.

A passenger's action for an assault and ill treatment, based on an alleged breach of the carrier's contract to carry safely, may be revived in the name of plaintiff's personal representative after his death pending reversal of judgment for the carrier and a second trial. (*Rundlett & Reynolds, Inc., v. Whitall*, 135 New York, Sup. 698.)

New York.—Injury to Servant from Defective Structures.

A trackwalker of an elevated railroad company used a temporary passage over an opening incidental to the unfinished work of an independent contractor in lowering the structure and fell through into the street when a plank on which he stepped turned. There was no evidence that trackwalkers when in the discharge of their duties as such were accustomed to use the temporary passage. Held, that the company was not liable on the theory that it ought to have known of the use of the temporary passage by its employees. (*Eddery v. Interborough Rapid Transit Co.*, 135 New York Sup., 170.)

Pennsylvania.—Injuries to Trespasser.

Where plaintiff was injured while walking on a trestle on defendant street railroad's private right-of-way, when he could easily have got to a place of safety before he was struck by stepping on crossbeams at either side of the track, and the motorman, on discovering that plaintiff was making no attempt to avoid a collision, did all he could to stop the car, a nonsuit was properly entered in plaintiff's action to recover for the injuries. (*Bliss v. Pittsburgh Rys. Co.*, 83 Atlantic Rep., 278.)

Wisconsin.—Injuries to Passengers in Dangerous Position.

Where a conductor of a trolley car knows of a passenger's dangerous position on a step within the vestibule of a crowded car and fails to warn him of the danger, or where he negligently fails to learn of the dangerous position of the passenger, he is guilty of negligence, making the carrier liable for injuries to the passenger caused by his being forced outward so as to collide with a trolley pole. (*Tolleman v. Sheboygan Light, Power & Ry. Co.*, 134 N. W. Rep., 406.)

Wisconsin.—Meddlesome Act of Fellow-Passenger—Carrier's Liability.

As carriers are not responsible for acts of third persons not under their control which they could not reasonably foresee, a street railroad company is not liable for injury to a passenger injured while standing in the rear vestibule of a car through the meddlesome act of a fellow passenger in suddenly releasing a brake in such manner that the handle swung around with great force, when there was no showing of previous and similar meddlesome acts of passengers. (*Sure v. Milwaukee Electric Ry. & Light Co.*, 133 N. W. Rep., 1098.)

Wisconsin.—Master and Servant—Inspection of Span Wire Hangers.

The appliances being of approved pattern and there being nothing in their appearance to indicate any defect, the master cannot be held liable for presence of electricity in a span wire, through defective insulation in hangers by which trolley wires were suspended therefrom, unless its thorough inspection twice a year was not sufficiently frequent. This cannot be held, as there is not evidence that hangers easily or frequently become defective, but the inference is to the contrary, and there is no evidence that more frequent inspection is customary with others. (*Doyle v. La Crosse City Ry. Co.*, 134 N. W. Rep., 364.)

News of Electrical Railways

Review of the Stotesbury Management in Philadelphia

In Co-operative Bulletin No. 25, issued under date of Dec. 18, 1913, the results are reviewed which have been attained by the Stotesbury management of the Philadelphia (Pa.) Rapid Transit Company since it undertook the work of rehabilitation on June 5, 1911. The statement is made that it was necessary, first, so to increase wages and improve working conditions as to establish harmony and unity of effort between the management and its motormen and conductors; second, to provide for the purchase of a sufficient number of additional cars of modern type having the largest possible seating capacity to relieve the over-crowding of cars; third, so to increase the capacity of the tracks in the downtown district by a general re-routing of car lines as to permit the operation of a larger number of cars during the rush hours. The statement follows in part:

"The wages of motormen and conductors, by the co-operative plan and the use of the 22 per cent fund, have been raised from a maximum of 23 cents to a maximum of 30 cents per hour. This scale will be continued until the accumulations in the 22 per cent fund make further advances possible. The present wage scale was made effective Sept. 1, 1913, two and one-half years earlier than had been considered possible.

"This management at its incoming undertook to supply during the ensuing five-year period 1300 cars of modern type. As against this promise, 1500 new near-side cars have now been purchased and are in service. The standard near-side car has nearly double the seating capacity of the obsolete equipment retired from service. There has therefore now been accomplished within a two-and-one-half-year period an increase in the total car capacity greatly in excess of that which was undertaken to be performed in the entire five-year period.

"The re-routing plan, necessitating the changing of over fifty lines, has been practically completed. This improved routing has already enabled the company to increase the car capacity now operated in the business district during the rush hour nearly 20 per cent as compared to the service of one year ago. That the re-routing changes are proving to the advantage of the great majority is now evidenced in the greater proportion of passengers carried direct to their destination and in the shorter time required for the ride.

"The timetable department is checking the new traffic requirements on the several lines, and the car schedules are being so adjusted as to place the cars on the street in direct accordance with the needs of the public.

"The co-operation of the bureau of police and also of the team owners is being enlisted in a campaign having for its object the elimination of all unnecessary delays to street cars, thus insuring that cars follow each other on the street with such dependable regularity as to permit the displaying of the 'car full' sign whenever necessary to avoid extreme overloading.

"A complete guide book containing descriptions of the street car routes, including rates of fare and transfer and exchange privileges, will be issued by the company for free distribution to the public not later than Jan. 1, 1914.

"The co-operative plan, adopted in August, 1911, under which this management is now working with its motormen and conductors, has exceeded all expectations in securing increased wages, improved working conditions and in providing the means for adjusting every difference before it becomes a grievance. Discipline of the men is at a higher standard than ever before, while the number of motormen and conductors discharged from the service averages only thirty per month as against an average of 130 per month prior to the inauguration of the co-operative plan.

"Direct representation in the discussion and adjustment of all matters affecting their interests is assured to the men through the co-operative committee, whose members include two representatives from each depot, chosen by the direct vote of the motormen and conductors. This is representation in a larger sense than was ever attained through any grievance committee.

"A new book of rules for the guidance and information of motormen and conductors, including rules governing working conditions, was prepared and issued in February, 1913. The beneficial effects of co-operative effort were never more apparent than in this instance, inasmuch as the rules by which the men are governed were passed upon by the co-operative committee directly representing the men in joint council with the operating officials of the company.

"The co-operative committeemen now pass upon all timetables before the schedules are put into force, thus insuring that the car hours required upon the street to serve the public properly are divided into such runs for the men as best suit their convenience.

"No regular run now pays less than nine hours' time (except for trippers and Sunday timetables). All regular runs are based on a minimum of nine hours and a maximum of eleven hours, to be completed within a maximum of fourteen consecutive hours; this as against the former practice of spreading runs over a sixteen-hour to seventeen-hour consecutive period.

"To give the motormen and conductors the benefit of buying their uniforms on an instalment plan without subjecting them to the extra charge of 10 per cent usually required, a plan of buying uniforms has been instituted whereby the man makes a first payment of \$3 and the company advances the balance, which is thereafter payable from the man's wages at the rate of \$1 per week.

"The co-operative beneficial association, launched in November, 1912, now has a total membership of more than \$500. This association provides sick benefits of \$1 per day for 100 days following the first week's illness and a death benefit of \$150.

"Following a careful analysis of the cost of living among the motormen and conductors, carried on by members of the co-operative committee, a plan of co-operative buying was instituted in June, 1913. More than 150 stores are now listed where purchases can be made with the cash coupon books issued by the co-operative beneficial association at a saving to the members of 8 per cent on the cash selling price. The insurance and pension plan, which provides a pension of \$20 per month and death benefit of \$500, has been broadened to apply to employees of all departments of the company, and the administration of the plan has been placed more directly under the supervision of the men themselves.

"The effective application of the near-side principle, together with the perfecting of platform and seating arrangements, ventilating system, car route signs, life guard and other details for enhancing the public safety, health and convenience, are included in the standard near-side car, which, experience has shown, effectually remedies the shortcomings of existing car designs.

"The total number of accidents now occurring shows the astonishing decrease of more than 25 per cent as compared with the total accidents in the year immediately preceding the incoming of the Stotesbury management, although 14 per cent more passengers are carried now.

"Accident prevention work is being carried on in co-operation with the school authorities by illustrated talks in the public schools, explaining how accidents may be avoided. More than 1,000,000 illustrated blotters, together with a display of posters and photographs illustrating the 'safety first' principle, have been used. Co-operation of the motormen and conductors has been most beneficial in the prevention of accidents.

"The practice of smoking and spitting and the carrying of partly consumed cigars or cigarettes on the cars has been practically eliminated following a vigorous campaign instituted in January, 1913.

"The efficiency of the emergency service has been greatly improved by the purchase of additional high-speed auto wreck wagons and the installation of new emergency stations at locations where they are required. The average time now required to make a 'run' from the nearest emergency station is not more than five minutes, and any point in the downtown district can be reached in an average of three to four minutes.

"The capacity of the surface car subway, which before the re-routing was confined to fifty-six cars per hour, has been increased to 140 cars per hour by the use of block signals and the 'berth' system of dispatching at the Juniper street station.

"The capacity of the company's power plants as of June 5, 1911, was not sufficient to propel additional cars or to heat the cars properly. To meet this shortage, contracts were closed for approximately 35,000 hp of purchased power, and the output of the Beach Street power house has in addition been increased approximately 20,000 hp by the installation of new power-generating machinery.

"Two modern concrete carhouses have been built, one having a capacity of 336 cars, and the other having a capacity of 333 cars.

"At the time that the present increased wage scale was made effective, Sept. 1, 1913, a guaranteed minimum wage for extra men was put into force. This guarantee was, as set forth at the time, \$2 per day minimum for each day upon which an extra motorman or conductor was required to report for duty. The \$2 a day guarantee to the extra men, added to the amount received when working runs in relieving the regular men, is not only producing a higher average rate of wage to the extra men than that received by the newer regular men, but is also resulting in an excessive drain upon the 22 per cent fund, the accumulations in which are of vital interest to every motorman and conductor because of the fact that further increases in their wages must be derived therefrom. The co-operative committee decided unanimously that the adjustment of this matter be left to Chairman Mitten. Effective Jan. 1, 1914, the minimum wage guaranteed to extra men will be changed from the stipulated guarantee of Sept. 1, i. e., \$2 per day minimum for every day upon which the men are required to report for duty, to a guaranteed minimum wage of \$12 for each week of seven days. This weekly guarantee assures to the extra men a steady wage of not less than \$12 per week until such time as they secure regular runs. At the same time it will fully protect the interests of the regular men in the 22 per cent fund. Extra men are paid a minimum rate of 25 cents per hour, and are not confined to the minimum weekly wages of \$12, as they may, when substituting on regular runs, earn as much as \$18 per week."

Indianapolis Employees Close Their Case

The employees of the Indianapolis Traction & Terminal Company ended their side of the hearing before the Public Service Commission of Indiana on the evening of Dec. 20. On Dec. 18 J. J. Thorpe, first international vice-president of the Amalgamated Association, was called to the stand. He told of his coming to Indianapolis in August, prior to the calling of the strike of the employees of the interurban lines operating out of Indianapolis. Mr. Thorpe described his attempts to organize the city men in Indianapolis. Figures were submitted showing wages in cities where unions have been established. Mr. Thorpe said that many cities pay as high as the 32 cents an hour flat rate demanded for the men at Indianapolis. Chairman Duncan of the commission pointed out that the cities on the list were on the Pacific Coast, where wages are much higher, and that the list showed union men receiving as low as 18 cents and 20 cents per hour.

When the matter of arranging the schedules so that 75 per cent of all runs should be straight earlies and lates was discussed, Mr. Latta, for the company, submitted a schedule of one of the lines of the Indianapolis Traction & Terminal Company and asked that Mr. Thorpe prepare a schedule showing how the runs on that line could be arranged in accordance with the demand. Mr. Duncan overruled the objections which were raised to this, stating:

"You are asking that these demands be granted, and we want to know how much it will cost the company. You should be prepared to sustain your demands with proof. Do your best to have the information ready for the commission."

On Dec. 19 and the morning of Dec. 20 Mr. Thorpe was very closely cross-examined, not only by the attorney for the company, but also by each of the commissioners. The commission insisted that the witness should be required to

disclose the details of the work of organization and the happenings prior to and during the strike. It was then brought to light by the cross-examination that no local union existed in Indianapolis the day the strike was called; that the election of local officers was held the day following, when mobs had prevented the operation of the cars; that Mr. Thorpe himself had drawn up the original brief demands, with only two men present, on Oct. 30; that he had written the paper calling the strike for the night of Oct. 31, and that this paper was in the hands of the printer before the expiration of the twenty-four hours which had been given the company to make a reply.

Under cross-examination by Mr. Latta, it was stated by Mr. Thorpe, in spite of his former testimony that the last thing the Amalgamated Association ever did was to call a strike, that in this case a strike had been called without a vote being taken by the men and without there even being a local organization actually in effect. Mr. Duncan asked Mr. Thorpe whether the union thought it had the right to stop the operation of cars by force, or whether it thought it had the right to prevent a man operating a car in case he did not wish to join in the union movement. Mr. Thorpe said that the policy was persuasion and arbitration.

Attorney Latta asked the witness whether he had investigated labor conditions and wages in Indiana and adjoining states before making demands for the increase. Mr. Thorpe said he had not. Questioned as to why, for example, the company should pay 30 cents an hour for a laborer to shovel gravel, as demanded, when the same class of labor in Indianapolis was paid only 20 cents, Mr. Thorpe contended that the union man had an inherent right to higher wages than a non-union man. Mr. Thorpe said that if the union was recognized and it became necessary for the company to lay off men, the union men would dictate which men should be laid off. Mr. Duncan asked the witness if the strike had been called for Hallowe'en night because Hallowe'en was known to be a night when a certain amount of lawlessness was expected. Mr. Thorpe said he did not know just what the conditions were.

Attorney Latta brought out the fact that in many cities where the Amalgamated Association had conducted campaigns the militia had to be called to suppress riots. Mr. Latta read into the record the detailed financial report of the Amalgamated Association as given in its official organ. He also read from the same source a statement signed by the executive council of the union that "the producer, the worker, should receive all of the fruits of the production." Mr. Latta also read from the official organ of the Amalgamated Association a statement of the executive officials of that association that the union had found that strikes could be won by conducting a contest that would prove more expensive for the company than to grant the demands of the employees.

W. D. Mahon, international president of the Amalgamated Association, took the stand for the employees on the afternoon of Dec. 20. Mr. Mahon's testimony related almost entirely to a description of the Amalgamated Association and its purposes. He informed the commission that in the matter of the schedules which they had been instructed to prepare in order to show how the company could arrange that 75 per cent of the runs should be straight earlies and lates, it was impossible for them to prepare such a schedule, even with an expert schedule maker, as only those fully conversant with the local conditions and operation of the lines of the company could possibly arrange these schedules satisfactorily.

E. B. Peck, vice-president of the Indianapolis Traction & Terminal Company, was called to the stand by Mr. Roby, one of the attorneys for the employees. He was questioned as to the financial affairs of the company and asked for operating figures for different periods during the last five years. Mr. Peck informed the commission that it was impossible to give this information off-hand. This finally led the commission to ask that the company prepare and file with the commission as soon as possible statements giving all the necessary information regarding the financial condition of the company. The commission stated that as the employees are asking for increases in wages and changes in working conditions which will add to the expenses of the company, it wishes to go thoroughly into the matter of in-

come and expenditures in order to ascertain if it is possible for the company to meet the increase in expenditures.

The attorneys for the employees rested their case on the evening of Dec. 20.

Mr. Latta opened the company's side of the case on the morning of Dec. 22, and will probably require about ten days to introduce the company's testimony.

Means of Securing Rapid Transit for Cincinnati Discussed

At a meeting of representatives of the interurban committee of the Business Men's Club, Chamber of Commerce, Federated Improvement Association, Taxpayers' Association, City Club and Real Estate Exchange, after a dinner at the Business Men's Club on the evening of Dec. 17, the proposed loop for the purpose of giving Cincinnati rapid transit and allowing the entrance of interurban cars to the heart of the city was discussed. Mayor Hunt opened the proceedings with an address in which he pointed out the need for the improvement in order to preserve the importance of the city as an industrial and commercial center. He referred to the Cincinnati Southern Railroad, which was built by the city years ago for the purpose of opening the southern country. It is one of the city's chief assets now, he said. There is competition and strife between cities, and Cincinnati must realize that it is necessary to keep fully abreast of the times in all kinds of improvements.

In his address to the representatives of the civic associations, G. F. Swain, chairman of the Boston Transit Commission and consulting engineer of the Cincinnati rapid transit loop, said in part:

"The congestion of the streets is increasing and transit by surface means becomes slower and slower. Three remedies are possible: First, new streets; second, elevated lines; third, subways. New streets are generally impracticable. Elevated lines have the great disadvantage that they destroy property values. They are, however, relatively inexpensive. To-day subways are much more in favor. Subways, however, are very expensive. They increase property values. Generally speaking, an elevated road in a city, in the public streets, will cost from \$500,000 to \$750,000 per mile of double track. The cost of subways will vary, not including equipment, from about \$2,000,000 to \$6,000,000 per mile of double track.

"The conclusion which I have reached after studying the problem is that your great opportunity, if not, indeed, your only salvation, lies in making use of the canal and in constructing a loop along its line and around the easterly portion of your city. This loop should be part subway and tunnel and part surface line, connecting with all the interurban lines around the circumference. With a subway along the line of your canal you will avoid some of the principal elements of cost and reduce by more than one-half the usual cost of a subway. The surface line would involve some difficulties, but none of them, in my opinion, serious. On this loop line a train service may be run connecting by transfer with all the outlying lines and freight cars may be brought in at night to some central freight station.

"This loop line would afford the citizens of Cincinnati a train service in which trains of four or more cars could run on two-minute headway or less and at a speed of 30 m.p.h. Cars could be used seating, say, seventy-two passengers and carrying more than 200 when full. Stations could be located about a mile apart with the platforms on a level with the floors of the cars so that loading and unloading would be quick and easy. The suburban districts of your entire city would, in my opinion, grow more rapidly than they are growing at present. The project should be thoroughly investigated, for it is in line with the tendency of the times."

City Engineer Waite told of the appointment of Messrs. Procter, Julian and Schneider by Mayor Hunt as a commission on high-speed interurban electric railway service for Cincinnati and of their employment of Bion J. Arnold to make an investigation, and he outlined Mr. Arnold's report. He said in part:

"A study of the situation by Mr. Arnold and the commission developed the fact that by the construction of a section between Norwood and St. Bernard a loop could be made which would give to the city of Cincinnati a belt line.

"Council passed a resolution authorizing a bond issue of

\$50,000 to make the necessary surveys for a subway, and as a result in June, 1913, an organization was started with F. B. Edwards, formerly of the Boston and Cambridge subways, in charge. George F. Swain, of Harvard University and president of the Boston Transit Commission, was engaged as consulting engineer. At this time we are not able to give you any definite figures as to the probable cost, but we are able to say that the lines suggested by Mr. Arnold are possible of construction. From the study which we have made of the entire situation, we believe that the proposed route by occupying the canal will give to Cincinnati a solution of its rapid transit perplexities at a cost within its earning capacity and add to it an impetus of growth which it has needed."

The City Council has taken the first step toward the revocation of the White-Bleekman franchise for an interurban depot, and it is said that the majority of the members are in favor of final action to that effect. Mayor Hunt is also in favor of nullifying the franchise on the ground that its terms have not been complied with. Both A. S. White and James E. Bleekman have entered protests against such action and assert that it has been almost impossible to make a move toward the construction of the depot because of the opposition made by the city.

Strike on Allegheny Valley Railway

The unionized car men on the Allegheny Valley Railway, Tarentum, Pa., have been on a strike since Dec. 10. The cars were started out with non-union men promptly after the strike and regular service was maintained until the afternoon of the first day when rioting began. The cars were also started on Dec. 11 and operated until stopped by rioters in and around Tarentum, who stoned the cars and pulled the crews off the platforms. Owing to the failure of the local authorities to protect the company and its men properly no further attempt to resume service was made until 10 a. m. on Dec. 16, at which time the members of the State Constabulary arrived on the scene. They immediately restored order and since that time cars have been run on regular schedule by non-union men with little or no interference.

The trouble between the company and the men originated when the president of the local union was discharged for violation of the rules and fighting in the crew room. The employees who were members of the union insisted upon their president being reinstated and voted, thirty-nine to three, there being only forty-two men on the line, to strike unless he was reinstated. Without waiting for the strike order to be carried out the management notified the men to come and get their pay and immediately placed non-union men on the cars.

The Allegheny Valley Railway is one of the constituent lines of the West Penn Traction Company. It comprises 22 miles of track out of a total of 314 miles for the entire West Penn system.

Proposal to Increase Stock of Cleveland Railway

At a special meeting of the directors of the Cleveland Railway on Dec. 19, it was decided to take final action at the regular monthly meeting on Dec. 26 on a proposition to ask the stockholders to authorize an issue of additional stock. It is thought the amount will be \$2,000,000. It is said that \$1,600,000 is needed at once to take care of extensions and betterments already planned and make good the deficits incurred. The new carhouse and shops in the southern part of the city and the Harvard-Denison line, recently put into operation, were the principal works completed during the year. Most of the replacements were taken care of as maintenance charges. The proposed increase in the capital stock of the company will mean larger fixed charges, and if the increase is opposed by the city officials the case will likely be argued at length before the Public Utilities Commission.

The village of East Cleveland has passed an ordinance offering the Cleveland Railway the privilege of laying a double track on Superior Avenue to its intersection with Euclid Avenue, the final step having been taken on the evening of Dec. 17. This comprises a stretch of about 2000 ft. Both thoroughfares are extensions of city streets of the same name. The village requires the company to accept a

fare of 3 cents on the Superior Avenue line until the running time between the village and the Public Square in the city is reduced to twenty-five minutes, when 5 cents may be charged. This is an inducement to the city to build four tracks on Superior Avenue between East Ninth Street and East Fifty-fifth Street, so that express cars may be operated for the East Cleveland people. The fare on the Euclid Avenue line is to remain 3 cents.

The city engineers have prepared plans for a subway terminal under the Public Square, and they will be presented to Council at an early date. The plans include a subway from East Ninth Street to the Public Square on one of the principal thoroughfares.

Furthering Rapid Transit Construction in Brooklyn

During the week ended Dec. 20 the Public Service Commission for the First District of New York took another important step in the furtherance of the construction work in Brooklyn under the dual system subway contracts. This was the conclusion of an agreement with the New York Municipal Railway Corporation for the acquisition of an easement by the city in the property of the South Brooklyn Railway in the right-of-way of that company along Thirty-eighth Street, Brooklyn, from Fourth Avenue to Tenth Avenue. This right-of-way is to be used by the city for the construction of a depressed railroad to connect the Fourth Avenue subway with the proposed elevated lines to Coney Island through New Utrecht and Gravesend Avenues over the routes now known as the "West End" and "Culver" lines. The city agrees to pay \$1,000,000 for this easement and to credit the New York Municipal Railway Corporation with that amount against its promised contribution of \$13,500,000 toward the cost of construction of the new lines. At the same time the commission adopted the form of two agreements with the New York Municipal Railway Corporation modifying the dual system operating contract, and these will be executed as soon as the deed for the easement is signed. The modifying agreements authorize the New York Municipal Railway Corporation to undertake and complete the construction of the depressed railroad through the Thirty-eighth Street cut and the reconstruction of the Centre Street loop so as to fit it for permanent operation. The Centre Street loop has four tracks, and at present only the two easterly tracks are being operated. The agreements provide that the Thirty-eighth Street work shall be completed within eighteen months and the Centre Street loop work within nine months from the delivery of the agreements. The commission also approved an agreement between the New York Municipal Railway Corporation and Jacob & Davies, Inc., construction engineers, to take exclusive charge of the work required in the Thirty-eighth Street cut and the Centre Street loop. The company agrees to pay the engineers \$27,500 per year while the work in Thirty-eighth Street and that in the Centre Street loop are going on simultaneously, and \$20,000 a year while such works are not prosecuted at the same time.

Railroad Valuation Plan Outlined

The government Board of Engineers and the committee of railroad engineers in charge of physical valuation of the railroads have agreed upon a tentative plan of procedure in carrying out the work. The railroads will furnish the government with a complete inventory of all property owned, exclusive of grading. This inventory will give three valuations—original cost, replacement cost and replacement cost less depreciation. The army board will survey all rights of way and make cross-section surveys of the grading elevations and cuts and in conjunction therewith will check up the inventories previously submitted by the railroads. A railroad engineer representing the road under investigation will be permitted to accompany each government board, and the railroads will receive daily copies of the reports submitted by the government engineers. It is estimated it will cost the government between \$25,000,000 and \$30,000,000 to make a complete valuation of all the railroads. The cost to the railroads will be between \$15,000,000 and \$20,000,000.

Work will be started upon an experimental basis early in January. The preliminary valuations will cover the properties of the Atlanta, Birmingham & Atlantic Railway and

City Southern Railway in the Middle West, including about 100 miles of the Santa Fé, and of the Rock Island in Oklahoma, where the railroads recently made reports upon physical valuation to the state commission, and of the San Pedro, Los Angeles & Salt Lake Railroad, running from Salt Lake to Los Angeles.

Traffic Problems in Liverpool

The traffic problem at the Liverpool (England) docks and the question of the transport of goods in the district generally have caused considerable discussion for some time, and various schemes have been propounded, particularly for the relief of the congestion at the docks. The Liverpool City Council requested that a report be prepared on the practicability of using the tramway system for the conveyance of goods to neighboring towns, with which Liverpool is linked by the route passing through Knotty Ash on to St. Helens and so to the various important manufacturing centers not only of Lancashire but of Yorkshire. That report has now been prepared by C. W. Mallins, manager of the Liverpool Corporation Tramways, and will be brought before the Council. In the report the question is dealt with under two heads: (1) local traffic between the docks and railway stations and warehouses, and (2) the transport of merchandise between the Liverpool docks and the manufacturing centers. In regard to the first point, Mr. Mallins expresses the opinion that if a thoroughly well-organized system, equipped with the most modern type of mechanically propelled vehicles, were provided to deal with the work now done by the horse-drawn vehicles, that work could be done by half the number of vehicles, thus materially reducing the congestion and the cost of the present methods. In regard to the second point the first consideration is the facilities the Mersey Docks and Harbor Board are prepared to grant to enable any new system of transport to enter the dock estate. Mr. Mallins is of the opinion that it is quite impracticable to operate a good service of any magnitude over the existing lines. The most that could be done with the existing lines would be to run three or four trains a day at a small capital expenditure. If this were successful and the Dock Board and the Bootle Corporation provided the necessary facilities, a more elaborate system could be established. The scheme suggested would involve the electrification of the dock railway, or the construction of a new line of tramways parallel with it, and the construction of tramways dealing with the north and south docks traffic and connected with Knotty Ash, at an outlay of £246,750.

Progress with Kansas City Franchise

An entirely new ordinance, to be independent of the franchise now before the Council, and to provide for the routing of cars at the new Union Station, will probably be presented by the committee of the Council of Kansas City, Mo., which is considering the Metropolitan Street Railway grant. The proposed new ordinance also is likely to specify the extensions which shall be built during the next three years. The question of whether cars shall run on the plaza at the new depot has been a troublesome one and may be disposed of by the new plan. L. R. Ash and P. J. Kealy, engineers for the Metropolitan Street Railway and for the city, have recommended the building of 18½ miles of extensions, which they regard as reasonable.

Members of the committee of the Council considering the Metropolitan Street Railway franchise introduced the reduced fare idea recently. Ford Harvey, receiver for the company, asserted that it would be impossible to finance the company were fares to be reduced. Alderman Frank Welch advocated ten tickets for 25 cents to school children, good on school days between 7.30 and 9.30 a. m. and 3 and 5 p. m. Alderman George Hoffman went further and asked for six tickets for 25 cents for everyone, half fare for school children and free service for children under seven years when accompanied by an older person.

The joint committee of the Kansas City Council which is considering amendments to the Metropolitan franchise ordinance adjourned until Dec. 26, because of the inability of Alderman George H. Edwards to attend meetings prior to

that date. It was planned to resume hearings at that time and to get the ordinance back to the City Council early in January if possible. Of the hundreds of suggestions which have been offered few have been important enough to warrant inserting in the ordinance.

New Texas Road Opened.—The Jefferson County Traction Company placed its new line between Beaumont and Port Arthur, Tex., in operation on Dec. 16, 1913.

Cards Advertising Liquor Removed.—As the result of the passage of an ordinance prohibiting advertisements of liquors in Kansas City, Kan., the Metropolitan Street Railway has removed all such cards from cars entering that city. The ordinance took effect Dec. 15.

Route Signs in Pittsburgh.—The Pittsburgh (Pa.) Railways has adopted the car-numbering system and has placed figures 2 ft. high on the cars of the lines running through the city. It is proposed after the patrons have become familiar with the new system to remove the names of streets from the cars.

New Depot Loop Line in Detroit.—First operation of the new depot loop and the opening of the new Michigan Central station in Detroit have been arranged for Jan. 4. Depot cars will operate from the station on Fourteenth Avenue to Michigan Avenue, thence to Woodward Avenue, to Congress Street, to Griswold Street and back to Michigan Avenue.

Toronto Purchase Held Up.—On Dec. 18 the Board of Control of the city of Toronto, Ont., reversed its decision of the day previous and passed a motion to notify Sir William MacKenzie that all negotiations for the proposed purchase of the Toronto Railway and the Toronto Electric Light Company were at an end. The resolution must now go before the City Council for ratification, where it may be negated by a straight majority vote. Another solution to the transportation problem of the city has been presented to the Board of Control by W. H. Widmer and referred to Commissioner Harris for a report thereon. The plans show a belt line around the city in a semi-circle, extending as far north as York Mills, with a line along the waterfront. The system provides for a four-way track, the two inner lines to be devoted to rapid transit service at 30 m.p.h. including stops.

Arrests in Connection with Wrecking Street Car in Cincinnati During Strike.—William Molloy, metal worker, thirty-nine years of age, and John Brulard, twenty-four years old, a marble setter, were arrested on Dec. 18 on the charge of taking part in wrecking a Warsaw Avenue car of the Cincinnati Traction Company in front of the new Union Central building in Cincinnati during the strike of the street railway employees last May. Both were working on the new building at the time and are accused of throwing missiles from the upper floors of the building at the car. Molloy confessed that he had thrown a bag of plaster and a metal window weight out of a window to the street. Brulard denied that he threw anything into the street. Both were locked up. Warrants have been issued for fourteen other workmen on this building on similar charges.

Report on Underground Franchises in Toronto.—City Solicitor Johnston of Toronto, Ont., reported to the Board of Control on Dec. 16 that the only underground suburban railway franchises affecting Toronto and adjoining municipalities that he was aware of are held by the Hamilton Radial Electric Railway and the Hamilton, Waterloo & Guelph Railway. Mr. Johnston said: "The rights possessed by these different companies can only be gathered from a perusal of all the statutes relating to each company. I do not, however, take the above order to mean that you wish all the powers of each of the companies to be extracted from the statutes. If this is the meaning of the order, it will take a very considerable time to peruse all these different statutes and agreements." Comptroller Foster thought that there was a franchise from the east, but the Mayor told him that he was wrong. Comptroller Church remarked that there were about seventeen radial and electric and railway franchises, some of them provincial charters, and that under the Ontario Railway Board act of 1906 all these lines could exchange traffic with the civic lines.

Final Brakeshoe Hearing in New York.—On Dec. 19 the final hearing in regard to the installation of composition brakeshoes on the surface railways of New York City was held before the Public Service Commission for the First District of New York. After a conference between representatives of the New York Railways, the Brooklyn Rapid Transit Company, the Third Avenue Railway and others and the engineers of the commission, an order was issued by the commission to the effect that the companies will have until March 1, 1915, to equip all their cars with brakeshoes containing a lubricant or with some other effective device for the mitigation of "squealing." This time is given the companies in order that they may complete their tests to ascertain what kind of device it will be best to install. It is expected that the formal acceptance of the order by the companies will be received by the commission in the near future. As has been previously stated in the *ELECTRIC RAILWAY JOURNAL*, a composition-filled shoe is already in operation for experimental purposes on the Montague Street line of the Brooklyn Rapid Transit Company and the Madison Avenue line of the New York Railways.

PROGRAMS OF ASSOCIATION MEETINGS

International Electrical Congress, San Francisco, 1915

The International Electrical Congress is to be held at San Francisco, Cal., Sept. 13 to 18, 1915, under the auspices of the American Institute of Electrical Engineers by authority of the International Electrotechnical Commission, and during the Panama-Pacific International Exposition. Dr. C. P. Steinmetz is the honorary president. The deliberations of the congress will be divided among twelve sections which will deal exclusively with electricity and electrical practice. There will probably be about 250 papers. The first membership invitations will be issued in February or March, 1914.

Attention is drawn to the distinction between this electrical congress and the International Engineering Congress which will be held at San Francisco during the week immediately following the electrical congress. The engineering congress is supported by the civil, mechanical and marine engineering societies and by the Institutes of Mining and Electrical Engineers, as well as by prominent Pacific Coast engineers who are actively engaged in organizing it. This congress will deal with engineering in a general sense, electrical engineering subjects being limited to one of the eleven sections which will include about twelve papers treating more particularly applications of electricity in engineering work.

Wisconsin Electrical Association

Secretary George Allison, of the Wisconsin Electrical Association, has given out a revised program for the annual meeting of this association, which will be held in the Hotel Pfister, Milwaukee, on Jan. 15 and 16. In addition to the following program of papers the secretary intends to add a paper on the commercial department of electric utilities:

Paper, "High Efficiency Incandescent Lamps and Their Central Station Applications," by Prof. S. E. Doane, chief engineer of the National Lamp Association.

Paper, "Some Problems of Public Utility Accounting and Rate Making," by Halford Erickson, member of the Wisconsin Railroad Commission.

Paper, "Street Railway Traffic Surveys in Relation to Railway Operation, Management and Regulation," by C. M. Larson, chief engineer of the Wisconsin Railroad Commission.

Paper, "A Practical Accounting System for Small Central Stations," by H. G. D. Nutting, assistant to the president of the Clement C. Smith properties.

Paper, "Voltage Regulation, Its Necessity and How Accomplished," by G. G. Post, electrical engineer of the Milwaukee Electric Railway & Light Company.

Paper, "Review of New Laws Affecting Public Utilities," by John B. Sanborn, of Sanborn & Blake, attorneys.

Paper, "Comparative Maintenance of Car Electrical Equipment, Modern vs. Old Type," by experts from the General Electric Company and the Westinghouse Electric & Manufacturing Company.

Several standing committees will also report.

Financial and Corporate

Stock and Money Markets

Dec. 23, 1913.

Stocks were strong at the opening of trading on the New York Stock Exchange to-day, but toward the close the market eased off and trading became dull. Sales to-day total 368,860 shares. The local traction bonds were strong, the Interborough-Metropolitan 4½'s advancing nearly a point, while New York Railways 5's gained more than a point. Rates in the money market to-day were: Call, 3 @ 3½ per cent; thirty days, 5¼ @ 5½ per cent; ninety days, 4¾ @ 5 per cent; four, five and six months, 4 @ 4¾ per cent.

There were very few changes in prices of stocks traded in on the Philadelphia Exchange to-day. Philadelphia Rapid Transit, after advancing to 19 for an odd lot, reacted to 18½ and was later offered at 18½. Union Traction sold at 44¼.

The Chicago market was narrow to-day, and the volume of transactions was small.

Trading in Boston to-day was broad and fairly active. New Haven advanced to 73½. The demand for bonds was fair.

Trading in stocks in Baltimore was extremely narrow and dull. The bond transactions totaled \$103,200, par value.

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

	Dec. 17	Dec. 24
American Brake Shoe & Foundry (common).....	87	86
American Brake Shoe & Foundry (preferred).....	127	126½
American Cities Company (common).....	36	36
American Cities Company (preferred).....	63¾	60
American Light & Traction Company (common).....	333	334
American Light & Traction Company (preferred).....	106	106
American Railways Company.....	38¼	38
Aurora, Elgin & Chicago Railroad (common).....	a42	a42
Aurora, Elgin & Chicago Railroad (preferred).....	a84	a84
Boston Elevated Railway.....	85	86½
Boston Suburban Electric Companies (common).....	7	7
Boston Suburban Electric Companies (preferred).....	6	6
Boston & Worcester Electric Companies (common).....	*6½	*6½
Boston & Worcester Electric Companies (preferred).....	37	37
Brooklyn Rapid Transit Company.....	86¼	83
Capital Traction Company, Washington.....	111	110½
Chicago City Railway.....	160	160
Chicago Elevated Railways (common).....	25	25
Chicago Elevated Railways (preferred).....	75	75
Chicago Railways, pteptg., ctf. 1.....	a90	91½
Chicago Railways, pteptg., ctf. 2.....	28½	28¼
Chicago Railways, pteptg., ctf. 3.....	7	7
Chicago Railways, pteptg., ctf. 4.....	1¾	1¾
Cincinnati Street Railway.....	110	107½
Cleveland Railway.....	103½	103½
Cleveland, Southwestern & Columbus Ry. (common).....	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred).....	*30	*30
Columbus Railway & Light Company.....	18	18
Columbus Railway (common).....	59½	59¼
Columbus Railway (preferred).....	88	88
Denver & Northwestern Railway.....	*80	*80
Detroit & United Railway.....	a80	80
General Electric Company.....	135¾	140
Georgia Railway & Electric Company (common).....	119	119¼
Georgia Railway & Electric Company (preferred).....	84½	84
Interborough Metropolitan Company (common).....	14¾	15
Interborough Metropolitan Company (preferred).....	59	60¾
International Traction Company (common).....	*30	*30
International Traction Company (preferred).....	*90	*90
Kansas City Railway & Light Company (common).....	*20	*20
Kansas City Railway & Light Company (preferred).....	*30	*30
Lake Shore Electric Railway (common).....	6	*6
Lake Shore Electric Railway (1st preferred).....	92	*92
Lake Shore Electric Railway (2d preferred).....	24	*24
Manhattan Railway.....	127	125
Massachusetts Electric Companies (common).....	10	10¼
Massachusetts Electric Companies (preferred).....	64	63
Milwaukee Electric Railway & Light Co. (preferred).....	95	*95
Norfolk Railway & Light Company.....	24¾	24¾
North American Company.....	66	67
Northern Ohio Light & Traction Company (common).....	70	70
Northern Ohio Light & Traction Company (preferred).....	101	101
Philadelphia Company, Pittsburgh (common).....	39	39
Philadelphia Company, Pittsburgh (preferred).....	39	39
Philadelphia Rapid Transit Company.....	18	18
Portland Railway, Light & Power Company.....	53	53
Public Service Corporation.....	105	105
Third Avenue Railway, New York.....	39¾	41½
Toledo Traction, Light & Power Company (common).....	15	30
Toledo Traction, Light & Power Company (preferred).....	75	80
Twin City Rapid Transit Co., Minneapolis (common).....	103	105½
Union Traction Company of Indiana (common).....	11½	*11½
Union Traction Company of Indiana (1st preferred).....	80	*80
Union Traction Company of Indiana (2d preferred).....	14	14
United Rys. & Electric Company (Baltimore).....	24¾	24¾
United Rys. Inv. Company (common).....	16	20
United Rys. Inv. Company (preferred).....	32	37
Virginia Railway & Power Company (common).....	56	56
Virginia Railway & Power Company (preferred).....	97½	99¼
Washington Ry. & Electric Company (common).....	85	85
Washington Ry. & Electric Company (preferred).....	86½	87
West End Street Railway, Boston (common).....	67½	68
West End Street Railway, Boston (preferred).....	90	90
Westinghouse Elec. & Mfg. Company.....	63	65
Westinghouse Elec. & Mfg. Company (1st preferred).....	112	114

*Last sale. a Asked.

Columbus Utility Merger to Go in Effect in February

It has been announced that the consolidation of the Columbus (Ohio) Railway, the Columbus Edison Company and the Columbus Railway & Light Company, as the Columbus Railway, Power & Light Company, will become effective Feb. 4, 1914. Owing to the fact that but a little more than 40 per cent of the Columbus Light, Heat & Power Company stocks have been deposited with the committee in charge of the consolidation, that company will not be included, but the lease of its properties will continue to be held by the Columbus Railway & Light Company, and they will be operated by the consolidated corporation. The work of the reorganization of the Columbus public utility companies has been delayed by the refusal of the majority of the stock of the Columbus Light, Heat & Power Company to agree to the merger.

A meeting of the Columbus Railway & Light Company will be held Jan. 5, 1914, at which the lease held by that company on the properties of the Columbus Railway, Power & Light Company, the Columbus Railway and the Columbus Edison Company will be cancelled. At the same time, the stockholders will vote upon the sale of a part of the assets of the company to the Columbus Railway, Power & Light Company.

The assessment of \$20 a share on the stock of the Columbus Railway & Light Company, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 13, 1913, will realize \$1,000,000 for use in paying off floating debt of the company. With this done the company will be free from debt and have in its treasury a substantial amount of the common stock of the Columbus Railway, Power & Light Company. It is expected that this stock will be exchanged for Columbus Railway & Light Company stock, after the assessments have been paid, in the ratio of three shares of Columbus Railway, Power & Light Company common stock for five shares of Columbus Railway & Light Company stock.

Series A and B of the preferred and the common stock of the Columbus Railway, Power & Light Company will be exchanged for the common and preferred stocks of the Columbus Edison Company and the Columbus Railway. With all these exchanges completed the Columbus Railway, Power & Light Company will have outstanding \$10,738,600 of Series A and B preferred and common stocks, with underlying bonds to the amount of \$8,091,000. In addition, through the Columbus Railway & Light Company, it will control the leases on the properties of the Columbus Light, Heat & Power Company, which has \$726,800 of stocks and \$471,700 of bonds.

Soon after the meeting of the Columbus Railway & Light Company the Columbus Edison Company and the Columbus Railway stockholders will meet and approve the terms of consolidation.

The consolidated properties will be under operating management of E. W. Clark & Company, of Philadelphia. C. M. Clark, representing the company in the reorganization proceedings, recently issued the following statement relative to the situation at present and the prospects for the future:

"A great many inquiries have been received from the Columbus Railway common stockholders and the Columbus Railway & Light Company stockholders in regard to the prospects of the new company and the probability of dividends on the new common stock. Of course, it is impossible for anyone to forecast the future, but an answer can be made to such inquiries, based upon experience extending over a great many years in the public utility business. Assuming that business conditions are normal, the management fully expects to continue the 5 per cent dividends upon the common stock without interruption. Estimates made indicate that a safe margin will be earned over and above these dividends. The rate of fare, namely, eight tickets for 25 cents, is extremely low, and were it not for the fact that the Columbus street railway system has for years been operated on a most economical basis, because of good management and natural conditions which make economical operation possible, there would be no profit in such low fares.

"The reorganized company will be in a strong financial position and able to handle all requirements. Speaking for E. W. Clark & Company and their interest in the property, I desire to say that we purpose to pay our assessments and continue and increase our interest in the property, because we have faith in its future."

East St. Louis & Suburban Company Readjustment

Notices of a proposed change of capitalization have been sent to stockholders of the East St. Louis & Suburban Company, East St. Louis, Ill., by E. W. Clark & Company, Philadelphia. In view of recent legislation in New Jersey, where the company was chartered, it is planned to organize, probably under the laws of Maine, a new corporation to be known as The East St. Louis & Suburban Company, to which all the assets, debts and obligations of the existing company will be transferred. In place of the \$7,000,000 of preferred and \$7,000,000 of common stock outstanding, the new capitalization will be as follows: 6 per cent five-year convertible bonds, \$2,000,000; 5 per cent cumulative preferred stock, \$6,000,000; common stock, \$6,000,000.

Under the plan preferred shareholders receive the privilege of converting one-seventh of their holdings into an equal amount in par value of convertible bonds upon payment of \$20 a share. The remaining six-sevenths of their stock will be exchanged for an equal amount of 5 per cent preferred stock in the new company. Common stockholders may exchange one-seventh of their holdings into bonds by paying \$55 a share and surrendering the remaining six-sevenths for an equal amount of new common stock. In case the plan is declared operative, stockholders who do not desire to subscribe will be permitted to exchange their present stock, share for share, for a like amount in the new corporation, without any payment.

The \$2,000,000 of bonds, which are part of an issue of \$3,000,000, will be convertible up to July 1, 1918, into an equal amount in par value of 6 per cent cumulative preferred stock and, in addition, 33 1-3 per cent in common stock. The 5 per cent preferred shares may at any time be exchanged one-half into 6 per cent cumulative preferred and one-half into common stock.

Chicago (Ill.) Railways.—Holders of participation certificates of the Chicago Railways ratified on Dec. 22 the Council ordinance and operating agreement of Nov. 13 for unified operation of surface street railways in the city of Chicago. The vote cast in favor was 182,826, out of 261,802 outstanding. There were no dissenting votes.

Cities Service Company, New York, N. Y.—The Cities Service Company has declared regular monthly dividends of one-half of 1 per cent on its preferred stock and five-twelfths of 1 per cent on its common stock, both payable Jan. 1 to stockholders of record of Dec. 15. The board of directors also declared a monthly dividend of one-half of 1 per cent on its preferred stock and a monthly dividend of one-half of 1 per cent on its common stock, both payable Feb. 1 to stockholders of record of Jan. 15. This increases the disbursement on the common stock from 5 per cent to 6 per cent annual rate. It has been announced that Henry L. Doherty & Company and the Cities Service Company will open an office in London and several prominent London men will be added to the board of directors of the Cities Service Company. The capital stock of the company is listed on the London Stock Exchange.

Connecticut Company, New Haven, Conn.—The stockholders of the Connecticut Company at a special meeting on Dec. 22 amended the company's by-laws to provide for a chairman of the directors. The directors will meet in a few days and elect Howard Elliott chairman and L. S. Storrs president. Mr. Elliott is now president and Mr. Storrs vice-president of the company.

Dayton (Ohio) Street Railway.—The Dayton Street Railway has declared an initial quarterly dividend of 1½ per cent on the \$650,500 of 5 per cent cumulative preferred stock which is outstanding.

Fayetteville Street Railway & Power Company, Fayetteville, N. C.—The property of the Fayetteville Street Railway & Power Company has been sold under foreclosure for \$70,000 to H. T. Detehert, Philadelphia, Pa., representing the bondholders. The company was placed in the hands of H. L. Brothers, Fayetteville, N. C., as receiver in October, 1913.

Interborough-Metropolitan Company, New York, N. Y.—The \$1,817,000 of 6 per cent two-year notes of the Interborough-Metropolitan Company which matured on Dec. 22

were paid on that date by the company. Payment was made from the proceeds of a new issue of \$1,500,000 of 6 per cent notes running for six months and from funds already in the treasury. On Jan. 1, 1914, the company has \$2,039,520 of collateral trust 6 per cent notes of 1908 maturing, and it is understood that these will be taken care of in the same manner as the first-mentioned issue.

Johnstown (Pa.) Traction Company.—Papers were filed at Harrisburg on Dec. 16 merging under the title of the Johnstown Traction Company, with \$2,000,000 of authorized capital stock, the Johnstown Traction Company and its leased line, the Johnstown Passenger Railway. The American Railways, which formerly owned the Johnstown Passenger Railway, will receive approximately \$2,700,000 for its investment of about \$2,200,000 made four years ago in the stock of the Johnstown Passenger Railway. A large part of the price will be in cash and the balance in securities of the Johnstown Traction Company. In connection with the merger it is proposed to retire the \$1,500,000 of American Railways-Johnstown Passenger Railway collateral trust 5's by offering them at 102½ for new 5 per cent first refunding mortgage bonds of the merged companies at 95. The American Railways owned 90 per cent of the capital stock of the Johnstown Passenger Railway. The road was afterward leased to the Johnstown Traction Company, which was organized by the du Pont interests, and an option was given to that company by the American Railways to purchase the Johnstown Passenger Railway within five years. The present sale is in exercise of that option.

Macon Railway & Light Company, Macon, Ga.—Jesse B. Hart, Curran R. Ellis and Orville A. Park have been elected directors of the Georgia Public Service Corporation to succeed John Walker, T. D. Masee and Jack Nyhan. Mr. Hart has been elected vice-president of the company, the stock of which is controlled by the Macon Railway & Light Company.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—The Milwaukee Electric Railway & Light Company has applied to the Railroad Commission for authority to issue \$3,500,000 of 4½ per cent refunding and extension twenty-five-year bonds, dated Jan. 1, 1906. The bonds are part of an authorized issue of \$20,000,000, and are to be deposited as collateral, under an authorized issue of \$90,000,000 general and refunding mortgage bonds, of which \$4,700,000 were issued from August, 1911, to October, 1913, for capital expenditures.

Northern Ohio Traction & Light Company, Akron, Ohio.—At the annual meeting of the stockholders, to be held on Jan. 24, the shareholders of the Northern Ohio Traction & Light Company will be asked to approve an increase in the 6 per cent preferred stock of the company from \$3,000,000 to \$5,000,000. All of the \$3,000,000 preferred stock is now outstanding. None of the new preferred stock is to be issued, unless earnings applicable to the payment of preferred dividends are for the twelve months preceding the sale of the stock equal to three times the dividend requirements on the preferred stock then outstanding and also on the amount of new preferred stock to be issued. At present the Northern Ohio Traction & Light Company is earning about three and a third times the dividends on the present outstanding amount, so that a part at least of the new stock may be issued at once. The directors also will ask the stockholders to approve a plan by which the company will provide for the payment of the normal income tax on all Northern Ohio Traction & Light Company bonds, so that no deductions will be made on coupons deposited for collection.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Oakland, Antioch & Eastern Railway has obtained in New York convertible long-term loans, aggregating, it is reported, about \$1,000,000, to provide for extensions and acquisition of rolling stock. The construction of an electric railway from Marysville to Colfax is proposed.

Ohio Service Company, Dennison, Ohio.—Application has been made to the Public Utilities Commission of Ohio for permission to consolidate the following companies under the control of the Ohio Service Company: The Twin City Traction Company, the Midland Power & Traction Company, the Coshoeton Light & Heating Company, the Newcomers-

town Electric Light, Heat & Power Company and the Lafayette Light & Power Company.

Portland Railway, Light & Power Company, Portland, Ore.—F. T. Griffith, president of the Portland Railway, Light & Power Company, has made the following statement in regard to the quarterly dividend of \$1 payable Dec. 1, 1913: "On Dec. 1, 1912, the dividend on the stock was increased to \$1.25 per share and has been continued at that rate quarterly. It was expected that Portland, and, therefore, our earnings, would continue to grow approximately as during the previous seven years. In order to provide for this anticipated growth, large investments were made during 1911 and 1912 for hydroelectric plants, equipment and extensions. During the past year Portland has not grown as expected. In many respects progress has been made, but the company and many other business institutions have been temporarily over-developed. As a result, interest charges and taxes have increased at a greater rate than net earnings, and the surplus available for dividends has therefore decreased. After careful consideration of the earnings of this year and the prospects for the coming year, the directors have decided that a conservative policy requires that the Dec. 1, 1913, dividend be reduced to \$1 per share."

Reading Transit & Light Company, Reading, Pa.—At a meeting held in New York on Dec. 18, 1913, the following officers and directors were elected: Reading Transit & Light Company—Officers and directors: Norman McD. Crawford, president and general manager; J. B. Taylor, vice-president; F. V. Henshaw, vice-president; William Buchsbaum, treasurer; W. S. Barstow; G. L. Roller, assistant secretary and assistant treasurer; A. L. Kramer. J. R. Fusselman, secretary and assistant treasurer. Metropolitan Electric Company—Officers and directors: W. S. Barstow, president; Norman McD. Crawford, vice-president and general manager; J. B. Taylor, vice-president; William Buchsbaum, assistant secretary and treasurer; O. Clement Swenson. J. R. Fusselman, secretary and assistant treasurer. Neversink Mountain Railway—Officers and directors: W. S. Barstow, president; Norman McD. Crawford, vice-president and general manager; J. B. Taylor, vice-president; William Buchsbaum, assistant secretary and treasurer; O. Clement Swenson. Oley Valley Railway—Officers and directors: W. S. Barstow, president; J. B. Taylor, vice-president; Norman McD. Crawford, vice-president and general manager; William Buchsbaum, treasurer and assistant secretary; O. Clement Swenson. J. R. Fusselman, secretary and assistant treasurer.

United Railroads, San Francisco, Cal.—Arrangements have been made through Ladenburg, Thalmann & Company, New York, N. Y., and E. H. Rollins & Sons, Boston, Mass., for the extension to Dec. 15, 1915, of \$1,800,000 of first mortgage 6 per cent bonds of the Market Street Cable Railway, which mature Dec. 15, 1913. The bonds form part of an issue of \$3,000,000, of which \$1,200,000 were paid on maturity on Jan. 1, 1913.

Dividends Declared

American Cities Company, New York, N. Y., 3 per cent, preferred.

Birmingham Railway, Light & Power Company, Birmingham, Ala., 3 per cent, common and preferred.

Chicago City & Connecting Railway, Chicago, Ill., \$2.25, preferred participating certificates.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio, 2½ per cent, preferred.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

City Railway, Dayton, Ohio, quarterly, 1½ per cent, preferred; quarterly, 2 per cent, common.

Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.

Columbus (Ga.) Electric Company, 3 per cent, preferred. Columbus, Newark & Zanesville Electric Railway, Cincinnati, Ohio, quarterly, 1½ per cent, preferred.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Consolidated Cities Light, Power & Traction Company, New York, N. Y., quarterly, one-half of 1 per cent.

Halifax (N. S.) Electric Tramway, quarterly, 2 per cent.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.

Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.

Interstate Railways, Philadelphia, Pa., 30 cents, preferred. Lake Shore Electric Railway, Cleveland, Ohio, quarterly, 1½ per cent, first preferred.

Little Rock Railway & Electric Company, Little Rock, Ark., 3 per cent, preferred; 5 per cent, common.

Memphis (Tenn.) Street Railway, quarterly, 1½ per cent, preferred; 1 per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.

Porto Rico Railways, Ltd., Poncc, P. R., quarterly, 1 per cent, common.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 1½ per cent.

Reading (Pa.) Traction Company, 75 cents. Republic Railway & Light Company, New York, N. Y., 1½ per cent, preferred.

Rome Railway & Electric Company, Rome, Ga., quarterly, 1 per cent.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., quarterly, 1½ per cent.

Winnipeg (Man.) Electric Railway, quarterly, 3 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$15,028	*\$9,994	\$5,033	\$2,125	\$2,908
1 " " '12	13,315	*7,638	5,678	1,730	3,948
12 " " '13	158,139	*98,440	59,699	24,042	35,657
12 " " '12	143,664	*85,470	58,194	20,763	37,431

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$9,316	*\$8,766	\$550	\$1,025	†\$475
1 " " '12	9,595	*8,023	1,572	1,028	544
12 " " '13	124,943	*97,142	27,801	13,046	14,755
12 " " '12	120,265	*89,988	30,277	12,511	17,766

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$36,794	*\$18,752	\$18,042	\$6,082	\$11,960
1 " " '12	31,133	*16,340	14,794	5,620	9,174
12 " " '13	378,884	*206,174	172,710	71,911	100,799
12 " " '12	353,635	*193,950	159,686	68,047	91,639

COLUMBUS (GA.) ELECTRIC COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$54,378	*\$23,289	\$31,089	\$25,042	\$6,047
1 " " '12	54,913	*22,434	32,480	18,952	13,528
12 " " '13	638,157	*293,984	295,104	261,118	83,054
12 " " '12	606,595	*268,726	266,799	225,021	112,848

DALLAS (TEX.) ELECTRIC COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$226,968	*\$121,011	\$105,957	\$26,493	\$79,464
1 " " '12	202,728	*103,791	98,938	24,641	74,297
12 " " '13	2,129,316	*1,235,782	893,534	298,868	594,666
12 " " '12	1,782,511	*1,094,562	687,949	280,456	407,493

EL PASO (TEX.) ELECTRIC COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$74,566	*\$40,092	\$34,473	\$3,993	\$30,480
1 " " '12	71,029	*40,729	30,300	4,746	25,554
12 " " '13	883,873	*469,431	414,441	48,237	366,204
12 " " '12	773,258	*424,118	349,139	74,916	274,223

GALVESTON-HOUSTON ELECTRIC COMPANY, HOUSTON, TEX.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$193,411	*\$114,879	\$78,533	\$35,493	\$43,040
1 " " '12	175,449	*104,415	71,035	33,724	37,311
12 " " '13	2,322,358	*1,327,889	994,468	415,543	578,925
12 " " '12	1,932,298	*1,139,958	792,340	377,207	415,133

HOUGHTON (MICH.) COUNTY TRACTION COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$22,216	*\$13,291	\$8,925	\$5,606	\$3,319
1 " " '12	24,853	*13,202	11,650	5,677	5,973
12 " " '13	300,850	*179,876	120,974	67,758	53,216
12 " " '12	303,790	*173,860	129,930	66,270	63,660

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$201,479	*\$101,117	\$100,362	\$24,166	\$76,196
1 " " '12	201,567	*89,710	111,857	24,940	86,917
12 " " '13	2,089,688	*1,143,153	946,535	288,137	658,398
12 " " '12	1,727,037	*916,645	810,392	258,756	551,636

TAMPA (FLA.) ELECTRIC COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 m., Oct., '13	\$73,998	*\$40,961	\$33,036	\$4,539	\$28,497
1 " " '12	65,640	*33,782	31,858	4,475	27,383
12 " " '13	815,033	*441,049	373,985	55,169	318,816
12 " " '12	751,601	*392,919	358,682	53,533	305,149

*Includes taxes. †Deficit.

Traffic and Transportation

Increase in Wages in New Jersey

The following communication announcing an increase in wages was addressed to the 3850 motormen and conductors of the Public Service Railway, Newark, N. J., on Dec. 20 by Thomas N. McCarter, president of the company:

"At this Christmas season it is sincerely gratifying to be able to inform you that the company has decided to put into effect on Jan. 1, 1914, a new scale of wages which provides for marked increases over the present rates. Under the new schedule platform men will be paid as follows:

"During the first six months, 23 cents per hour; during the second six months, 24 cents per hour; during the second year, 25 cents per hour; during the third year, 26 cents per hour; during the fourth year, 26 cents per hour; during the fifth year, 27 cents per hour; during the sixth year, 27 cents per hour; during the seventh year, 28 cents per hour; during the eighth year, 28 cents per hour; during the ninth year, 29 cents per hour; during the tenth year, 29 cents per hour; after the tenth year, 30 cents per hour.

"The company has fixed the amount to be paid to regular employees who volunteer for extra duty when needed after the day's work is done at the rate of 37½ cents per hour, and has also decided to guarantee to men on the extra list who answer all roll calls and perform such work as may be assigned to them a minimum wage of \$12 per week. Comparisons made with the wage scales in effect on other properties of like character, operated under conditions similar to those which confront us, demonstrate that the rate of pay about to become effective places this corporation in the very front rank of street railway companies with regard to compensation of employees.

"In making this announcement the management realizes, and wants the trainmen to realize, that the company has a threefold obligation which it is compelled to meet within certain limitations. This threefold obligation of the company is to the public it serves, the employees who operate the cars and to the security holders whose money is invested in the property. All three classes are entitled to consideration in the distribution of the company's revenues, for service, wages and interest on bonded debt or dividends on stock.

"This is the sixth time the company has voluntarily raised the pay of its trainmen since July 1, 1903. Each time until the present it has been done to the extent that the company's finances would warrant. This time the effort has been to adopt a consistent scale that would fully and properly compensate every man, new or old, according to the measure of his efficiency considered in connection with the present high cost of living.

"While the cost of living has increased, so has the cost of everything connected with the operation of street railways. Fares only have not increased, but, on the other hand, by means of additional transfers and the lengthening of the ride possible for a nickel, the fare per passenger has slowly but surely decreased, so that it is now clearly apparent that with this wage scale in effect the limit of wage scale has been reached unless fares are to be increased.

"Notwithstanding the added financial burden which the company is assuming for the benefit of its employees, there will be no diminution of the advantages accruing to the men by virtue of the sick benefit, insurance and pension features provided by the company's welfare plan. The company will, of course, continue to expect in the future, as in the past, the loyal support and honest co-operation of all its employees, which is essential to the accomplishment of all its great undertakings."

Fourth Year of Interborough Bulletin

The ELECTRIC RAILWAY JOURNAL has from time to time in the past referred to the *Interborough Bulletin* and the work which is being done through the paper in the interest of the employees of the Interborough Rapid Transit Company, New York, N. Y., and the patrons of the company. With the issue for December, 1913, the paper completes another volume, and the editors have taken occasion with the

closing of the year to review the past, present and future in a statement in part as follows:

"The January number will begin the fourth year of existence of the *Bulletin*, and, with the continued hearty co-operation of the employees, for whose benefit it was promoted, the editors hope to make its contents during 1914 increasingly instructive, helpful and entertaining.

"The *Bulletin* during 1913 published many notable contributions from employees. This policy of throwing its pages open to all employees having anything to say on any subject relating to the operation or mechanism of the system will be continued, and the warmest encouragement is again extended to all wishing to contribute articles or news items on rapid transit matters or anything of value or interest to Interborough employees.

"During the year the columns have been enriched and enlivened by many articles and features of value written by employees. It is regretted that room for all the manuscripts that were received could not be found, but eventually room will be found, so we trust that contributors will not be discouraged by delay. A community of interest links the employees together, and the *Bulletin*, as their organ, reflects their work, welfare and progress toward efficiency and prosperity.

"The numerous letters from pleased patrons testify to efficient and courteous treatment from employees, and the few of the many pouring in that we are able to publish from month to month should be satisfying to those commended and encouraging to all.

"President Shonts' articles on 'Safety First—First Safety' and 'Perseverance' have been a most valuable feature, as also the lucid and informing papers on the instruction car and welfare work, the Panama Canal, transportation, etc., by other contributors. In the illustrations the editors have aimed not only to please the eye but to inform the mind. Many of them, it will be seen, depict important phases of the road's construction and operation. The editors in closing this brief résumé of work and progress heartily thank contributors and friends for their kind co-operation, and most cordially wish them a merry Christmas and a happy and prosperous new year."

New Commutation Fares.—On Jan. 1, 1914, the Providence & Danielson Railway, Providence, R. I., will establish a flat rate of \$3.35 for each commutation book of 100 tickets good over its line. The company has previously followed the practice of charging \$5 for the first book of 100 tickets.

Trailer Service Satisfactory in Louisville.—Officials of the Louisville (Ky.) Railway are pleased with the operation of the new trailers recently put into service. The trailers have entrances and exits at the center of the car, and the movement of traffic in and out is much more rapid than ordinarily. The cars were built by the company in its own shops.

Vote on Sunday Operation in London.—The London (Ont.) Street Railway has signified its willingness to give a Sunday service at the rate of seven tickets for 25 cents and maintain a schedule approximately half as frequent as on other days. The City Council at a special meeting on Nov. 28 decided to submit a by-law for Sunday cars to the people at the January elections.

Group Insurance for Colorado Springs Employees.—The Colorado Springs & Interurban Railway, Colorado Springs, Cal., will present each of its 225 employees with a \$1,000 insurance policy in a New York company. The railway will continue to pay the premiums so long as the men remain in its employ and will continue to do so for any man who is disabled in its service. The ages of the men range from twenty years to sixty years. By special arrangement with the company no medical examination is required.

Crusade Against Expectoration in Lexington.—F. W. Bacon, vice-president of the Kentucky Traction & Terminal Company, Lexington, Ky., has issued orders to the conductors on the city and interurban lines of the company to enforce the anti-spitting ordinance. In case a passenger spits on the floor of a street car the conductor is to stop the car and call a policeman. The company did not issue this order until the local officials indicated that the company would be supported in its campaign against the abominable practice.

Reduction Ordered in Commutation Rates.—Commutation passenger fares on the New York, New Haven & Hartford Railroad between points in Connecticut and New York City have been ordered reduced by the Interstate Commerce Commission. The charges fixed by the commission for sixty-trip tickets follow: Greenwich, \$8.65; Cos Cob, \$9.15; Riverside, \$9.25; Sound Beach, \$9.65, and Stamford, \$10.25. The commission held that generally the commutation rates of the company from other points in Connecticut and New England than those specifically named were reasonable, and it declined, therefore, further to reduce them.

Will Take Fare Question to Court.—Acting on the advice of City Solicitor Hastings, the Board of Utilities Commissioners of Wilmington, Del., is to ascertain the right of the Wilmington & Philadelphia Traction Company to charge a straight 5-cent rate of fare on its local lines, in preference to six tickets for a quarter, by renewing the old action in the United States District Court at Wilmington. If a suitable agreement can be reached the question as to whether the charter of the company gives it the right to charge a 5-cent fare will be argued before the court, exclusive of any other questions involved in the old action.

Extending the Safety Campaign in Lexington.—In connection with the safety campaign of the Kentucky Traction & Terminal Company, Lexington, Ky., referred to recently, representatives of the company have recently delivered lectures in the schools on the subject of accident prevention. Blotters, cards and other literature have been distributed, and the co-operation of the teachers has been secured. M. A. Cassidy, superintendent of schools, has lectured in connection with the exhibition of the moving picture, "The Price of Thoughtfulness," which was shown by the company at a theater in Lexington for the benefit of the school-children.

Perfecting Detroit's Safety Campaign.—With two mass meetings of Detroit employees on Dec. 15 the preliminary organization work in the "Safety first" campaign of the Detroit (Mich.) United Railway was completed. Division safety boards have been elected on all the interurban lines and a district safety board was elected for the city of Detroit as one unit. These boards will co-operate with the general safety board in formulating plans along which the campaign will be carried on. "Safety first" buttons already have been ordered for all employees, and the words "Safety first" appear on the trolley poles on all busy corners in the heart of the city.

Results with Freight on Lines of Massachusetts Electric Companies.—P. F. Sullivan, general manager of the Massachusetts Electric Companies, Boston, Mass., is quoted as follows in regard to the results which have been attained by the company with its freight service: "This year the gross receipts from freight will be about \$300,000. Not much profit has been shown yet, because it is a business we are developing—studying it out carefully—and we are trying it entirely to the south of Boston, on what was formerly the Old Colony system. We have franchise rights in the north for about four-fifths of the territory, but we will not start operation in this territory until we have felt our way in the southern development. On the whole, however, the business is satisfactory."

The New Lexington Terminal Station.—The new terminal station of the Kentucky Traction & Terminal Company, Lexington, Ky., has been put into use. The first floor is given over to waiting rooms and conveniences for passengers. The second floor is fitted up for recreation purposes and is used by the trainmen. It has billiard and pool tables and other amusement devices. The third floor has the offices of F. W. Bacon, vice-president, and other officials. A window display showing a train of electric cars in operation is a feature of the first floor. Owing to the large amount of traffic brought to this point by the new terminal station, it has been proposed to have the company and the city share the expense of maintaining a traffic policeman in front of the building.

Dogs on Interurban Cars.—Because of complaints that passengers with dogs have been permitted to board interurban cars and ride in the smoker when it was crowded, to the annoyance of other passengers, a bulletin has been issued to the crews of the interurban lines of the Detroit (Mich.) United Railway calling attention to the following

company rule: "Permit passengers with dogs attached to a chain or rope to ride on the rear platform or in the smoking compartment of interurban cars, provided the dogs do not make themselves obnoxious to passengers. This is in addition to lapdogs which passengers may carry on their laps in the body of the car." The bulletin adds: "Good judgment must be at all times exercised by both motormen and conductors to the end that passengers with dogs may not be permitted to board cars if the dogs would be obnoxious to passengers."

Interswitching Charges.—The question of the rates to be charged by the Galt, Preston & Hespeler Railway for interswitching was before the Ontario Railway & Municipal Board on Dec. 19. The application for an order of the board fixing the rates to be charged by the company was after a long discussion left over until the Ontario Railway Board has conferred with the Dominion Railway Board. It is charged against the radial railway that competitors of the Canadian Pacific Railway are discriminated against on shipments from all points, but particularly on shipments from non-competitive points. The Galt, Preston & Hespeler Railway asks that 2 cents per 100 lb. be charged in all the territory south of the Canadian Pacific Railway and 1 cent per 100 lb. north of the Canadian Pacific Railway, where there is little delivery of materials. On the Grand Trunk Railway the switching charges are absorbed partly by the shipper and partly by the railway, while in the case of the Canadian Pacific Railway they are all absorbed by the railway, which charges nothing for switching for goods shipped over its line.

Jurisdiction of Quebec Commission Argued.—The Court of Appeals at Montreal has heard arguments in the case of the Montreal Tramways vs. the Quebec Public Utilities Commission. The latter ordered the company to give detailed information relative to the service, number of cars, earnings, lines, etc., and the directors of the company declined to comply with the order on the ground that the commission had no jurisdiction. It was contended before the Court of Appeals that under the contracts with the various municipalities it is provided that in case of any disputes or differences, or alleged failure on the part of either the company or the municipalities to fulfil the obligations which have been entered into, the Recorder's Court enjoys exclusive jurisdiction. For the Public Utilities Commission it was argued that the commission was exercising supervising and governing powers specially conferred upon it by the Legislature and was thus constituted an extraordinary tribunal for purposes of public interest, and that it was clearly intended that a simple contract between the company and a municipality should not override the jurisdiction of the commission. Judgment was reserved.

Aurora, Elgin & Chicago Inaugurates Pick-Up and Delivery Service in Chicago.—On Dec. 1, 1913, the Aurora, Elgin & Chicago Railroad inaugurated a pick-up and delivery service in Chicago, Ill., through an arrangement with an independent transfer company. This transfer company will receive and deliver non-perishable and less-than-carload shipments at its own warehouses, which are centrally located, in the Chicago business district. Under this new arrangement outbound freight is received during the usual freight-house hours and promptly forwarded to destination, and inbound freight will be delivered to consignees at the same station. This additional service gives the merchants and manufacturers along the line of the Aurora, Elgin & Chicago Railroad extra freight service at reasonable rates, and at the same time extends the freight service from the railroad company's existing freight house at Fifty-second Avenue to the downtown district of Chicago. Freight will continue to be received and delivered at the Fifty-second Avenue freight house, the new service being added to stimulate business which would not come to the third-rail line owing to the long haul to the company's freight house in the outlying district. Non-perishable and less-than-carload shipments are received by the transfer company at a distribution and handling charge of 5 cents per 100 lb., with a minimum charge of 25 cents, while miscellaneous shipments are handled at 5 cents per 100 lb., minimum 35 cents. This charge is made by the transfer company in addition to the freight charge applied by the Aurora, Elgin & Chicago Railroad.

Personal Mention

Mr. Charles W. Day has resigned as master mechanic of the Oklahoma Railway, Oklahoma City, Okla., to accept another position.

Mr. P. S. Young, comptroller of the Public Service Corporation of New Jersey, Newark, N. J., has been elected president of the National Commercial Gas Association.

Mr. George D. Baxter, Haverhill, Mass., has been appointed superintendent of the Exeter, Hampton & Amesbury Street Railway, Exeter, N. H., to succeed Mr. Charles W. Rogers, resigned.

Mr. J. R. Fusselman has been elected secretary and assistant treasurer of the Reading Transit & Light Company, Metropolitan Electric Company and the Oley Valley Railway, Reading, Pa.

Mr. John A. Cleveland, general manager of the Saginaw-Bay City Railway and vice-president of the Saginaw & Flint Railway, Saginaw, Mich., has been appointed to a position in the office of Hodenpyl, Hardy & Company, New York, N. Y., the members of which firm control the railway and light properties in Saginaw and Bay City.

Mr. S. L. Shober, who was connected with the engineering and maintenance of way departments of the Pennsylvania Railroad for many years, and subsequently was a member of the banking firm of Cramp, Mitchell & Shober, Philadelphia, Pa., has been elected president of the Protective Signal Manufacturing Company, Denver, Col.

Mr. Francis J. Hogan has been appointed counsel for the Capital Traction Company, Washington, D. C., to fill a vacancy caused by the approaching retirement of Mr. R. Ross Perry, general counsel of the company for several years. The title and some of the duties of general counsel will be taken over by Mr. George E. Hamilton, president of the company, who will be assisted by Mr. Hogan and Mr. G. Thomas Dunlop.

Mr. J. B. Sunderland has resigned from the British Columbia Electric Railway, Ltd., Vancouver, B. C., with which he had been connected for the past five years, filling an important post in the comptroller's department. Mr. Sunderland will take charge of the agency department of McDonald, Marpole & Company, Vancouver, and give his personal supervision to the extension and development of the firm's business.

Mr. Milo R. Maltbie, a member of the Public Service Commission for the First District of New York, has been appointed chairman of the executive committee of the committee of fifteen named by the National Association of Railway Commissioners to represent the various state commissions before the Interstate Commerce Commission in the work of appraising the railroad properties of the country. The executive committee consists of five members, who are all members of the committee of fifteen. Mr. Maltbie has accepted the appointment.

Mr. J. P. H. de Windt has been appointed assistant to the president of the Birmingham Railway, Light & Power Company, Birmingham, Ala., to succeed Mr. M. S. Sloan, who has become connected with the New Orleans Railway & Light Company, New Orleans, La., as noted elsewhere in this column. Mr. de Windt is thirty-one years of age, was born in Suffield, Conn., and prepared for college at the Phillips Academy. He took a three years' course in electrical engineering at the Williston Seminary. He was formerly general manager of the Shore Line Electric Railway of Connecticut. He served as superintendent of the light and water company in Suffield and was also connected for a time with one of the public service companies in Alberta, Can., as superintendent.

Mr. Kurtz A. Fichthorn has resigned as general manager, secretary and treasurer of the Metropolitan Electric Company, Reading, Pa., after a service of more than nineteen years in various capacities with the company and its predecessors. Mr. Fichthorn will also retire as second vice-president and director of the Reading Transit & Light Company. He entered the service of the Metropolitan Light Company in August, 1894, after it had leased the Reading Electric Light & Power Company, and rose from the position of assistant to the treasurer to the ones which he now

resigns. Since Mr. Fichthorn's connection with the company the plant in West Reading has been erected and a system of underground wiring is being completed at a cost of \$1,000,000. Mr. Fichthorn will retain his holdings in the subsidiary companies. He will in the future devote all his time to his private interests.

Mr. Walter A. Rigg has resigned as vice-president and general manager of the Reading Transit & Light Company, Reading, Pa., as general manager of the Neversink Mountain Railway and as vice-president of the Metropolitan Electric Company. Mr. Rigg had the management of over 200 miles of street railways, including extensive property holdings and lines in Lebanon and Norristown. Fifteen years ago he succeeded his uncle, the late Samuel E. Rigg, in the management of the system. During the last five years more than \$2,000,000 has been expended in and about Reading, with other improvements contemplated. Mr. Rigg will retain his interest and holdings in the underlying companies, which were leased to the Reading Transit & Light Company. He intends after the first of the year to devote more attention to his banking interests in Philadelphia.

Mr. E. C. Carpenter has resigned as general manager of the Pittsburgh & Butler Street Railway and the Butler Passenger Railway, Pittsburgh, Pa., effective on Jan. 1. Mr. Carpenter became connected with the companies on Oct. 1, 1911. Since that time the power plant has been overhauled, the roadway and rolling stock improved and during the past summer the system was changed from 6600 volts a. c. to 1200 volts d. c. without interruption to travel or schedule. Before becoming connected with the Pittsburgh & Butler Street Railway and the Butler Passenger Railway, Mr. Carpenter was with the Union Traction Company of Indiana and allied interests for seventeen years and helped to construct the first interurban line in Indiana from Anderson to Alexandria and continued with that company through the various extensions, consolidations, etc. The installation of the plant and system of the Butler County Light Company was completed while Mr. Carpenter was at Butler.

Mr. M. S. Sloan, who has been assistant to the president of the Birmingham Railway, Light & Power Company, Birmingham, Ala., has been appointed assistant to Mr. J. S. Pevear, vice-president of the New Orleans Railway & Light Company, New Orleans, La. Both properties are controlled by the American Cities Company, the common stock of which is owned by the United Gas & Electric Corporation, New York, N. Y. Mr. Sloan became connected with the Birmingham Railway, Light & Power Company as chief engineer of the power station for the construction department of the General Electric Company, in July, 1906. In September, 1907, he was made superintendent of power of the Birmingham Railway, Light & Power Company, and in July, 1908, he was appointed superintendent of the business department of the company. On Dec. 22, 1909, Mr. Sloan was appointed superintendent of the lighting department of the Birmingham Railway, Light & Power Company, and in August, 1910, he was advanced to the position of assistant to the president of the company.

Mr. Norman McD. Crawford has been elected president and general manager of the Reading Transit & Light Company, vice-president and general manager of the Metropolitan Electric Company, vice-president and general manager of the Neversink Mountain Railway and vice-president and general manager of the Oley Valley Railway, Reading, Pa. He succeeds Mr. W. S. Barstow with the Reading Transit & Light Company and Mr. Walter A. Rigg with the Metropolitan Electric Company, the Neversink Mountain Railway and the Oley Valley Railway. Mr. Crawford was formerly president of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio. Mr. Crawford was for several years vice-president of the Ohio Electric Railway, Cincinnati, Ohio, and previously, for a long time, was general manager of the Hartford (Conn.) Street Railway. As a contractor he built the Glastonbury line of the Hartford Street Railway in 1891 and was afterward retained by the company as engineer. In 1894 he was made general manager of the company, which position he held until the Hartford Street Railway was taken over by the Connecticut Company. In December, 1908, Mr. Crawford was elected president of the Mahoning & Shenango Railway & Light Company.

Construction News

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

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

RECENT INCORPORATIONS

***Goldsboro (N. C.) Street Railway.**—Application for a charter has been made by this company in Delaware, presumably to succeed the Goldsboro Traction Company. Capital stock, \$50,000. W. J. Maloney, Wilmington, Del., incorporator.

Independence, Caney & Oklahoma Railway, Independence, Kan.—Application for a charter has been made by this company in Kansas to build an electric railway between Caney, Havana, Wayside and Independence, Kan., and Bartlesville, Okla. Officers: J. E. Stone, Caney, president; J. H. Stewart, Havana, vice-president; H. E. West, Independence, treasurer, and R. R. Bittman, Independence, secretary. [E. R. J., Dec. 20, '13.]

***Fort Dodge (Ia.) Street Railway.**—Incorporated in Maine with a capital stock of \$100,000. Officers: Albert E. Jones, president; T. L. Croteau, treasurer, and James E. Manter, clerk, all of Portland.

***Carpenter Creek Railway, Musselshell, Mont.**—Application for a charter has been made by this company to build an electric or steam railway between Musselshell and Japan. Capital stock, \$50,000. C. M. Jacobs, director.

***Gaffney & James City Railway, Gaffney, Pa.**—Chartered in Pennsylvania to build a 2-mile electric railway from Gaffney to James City. Capital stock, \$20,000. George S. Stein, Philadelphia, president.

Fort Worth & Denton Interurban Railway, Fort Worth, Tex.—Application for a charter has been made by this company in Texas to build a 35-mile line between Fort Worth and Denton. Capital stock, \$500,000. Incorporators: E. E. Bildridge, N. Harding and Benjamin O. Smith. [E. R. J., Dec. 20, '13.]

Tyler (Tex.) Traction Company.—Chartered in Texas to operate an electric railway in Tyler. Capital stock, \$70,000. Incorporators: Daniel Hewitt, T. N. Jones, Laurence Hewitt, J. W. Fitzgerald and T. B. Butler.

***Weston & Glenville Electric Railroad, Weston, W. Va.**—Chartered in West Virginia to build an electric interurban railway about 20 or 25 miles long to connect Weston and Glenville. Capital stock, \$500,000. Incorporators: Louis Bennett, Andrew Edmiston, J. A. Chittum, R. T. Goe and Lloyd Rinehart.

FRANCHISES

Dixon, Cal.—The Northern Electric Railway, Chico, and the Sacramento Valley West Side Electric Railway, Willows, have received a franchise from the Council in Dixon for the use of a joint track in Dixon.

Galesburg, Ill.—The Rock Island Southern Railroad has asked the Council for a franchise on Kellogg Street from Berrien Street to Main Street in Galesburg.

Herrin, Ill.—The Southern Illinois & St. Louis Railway has asked the Council for a franchise in Herrin. This is part of a plan to build an electric railway between Marion and Harrisburg with branch lines to Benton and to Johnson City and Herrin. William Rothman, Chicago, is interested. [E. R. J., Dec. 20, '13.]

Minneapolis, Minn.—The City Council has granted a franchise for the Dale Street crosstown line in Minneapolis.

Olean, N. Y.—The Western New York & Pennsylvania Traction Company has received a franchise from the Council on Union Street and Barry Street in Olean.

Springfield, Ore.—The Oregon Electric Railway has asked the Council for a franchise in Springfield. This is part of a plan to build an extension from Eugene to Springfield.

***St. Michel de Laval, Que.**—Under a bill promoted by the village of St. Michel de Laval, near Montreal, the Quebec Legislature is asked to give authority to the municipality to enter into a contract for the construction of an electric tramway service and to grant to any firm or corporation an exclusive franchise and exemption from municipal taxes for a period not exceeding fifty years.

Dallas, Tex.—The Dallas Consolidated Electric Railway has asked the Council for a franchise to double-track certain sections of Bryan Street and San Jacinto Street in Dallas.

Centralia, Wash.—The Washington-Oregon Corporation has received a franchise from the County Commissioners along the county roads from the present line of the company 1 mile south of Centralia to connect with a line down Washington Street for which a franchise is being asked from the city. The company has also received a franchise to operate a line along the county roads to connect with its line on Grant Street in Centralia.

TRACK AND ROADWAY

Birmingham & Chattanooga Railroad, Birmingham, Ala.—Surveys have been completed for this 147-mile line between Birmingham and Chattanooga. Grading has been completed from Boaz, Ala., to Chattanooga, Tenn., 1 mile, and a contract has been awarded to Jordan & Phillips, Birmingham, for 20 miles of grading from Boaz to North East. Headquarters: Boaz, Ala. W. W. Shortridge, Boaz, secretary. [E. R. J., Dec. 13, '13.]

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Extensions and improvements are being planned by this company for its lines in Birmingham.

Bakersfield & Kern Electric Railway, Bakersfield, Cal.—It is reported that this company's lines will be extended to the southwestern part of Bakersfield and also to the northern part of East Bakersfield and eventually to the Taft-Maricopa oil district. These extensions are being financed by local capital, and it is planned to obtain power from the San Joaquin Light & Power Corporation.

Fresno & Clovis Interurban Railway, Fresno, Cal.—Contracts will be awarded at once by this company for 1500 tons of 75-lb. rails and 50,000 redwood ties. Right-of-way has been secured and grading will be begun in the spring on this 24-mile line to connect Fresno, Clovis and Academy. Financial arrangements have been made and stock will be issued to the extent of at least \$500,000. F. S. Granger, Clovis, promoter. [E. R. J., Dec. 6, '13.]

Fresno (Cal.) Traction Company.—This company has asked the Railroad Commission for a certificate of public convenience and necessity to construct standard-gage extension through additions to the city of Fresno known as North Park Terrace, College Addition and Van Ness Heights to the northerly line of Princeton Avenue, a distance of less than 1 mile. The company asks further for a certificate of public convenience and necessity to construct an extension approximately 9½ miles in length from Fresno through Normal View, across the Santa Fé Railroad tracks to the San Joaquin River.

***La Mesa, Cal.**—This city will vote \$60,000 for a municipal electric railway from La Mesa to Fairmont and University in East San Diego.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—Right-of-way has been secured by this company on its line from Petaluma to McNear's Point, and work will be begun at once on the extension from Forestville to Healdsburg.

St. Petersburg & Gulf Railway, St. Petersburg, Fla.—Work on the extension of this company's line from Davista to Junglé, 1½ miles, has been begun.

Carolina & Georgia Railway, Augusta, Ga.—This company has received the right to amend its charter so as to build a branch line between Johnson and Greenwood, 40 miles. James U. Jackson, Augusta, president. [E. R. J., Dec. 13, '13.]

Alton, Jacksonville & Peoria Railway, Alton, Ill.—This company has connected its lines at Akron with the lines of the Alton, Granite & St. Louis Traction Company.

Iowa Railway & Light Company, Cedar Rapids, Ia.—This company has completed its line between Cedar Rapids and Mount Vernon.

Kansas Central Traction Company, Topeka, Kan.—Voters of Coffeyville, Kan., registered in favor of the issue of \$30,000 bonus bonds to build this railway between Coffeyville and Nowata. This railway will connect at Coffeyville with the lines of the Union Traction Company. Philip Strack Parsons, president. [E. R. J., Nov. 8, '13.]

***Middlesboro, Ky.**—J. R. Young, Middlesboro, is reported to be promoting a plan for the construction of an electric railway to Pinnacle Rock, Ky., a distance of 16 miles.

***Mount Eden, Ky.**—Citizens of Mount Eden are negotiating with commercial interests of Shelbyville for the construction of an electric railway between Mount Eden and Shelbyville. It is proposed to continue the line ultimately to Harrodsburg, Danville and other Kentucky towns.

North Louisiana Electric Railway, Shreveport, La.—Surveys have been completed by this company on its 120-mile line between Shreveport and Monroe, via Homer, Minden, Ruston and West Monroe. Grading will be begun early in 1914. A. B. Blevins, Shreveport, president. [E. R. J., Sept. 6, '13.]

Aroostook Valley Railroad, Presque Isle, Maine.—Surveys have been completed for the St. John & Quebec Railroad, the western extension of the Aroostook Valley Railroad connecting with the St. John Valley.

United Railways & Electric Company, Baltimore, Md.—This company is asked to consider plans to extend its Garrison Avenue line to Park Heights and Belvidere Avenues in Baltimore.

Mesaba Electric Railway, Duluth, Minn.—An extension to Duluth is being contemplated by this company.

Electric Short Line Railway, Minneapolis, Minn.—The city of Brookings will raise \$30,000 bonus to secure an extension of this company's line to Brookings. W. L. Luce, Minneapolis, president.

Minnesota Union Electric Railway, Minneapolis, Minn.—Surveys are being made and grading will be begun in the spring by this company on its 70-mile line between Minneapolis and St. Cloud, via Brooklyn, Corcoran, Burschville, Hanover, St. Michael, Buffalo, South Haven, Fair Haven, Maine Prairie and Luxemburg. Headquarters, 302 Plymouth Building, Minneapolis. Achile D. Pouliot, secretary. [E. R. J., Dec. 13, '13.]

Holly Springs (Miss.) Railway.—Surveys have been completed and construction will be begun in the spring if financial backing can be secured by this company for its 1-mile line from the Union Station to the business section of Holly Springs. Contracts for all material needed will probably be awarded in the spring. It is planned to use Edison-Beach cars. E. G. Hammer, Holly Springs, president. [E. R. J., July 13, '13.]

Caldwell County & Southern Railway, Kingston, Mo.—Surveys have been completed and grading has been finished by this company for its 9-mile line between Kingston and Hamilton. H. L. Gilbert, Kansas City, is interested. [E. R. J., Nov. 29, '13.]

Springfield & Western Railroad, Springfield, Mo.—Preliminary surveys are being made by this company for its line from Springfield to Carthage and Joplin. The line will fork to send one track west to Joplin and one track northwest into Carthage.

Butte (Mont.) Electric Railway.—A double-track line from Centerville to the Elm Orlu Mine and the Meaderville line to the Montana Union property will soon be built by this company.

Ismay, Ekalaka & Southern Electric Railway & Power Company, Ismay, Mont.—This company plans to begin work in the spring on its electric railway to connect Ismay and Ekalaka, Mont. Application for a charter will soon be made. The company is to be capitalized at \$400,000. George Burke is interested. [E. R. J., Nov. 1, '13.]

International Railway, Buffalo, N. Y.—This company has placed in operation its double-track line between Lockport and Pendleton.

Sand Springs Interurban Railway, Tulsa, Okla.—Plans are being made by this company to double-track its entire line, a distance of 8 miles. The company recently completed a belt line in Tulsa connecting with every steam line entering Tulsa.

London & Lake Erie Traction Company, London, Ont.—Plans are being considered by this company to extend its line to Aylmer and Port Burwell.

Toronto (Ont.) Railway.—This company has placed in operation its new Wilton Avenue line in Toronto.

Sandy, Ore.—The Clackamas Development Company, of which E. J. Ellison is president, has asked for the use of the county road between Boring and Sandy as the road-bed for its proposed gasoline-electric railway. It will connect with the Portland Railway, Light & Power Company at Boring.

Nashville-Gallatin Interurban Railway, Nashville, Tenn.—This company has been asked to consider plans to build a line to Ridgetop, Hygeia, Greenbrier, Edgefield and Springfield.

Jefferson County Traction Company, Beaumont, Tex.—This company has placed in operation its line between Beaumont and Port Arthur. [E. R. J., Dec. 20, '13.]

Denison, Tex.—The proposed interurban electric railway to extend north from Denison over the new bridge on Red River, through Cobert, Calera and into Durant, Okla., a distance of 25 miles, has not been abandoned. Part of the preliminary surveys have been made and it is expected that they will be continued as soon as financial backing can be procured. John R. Cullinane, St. Louis, is the promoter. [E. R. J., Jan. 11, '13.]

Fort Worth (Tex.) Southern Traction Company.—Plans are being made by this company to build a 25-mile extension from Cleburne to Hillsboro, where a connection will be made with the Texas Southern Traction Company's line to Waco.

***Gulf & Pecos Valley Railway, Lufkin, Tex.**—Preliminary investigations have been under way for several months to construct a new railroad from one of the ports on the Texas coast, through Lufkin, Palestine, Dallas, Fort Worth and through the Panhandle of Texas to the Pecos Valley, N. M., by the Interstate Development Company. It is said that early next year active steps will be taken for the construction of the line. This line will probably be known as the Gulf & Pecos Valley Railway. Electricity may be the motive power. P. A. McCarthy & Sons, consulting engineers, Lufkin, Tex., have been conducting the work of investigation.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—This company has completed the section of its line between Salt Lake City and a point 2 miles south of Pleasant Grove at the southern end of the Jordan Narrows. Grading has been completed on its line between Pleasant Grove and Provo, and it is expected that rails will be laid on this section early in January. W. D. Orem, Salt Lake City, president. [E. R. J., Oct. 4, '13.]

Virginia Railway & Power Company, Richmond, Va.—This company has been asked to consider plans to extend its line to the baseball park on McKenzie Street in Petersburg.

Monongahela Valley Traction Company, Fairmont, W. Va.—This company has placed in operation its 1-mile extension from the Clarksburg interurban line to Lumberport.

SHOPS AND BUILDINGS

Geary Street Municipal Railway, San Francisco, Cal.—The supervisors have directed the Works Board to prepare specifications under which bids may be invited for the enlargement of the Geary Street carhouse in San Francisco.

Holyoke (Mass.) Street Railway.—Work has been begun by this company on its new carhouse in Holyoke.

Mesaba Electric Railway, Duluth, Minn.—Work has been begun by this company on a new depot in Mountain Iron.

Toronto (Ont.) Civic Car Lines.—Assessment Commissioner Forman of the city of Toronto has purchased 4 acres of land on Danforth Avenue for \$65,000 as a site for the carhouses of the Danforth Avenue civic car lines.

POWER HOUSES AND SUBSTATIONS

Birmingham Railway, Light & Power Company, Birmingham, Ala.—This company plans to extend and improve its power plant in Birmingham.

Houghton (Mich.) County Traction Company.—With the completion of the new substation building, adjoining the Laurium carhouse, the Houghton County Electric Light Company and the Houghton County Traction Company are preparing for the occupancy of the building and the transfer of the power equipment there.

Manufactures and Supplies

ROLLING STOCK

Glendale & Eagle Rock Railway, Glendale, Cal., expects to purchase immediately a number of cars.

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala., expects to purchase four additional city cars.

Altoona & Logan Valley Electric Railway, Altoona, Pa., is in the market for five 28-ft. passenger car bodies and four 32-ft. 6-in. car bodies.

TRADE NOTES

Ackley Brake & Supply Company, New York, N. Y., has received an order for 200 adjustable brakes from the Montevideo (Uruguay) Tramways.

Perry Ventilation Corporation, New Bedford, Mass., has received an order from the Pittsburgh Railways to equip with ventilators the seventy-five new cars which are being built by the St. Louis Car Company.

American Mason Safety Tread Company, Lowell, Mass., received a gold medal at the recent International Exposition of Safety and Sanitation held under the auspices of the American Museum of Safety at the Grand Central Palace, New York.

General Electric Company, Schenectady, N. Y., has received an order from the Detroit United Railways, Detroit, Mich., for two complete two-motor car equipments. The motors are of the GE-203 type, which has automatic ventilating features. The controller will be the K-35 arranged with full field control.

C. M. Paxton, whose retirement as assistant to the general manager of the American Railways, Philadelphia, Pa., was referred to in the *ELECTRIC RAILWAY JOURNAL* of Dec. 20, 1913, has been elected second vice-president of the Peter Smith Heater Company, Detroit, Mich., and will enter upon his new duties soon after Jan. 1, with headquarters in Detroit.

Railway Supply & Curtain Company, Chicago, Ill., received an order to equip with curtain fixtures the 100 cars which were ordered by the Chicago City Railway from The J. G. Brill Company. This item is in correction of a previous one which appeared in the *ELECTRIC RAILWAY JOURNAL* of Dec. 13, 1913, in which it was stated erroneously that the curtain fixtures were ordered from the Curtain Supply Company.

Mitsui & Company, Ltd., New York, N. Y., export agents, have received orders to export the following electric railway material manufactured by the General Electric Company: three 1200-volt 40-ton locomotives and power-station apparatus ordered by the South Manchurian Railway. Motor equipments have been ordered by the following Japanese railways: Kagoshima Electric Railway, Hankai Electric Railway, Kyushu Electric Railway and Keishin Electric Railway.

Nachod Signal Company, Philadelphia, Pa., has been reorganized and reincorporated as the Nachod Signal Company, Inc., under the laws of the State of New York; Carl P. Nachod, president; J. Ernest Nachod, vice-president; Joseph W. Stone, secretary; Alexander Perry, treasurer. The company will remove from Philadelphia and have its offices at 50 Church Street, New York, after Jan. 1, 1914. Nachod Signal apparatus will be manufactured exclusively and guaranteed by the Hall Switch & Signal Company, 50 Church Street, New York.

John Bellamy Taylor, after fourteen years' connection with the General Electric Company, has resigned as engineer of the foreign department in order to take up work independently as a consulting electrical engineer. Mr. Taylor has taken an active interest in the work of the American Institute of Electrical Engineers and other scientific and engineering societies. The past year he was chairman of the Schenectady Section of the A. I. E. E. He is an honorary member of the Association of Railway Telegraph Superintendents. Mr. Taylor will continue to live in Schenectady.

ADVERTISING LITERATURE

National Pipe Bending Company, New Haven, Conn., has issued three catalogs, two of which describe its feed-water heaters, the third its horizontal oil separator.

Allgemeine Elektrizitäts Gesellschaft, Berlin, Germany, has issued a catalog in German describing and illustrating the process of manufacturing its a.c. kilowatt-hour meters.

T. L. Smith Company, Milwaukee, Wis., has issued a catalog describing and illustrating its concrete mixer equipments which include ropeless, sheaveless, geared sideloaders, hot mixers for handling bituminous concrete, mascot mixers and side-gate concrete cars equipped with rack and pinion gate and hand wheel discharging mechanism.

National Malleable Castings Company, Sharon, Pa., has issued a catalog describing and illustrating its electric steel castings. The process of making electric steel consists in melting down a charge directly in an electric furnace, or in transferring molten steel from the open-hearth or Bessemer to an electric furnace, and there maintaining the charge in a molten state, under complete chemical control in a neutral atmosphere, until it is refined and purified.

Railway Utility Company, Chicago, Ill., has issued Catalog No. 401, which describes in detail its thermometer control of electric heaters. The text matter deals with the economies possible through the use of electric car heaters controlled by a thermostat and illustrates these possibilities on a chart showing the actual saving in heating current on street cars where the thermometer control was employed. A complete description, with wiring diagrams, is given of the control apparatus, its operation and installation.

Eclipse Railway Supply Company, Cleveland, Ohio, has issued a catalog describing its trolley retriever designed for any range of service from low-speed city to high-speed interurban work. It is of standard size and weight and is provided with adjustable brackets to permit quick removal from one dash to another. The release from high-tension to low-tension spring after the retriever has operated is instantly accomplished by pressing a push button at the top of the retriever which releases the power spring and places the weak spring in action.

Ohmer Fare Register Company, Dayton, Ohio, has issued a booklet entitled "Fare Accounting," which contains extracts from the symposium on "Fare Accounting" which appeared in the Souvenir edition of the *ELECTRIC RAILWAY JOURNAL*, Oct. 4, 1913. The booklet gives expressions of opinions from officers of the following electric railways: Terre Haute, Indianapolis & Eastern Traction Company, Union Traction Company of Indiana, Illinois Traction System, Mobile Light & Railroad Company, Portland Railway, Light & Power Company, Memphis Street Railway, Chipewa Valley Railway, Light & Power Company, Carolina Light & Power Company, Dayton & Troy Electric Railway, Cleveland, Youngstown & Eastern Railway, Grand Rapids, Grand Haven & Muskegon Railway, Newport News & Old Point Railway & Electric Company, Greenville Traction Company, Southwest Missouri Railroad, Eastern Pennsylvania Railways, Pacific Electric Railway, Lehigh Valley Transit Company, People's Railway, Southwestern Traction & Power Company, Mankato Electric Traction Company, Chicago, Harvard & Geneva Lake Railway, New York State Railways, Denver City Tramway.

Fulton Iron Works, St. Louis, Mo., have issued a catalog describing Fulton-Tosi oil engines of the modern European Diesel type, which this company manufactures exclusively in the United States under license of Franco Tosi, of Italy. These four-cycle engines are built in the vertical form and in two-cylinder, three-cylinder and four-cylinder arrangement. The crank pins are set at such angles that the power impulses follow each other at regular intervals. The impulses being downward upon the bearings, which are close to the floor line, the vibrations are taken up by the foundation of the engine, making a structure of the most stable character. The engine is designed to operate reliably on the cheapest petroleum crude or fuel oils or tar oils, and as ignition is insured by the heat of compression, no hot head, hot plate, electric spark or other exterior means of ignition is required. The engine may be started up from cold within one minute, without any troublesome or time-consuming preliminaries. This quick-start feature is an advantage in any installation. The operation of the engine is quiet, clean and safe. On account of the absence of boilers, gas producers or other bulky auxiliaries, it may be installed in almost any available location.