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ATLANTIC CITY SELECTED FOR 1913

Announcement has been made this week that the American Electric Railway Association has selected Atlantic City as the place for the 1913 convention. The date is Oct. 13 to 17. This time was selected after a careful consideration of all of the different weeks in October as the one best adapted to avoid conflict with other events in different cities which would prevent the presence of delegates at the convention. The choice of Atlantic City, we believe, will give general satisfaction as well as assurance of a large attendance and a good exhibit. There is nothing experimental in the holding of a convention at Atlantic City. Everyone understands what to expect there and also knows that the hotel accommodations as well as the arrangements for exhibits and meeting halls will be good. There will be lacking, it is true, the opportunity for inspecting a large railway system such as would have been possible if the convention, like that of last year, was to be in some large city. This is undoubtedly an important advantage of the plan of holding the convention in different places, and the opportunity which most of the delegates at Chicago last year improved by inspecting the rehabilitation work of the Chicago railway companies was generally welcomed. This, however, is not the sole purpose, or indeed the main purpose, of a convention. There will be this opportunity in 1915, when the convention meets in San Francisco, and those who wish to follow the plan this year will find a great deal of new and interesting electric railway construction and practice in the neighboring cities of Philadelphia, New York, Newark and Baltimore, not to mention other cities more distant.

LATEST STEAM RAILROAD ELECTRIFICATION The most recent of the electrification projects which have been planned within the past few months is unique in that it is solely a heavy freight traffic propo-

sition. The plan, of which a preliminary account is given elsewhere in this issue, includes a section of the main line of the Norfolk & Western Railway where passenger traffic is exceedingly light, being limited to two through trains and four local trains daily in each direction. While there are tunnels within the limits of the proposed electric zone, none of these is long enough to establish in itself a reason for dispensing with the steam locomotive even if the extent of the passenger traffic should warrant an expenditure on that score. The freight traffic is, however, enormously heavy, and this, owing to the preponderance of coal shipments, is handled in the largest trainloads which are permitted by the existing grades, power and equipment. The ruling grades near the summit of the Alleghany Mountains are so severe as to involve the alternatives of using an unreasonable number of locomotives per train or else of breaking up trains into small and uneconomical units which, after passing the summit, would have to be combined again into the maximum train capable of being handled over the descending grades to the seaboard. Under such conditions the advantages of the almost unlimited power and even tractive effort of the electric locomotive are obvious. They have, in fact, been pointed out many times. Indeed, the only surprising feature of the proposed electrification is that it can be classed as the first of its kind in this country, where so many similar situations exist.

ELECTRIFICATION OF BRITISH RAILWAYS In an address delivered Sept. 15, 1911, before the Turin International Electrical Congress, C. O. Mailloux enumerated what he felicitously termed the "peremptory factors" of electrification. The peremptory factor in the case of the suburban steam lines about London has not been the one usual in this country under similar conditions, to increase the capacity of already burdened steam tracks, but to stop a decline in traffic. This decline began with the development of the motor bus and electric tramway in the London metropolitan district and has continued as a result of the enormous expansion of the auto-bus industry. The British railway director may be conservatism incarnate, but even he is spurred to action when the choice lies between sure loss with steam and possible gain with electrification. A noticeable feature of the contemplated changes by the London & North Western and the London & South Western Companies, whose plans for electrification are described elsewhere in this issue, is that while the happy results of the Brighton electrification have been instrumental in their decision to abandon steam, the electric system to be employed by them will be different. They are to adopt 600 volts direct current instead of the high-tension, single-phase system, which is being used with entire satisfaction by the London, Brighton & South Coast Railway. The chief reason for this choice of direct-current equipment is the

desire on the part of these roads to have rolling stock which can be operated over the connecting tracks of the London underground railways. This need is not felt by the Brighton system since its main termini at Victoria and London Bridge are conveniently located for both commuter and through traffic from all parts of the metropolis. Finally, the fact that the North Eastern Railway has placed contracts for 1500-volt direct-current equipment for an important line in the north of England would indicate that the British engineers are not wedded to existing standards but, like their American and Continental brethren, are prepared to study each case on the basis of what is best for the individual conditions.

TREND OF ELECTRIFICATION IN EUROPE

Greater breadth of view in the choice of systems of electrification appears from a survey of recent work in France, Spain, Italy, Holland, Germany and elsewhere. In American discussions on this subject it is usually assumed that electrification on the Continent spells three-phase for Italy and single-phase for all the other nations which have electrified some lines to date. This assumption is correct so far as trunk-line railroading is concerned, but it is a fact that high-tension direct current has also found its place in the scheme of things. A conspicuous example of catholicity is offered by the two electrifications of the Midi Railway which are described in this issue. Both installations are in the extreme south of France but comprise practically independent systems. The 12,000-volt, 16 2/3-cycle line between Perpignan and Ille is a 15.5-mile section of a 175-mile electrification to center at Toulouse, while the 850-volt d.c. third-rail line between Villefranche and Bourg-Madame is a 35-mile trans-mountain railway which is operated with multiple-unit trains. About 150 miles southwest of this territory lies the Pamplona-Aoiz-Sanguesa Railway, which is also described in this issue. This is a 6600-volt, 25-cycle line and the first single-phase railway in Spain. Other branches of the company which furnished the equipment for this Spanish line have equipped the 1200-volt d.c. Leyden-Katwyk-Noordwyk Railway, a 14.3-mile line, as described in the *ELECTRIC RAILWAY JOURNAL* for Jan. 25, 1912, and the 1300-volt d.c. 14-mile Verona-San Bonifaccio Railway of Italy, while the parent company installed 1000-volt d.c. equipment on the Cologne-Bonn Railway as early as 1906 and has supplied like equipment for an extension of that line to Siegsburg. Another large company which has built many single-phase lines in the past is not only continuing in that direction but has also contracted recently to build a 22-mile high-tension d.c. narrow-gage line between Maastricht, Holland, and Aix, Belgium. The same company has announced that its choice between single-phase and 1200-volt direct current for a new 17.2-mile narrow-gage railway for the Prussian Riesengebirge will depend chiefly upon the source of energy supply. These facts indicate that while alternating current, either three-phase or single-phase, is favored by Continental engineers for trunk-line conditions, consideration is also given to the possibilities of high-tension direct current for isolated installations, especially where operation through towns is a factor.

SOME LESSONS IN INSULATION

The discussion on turbo-alternators published in the last number of the "Proceedings" of the American Institute of Electrical Engineers contains a very large amount of miscellaneous information regarding insulation and its faults. In modern machines there has been a marked tendency toward a steady increase of the working temperature to obtain improved output. This applies both to turbo-generators, in which very peculiar conditions as to dimensions have to be met, and to railway motors as well. Thorough ventilation, forced if necessary, has enabled outputs to be greatly increased, but there is always a little residual doubt as to how far the process is a safe one from the standpoint of insulation. The ventilation of armatures and fields has been greatly improved, and forced draft will do wonders in getting rid of the heat so as to obtain large output without impossibly high temperatures. The great difficulty in the way of continuing the process is to obtain insulation which will stand up, first, against prolonged heating to a moderate temperature and, second, against exceptionally great heating in some parts of the machine which are almost impossible to ventilate. Finally, in railway motor work in particular, the insulation must be able to endure steady and sometimes violent vibration and mechanical shock.

Most of those who took part in the discussion had an extremely good word to say for the old reliable mica as the mainstay of insulation, but, as one of the speakers pointed out, mica insulation is usually far from being made of that material pure and unalloyed. It is generally composed of a combination of mica, paper and varnish in various proportions. Mica itself, being a peculiarly stable inorganic substance, is probably not affected by the prolonged action of electrical strains which are unable to puncture. The coronal effect produces no damage to the mica itself, which is practically unoxidizable, but it may attack, through the formation of ozone, the materials associated with the mica rather violently, and, beyond this, one limitation of the mica is its lack of the mechanical qualities which enable it to resist prolonged application of shocks.

One of the participants in the discussion made the interesting suggestion that while the built-up mica insulation may char and be attacked by the coronal effects, there is a possibility of obtaining some synthetic chemical product which will stand a higher temperature than any of the ordinary organic materials used for insulation and so will make it feasible to run machines with safety at higher temperature than is now possible. As against this there stands the initial difficulty that nearly all stable organic compounds contain a rather large percentage of carbon, which tends to be set free and then even in small amounts tends to destroy the insulating properties of the material. A fact not generally appreciated is that many chemical reactions are affected by a time factor, so that substances apparently inert, for instance, at a moderate temperature may undergo change if that temperature is kept up for a long period. The slow carbonization of organic materials at temperatures considerably below that at which the immediate carbonization takes place is a well-known and dangerous phenomenon which has been responsible for many fires.

A slight tendency to oxidation, such as can be furnished by coronal discharge, may stimulate chemical change with astonishing effects, so that the wonder is not that our insulating materials as a whole do not stand any higher temperatures but that they endure for the length of time they do in the working conditions found in modern electrical machinery. It is a distinguished tribute to the skill of the maker of insulating material that it stands up for long periods under the mechanical, thermal and electrical strains that are put upon it.

Considerable progress has been made of late in the production of heat-resisting compounds, progress much greater than would have been believed possible a few years ago. How much further we can go is another matter. At present mica comes the nearest of everything available to being a fireproof insulation, and perhaps the best task for the chemist is not to attempt to find a material as good in this particular as mica but to discover something which allied with mica will give it the necessary mechanical support with the minimum danger of chemical failure. At the present time big generators, even turbo-generators, present less formidable problems in insulation than do railway motors, since the generators as now constructed can be by forced draft much more easily ventilated. One must, therefore, live in hope that the chemist will come to the rescue and improve the insulation, already surprisingly good from the standpoint of earlier practice, to a point that will give even better service; but a solution of the difficulty available for big generators may still fail, for mechanical reasons, under the exacting conditions of railway service.

ELECTRIC LOCOMOTIVE RATINGS

In a communication published elsewhere in these columns a correspondent takes exception to discrepancies which appear in connection with the capacities assigned to certain electric locomotives. The subject is one inviting careful consideration, for with the rapid increase in electrification of steam railroads which appears to be inevitable in the immediate future some simple standard of comparison between different locomotives will soon become necessary.

Unfortunately the need is much more obvious than is a satisfactory means for meeting it. The steam locomotive has been rated for some thirty years past on the rough-and-ready basis of weight on driving wheels, the approximate equivalent of the more technical expression, drawbar pull, which has of late come into practical use. In addition there are the three very well-defined classes of passenger, freight and switching locomotives which exist through limitations of design. As these classes are under no circumstances interchangeable, a steam locomotive is necessarily compared with others of the same class and the weight on drivers serves as a satisfactory measure of the hauling power.

Fortunately for electric locomotives but unfortunately for convenience in rating them, no rigid separation of them into classes is necessary. The large drivers of the passenger locomotive which are required to keep down the piston speed when the engine is running fast are not necessary with electric traction, except indirectly as a means to raise the center of gravity or the center line

of tractive effort. Nor is there anything which demands in the electric locomotive the equivalent of the small boiler and the absence of guiding truck wheels found with steam switch engines. The result is that, so far as its mechanical structure goes, the same type of electric locomotive could be satisfactorily used in any of the three classes of service which go to make up the traffic of a trunk line.

Electrically, however, there are vast differences in the requirements. Switching service, essentially intermittent, imposes upon motors very different conditions from those of freight service where heavy continuous tractive efforts must be sustained for long periods. Also, if no reduction gearing is interposed between the motors and the wheels, passenger service will involve much smaller motors for a given drawbar pull than freight service. In fact, the question of ratings resolves itself largely into one of duration of load. The motors of the original type of New York Central locomotive, referred to by our correspondent, are reported to have such a small heat-radiating ability that they can hardly be run continuously with any load at all. They have, however, an extremely high capacity for absorbing heat so that their hourly and intermittent rating is exceedingly high. The design is justified by the fact that the service at the New York terminal is practically all switching or the equivalent, short runs with many stops.

To say whether these locomotives are more powerful or less powerful than the latest type on the New York Central is at best difficult. The latter have with forced draft an exceedingly high continuous capacity and they are capable of making long sustained runs which would cause the original type of New York Central locomotive literally to go up in smoke. Forced draft for the original type would be useless in the service for which the locomotive was designed and could not satisfactorily be applied even if it was desirable. Based upon the arbitrary A. I. E. E. standard of hourly rating, the new type, as our correspondent points out, is not so powerful as the original locomotive. Yet the claim of the manufacturer to the contrary is not without justification, because the older locomotive was designed for special service and on account of its inability to stand continuous runs it may be looked upon with disfavor on a trunk line where for reasons of ill-advised expediency or oversight it might be coupled onto a through freight or passenger train.

If electric locomotives are to have ratings which are understandable to steam railroad men, and there is every reason why they should be, it is evident that the horsepower standard already adopted for street and interurban railway motors will not do. The drawbar pull is from the steam railroad standpoint the really useful means of comparison, and since the electric locomotive does not possess the automatic safeguard against continuous overload which is given to the steam machine through the limitations of boiler capacity it might be advisable that a distinction between continuous and intermittent service be made. The hourly rating which happened to fit conveniently into street railway service leads only to confusion when it is applied to locomotives which may easily be called upon for practically full rating for four or five hours at a stretch.

LABELING EQUIPMENT

Certain advantages apply to the more general labeling of apparatus, both for stationary and movable service, which deserve consideration in view of efforts now being made to facilitate the operation of machinery at all times. The practice of painting the names of auxiliary switches carried in car vestibules either on the car molding or paneling or upon the switch bases, in cases where the latter are of insulating material, has several points in its favor which offset the slight cost of putting on the inscriptions. This identification of apparatus is unquestionably useful when reports upon accidents, real or apparent, are being prepared by motormen and conductors, and it is also a good thing for unbiased passengers to know the exact purpose of such equipment in case there is any chance of their being called upon as witnesses. The average passenger on a street car does not know the difference between a heater switch and a curling iron and cares less; but when a possible court case looms up from some incident occurring in the vestibule, positive convictions are highly important in regard to the behavior of apparatus which, if of unknown purpose, might serve only to mystify the recollections of the passenger. The final disposition of a case may rest upon such a simple matter as whether the car-lighting switch was closed or open in the vestibule at some critical moment, and the marking of such a switch with its function and the necessary on and off indications may easily be the means of saving hundreds of dollars to the company under proper conditions. Again, such marking reduces the opportunities for mistakes and false movements in the handling of apparatus by new platform men. The proper movements become second nature in time, but they always consume valuable seconds or fractions of them.

In the power plant there is room for much more to be done along the line of marking apparatus for the benefit of those responsible for operating it. Name plates are on the whole entirely satisfactory in these days so far as electrical equipment goes, but less can be said for the mechanical side of the situation. The sizes of pump cylinders may be given, but the normal speed and rated capacity of such units is seldom put down except in the case of underwriters' fire pumps, which offer a refreshing contrast in the completeness of their essential data to the apparatus usually found in other parts of the station. It would serve the operating force well if the practicable speed limits of centrifugal and reciprocating pumps designed for speed adjustment according to load conditions were inscribed on a suitable plate in each case for handy consultation. The maintenance of the proper speed in a circulating pump of the centrifugal type often makes a great difference in the amount of water and steam required to hold the best vacuum under given load conditions, and it sometimes seems as though too much were left to the memories of the men on shifts in dealing economically with what are often very large volumes of water or steam. Along this same line, the complete listing of lines or districts controlled by feeder switches on the switchboard panels is often overlooked. Nothing is lost, to take a merely negative view of this practice, by having full information in front of the operating department in

black and white, in legible form, and kept up to date at all times. The really vital statistics of power plant machinery are few enough to bear their being permanently put down in accessible places for the convenience of the men who run the installation.

EFFICIENCY IN THE DRAFTING ROOM

The work of the drafting room assumes an increasing importance as the size of an electric railway system grows. Even in a small company the occasional need of accurate and effective drawings is urgent enough to warrant the incurring of some expense to obtain the desired results in the shortest feasible time, and labor-saving methods are worth knowing, even if the volume of work turned out does not justify the installation of elaborate equipment. Blue prints must be made regardless of weather conditions and dried in the shortest possible time, photographs are needed of some unusual condition on the property, data are called for at a moment's notice by the executive officers, and new ideas along designing lines must be put on paper in tangible form in connection with the comparison of estimates or the hurried purchase of equipment and material.

These every-day demands upon the drafting department require efficient planning for their prompt satisfaction. Whether the force at the drawing board is large or small, systematic work tells. The time-saving results of eliminating superfluities from drawings are little realized in organizations where intensified production has never characterized the drafting board. Attractive economies may be secured by such simple means as using only one line per phase in alternating-current wiring diagrams, by abbreviating company titles or by using initials in place of the corporate full name on drawings for use inside the organization, by showing different sections of the same subject upon the same sheet and by omitting minute details in outline drawings. Many piping and valve diagrams can be made on the single-line basis just as electrical sketches are usually made. Instead of showing the details of a car body, truck or seating design on several sheets, it is ordinarily sufficient to present typical plan and sectional views on one or two large tracings by avoiding the repetition of all symmetrical duplications. On a rush job requiring the exhibition of details in a car-lighting layout, for example, where several different arrangements are to be compared, it may serve the purpose to show only half or possibly one-quarter of the car. In the design of substations and power plants, where different arrangements of apparatus units are to be shown in comparative locations, the preparation of cardboard templates to outline the principal machines, boiler batteries and switchboard length required has been found to save a great deal of time. Again, there are doubtless cases where stenciling can be used to great advantage to save time instead of the draftsman spending effort on elaborate free-hand lettering. At other times, where duplicates and triplicates of sketched schemes are wanted practically the instant they are made in the original, pencil diagrams made on sheets interleaved with carbon copy paper are of the greatest value. There is no question that the drafting board furnishes with its auxiliaries an excellent field for economical time study. Home-made arc-lamp printing outfits, electrici-

cally heated print driers and the use of fan motors in drying plates and films are all worth investigation.

The efficiency of not a few drafting rooms could be raised by more attention to the inclusion of important dimensions on drawings and the better filing of sketches and tracings. In the last analysis, the drafting board is only a means to an end, and that end is often the saving of the time of high-priced men in executive chairs. No drafting department attains maximum efficiency until its products are complete within the desired limit of accuracy. The amount of time lost by busy men in poring over confusing drawings during conferences and in scaling dimensions which ought to have been written upon the plans themselves cannot be expressed with accuracy, but on not a few roads it is too large to be justified. Clear-cut productions with non-essentials omitted are almost invaluable at such times.

COMPULSORY ARBITRATION

Periodically threatened as we are by labor troubles on transportation lines and other public utilities, and listening as we have been for months to the accounts of railway wage demands and adjustments, there is naturally a more or less constant consideration of compulsory arbitration as a means to prevent strikes of the kind that paralyze industry and transportation. Because of this fact and owing to its comprehensive character there are material and information of much interest to be obtained from the report and discussion on "The Question of Compulsory Arbitration in the Railway Service" before the Société d'Études Législatives of Paris, reported in the April issue of the *Bulletin* of the International Railway Congress.

The report and discussion appear to have been brought about in connection with the proposal of a French commission for the adoption of a law which should provide for: (1) regular meetings between the heads of departments and the central administration of the railway system, on the one hand, and delegates elected by the railroad servants, on the other; (2) in case of dispute about the conditions of work, recourse to compulsory arbitration when the railways, the men or the minister of public works demand it; (3) the absence of penalties when the decision of the arbitration court is not carried out; (4) the promise of compensation in certain cases to the railway affected by the arbitration.

The discussion upon these proposals is noteworthy, although from one point of view or another objection was made to every one of the commission's recommendations, and in a concluding note the official reporter says that while the discussion terminated without a vote, "the remarks made show that the opinion of the great majority was against the project proposed." It is further intimated that "the discussion, though not completed, will not be resumed." The railway men who participated in the discussion were almost unanimous in disapproving of the commission's proposals on the general ground that the machinery for the representation of the employees would be, as one speaker said, "an instrument of war, not an instrument of peace." The political economists and lawyers who spoke were likewise opposed to the commission's ideas, though for different reasons.

Frequent reference throughout the discussion was made

to the compulsory arbitration and conciliation laws of other countries, from which it would appear that there is hardly any nation which has not attempted to prevent strikes, and incidentally to evade its responsibilities, by the enactment of some sort of compulsory or semi-compulsory arbitration legislation.

Even Turkey has a law, dating from 1909, which provides for compulsory recourse to conciliation "in the case of the public service." Strange as it may seem, the provisions of the Turkish law show a thorough grasp of the possibilities of evil in such legislation. Among these provisions is one that no demand made by employees or workmen shall have as its object interference in the internal affairs of the company or the exercise of control over the management and its regulations. According to another article it is forbidden to form any union in a public service enterprise, and all persons who form unions in enterprises of this kind which would prevent others from working or would induce the stoppage of work are made liable to imprisonment from a week to six months or a fine from 1 pound to 25 pounds Turkish. A penalty of imprisonment is also provided for those who take part in the stoppage of work on a public service while efforts at conciliation are pending under the law.

Australia usually receives the credit of being the discoverer of compulsory arbitration as a means of avoiding industrial disputes, but in respect to Australian attempts in this direction, as well as to other similar attempts elsewhere, the facts show that complete failure or only very limited success is the result to be expected. This is a confirmation of the statement made by J. S. Badger, manager of the Brisbane Tramway Company, in his address before the last meeting of the American Electric Railway Association (*ELECTRIC RAILWAY JOURNAL*, Vol. XL, page 759).

About the only unqualified evidence to be found in favor of compulsory arbitration or conciliation is that offered on behalf of the Canadian conciliation act, familiar to most of us in this country. As for the rest little or no evidence has been produced, even by the proponents of compulsory arbitration, to show that it is sufficiently productive of good and positive results to warrant recourse to it. This, the teaching of foreign experience, should be taken as all the more impressive when applied to American conditions for the reason that here we have relatively few incorporated or even responsible trade unions against which an award can be enforced. It is in this respect that the Australian laws have most signally failed. When awards are pleasing to the employees they are observed; when awards are objectionable they are ignored, and no method of enforcing them has been found. In the light of this experience it can hardly be claimed that there is sound foundation for the belief that compulsory arbitration is an effective remedy for labor troubles. But if we are to have arbitration, compulsory or otherwise, it should be so conducted as to contain the promise of judicial inquiry and award—not the kind of pseudo arbitration upon which comment was made in these columns last week, conducted by two prejudiced advocates and a supposedly neutral compromiser. The outcome of such proceedings almost invariably represents expediency rather than justice.

Notes on Midi D.C. and A.C. Electrifications

Descriptions Are Presented of an 850-Volt D.C. Third-Rail Local System and an Experimental Section Operated at 16 $\frac{2}{3}$ Cycles, 12,000 Volts, Single-Phase

The Midi (Southern) Railway, one of the great French railway systems, has recently carried out two distinct electrifications in southern France. One is a 35-mile d.c. 850-volt third-rail installation between Bourg-Madame and Villefranche-Vernet le Bains, which is 20 miles southeast of Toulouse; the other is a 15.5-mile single-phase 12,000-volt, 16 $\frac{2}{3}$ -cycle railway between Perpignan and Ille, forming the experimental section of a 175-mile electrification for the vicinity of Toulouse. A description of each installation follows.

D. C. ELECTRIFICATION

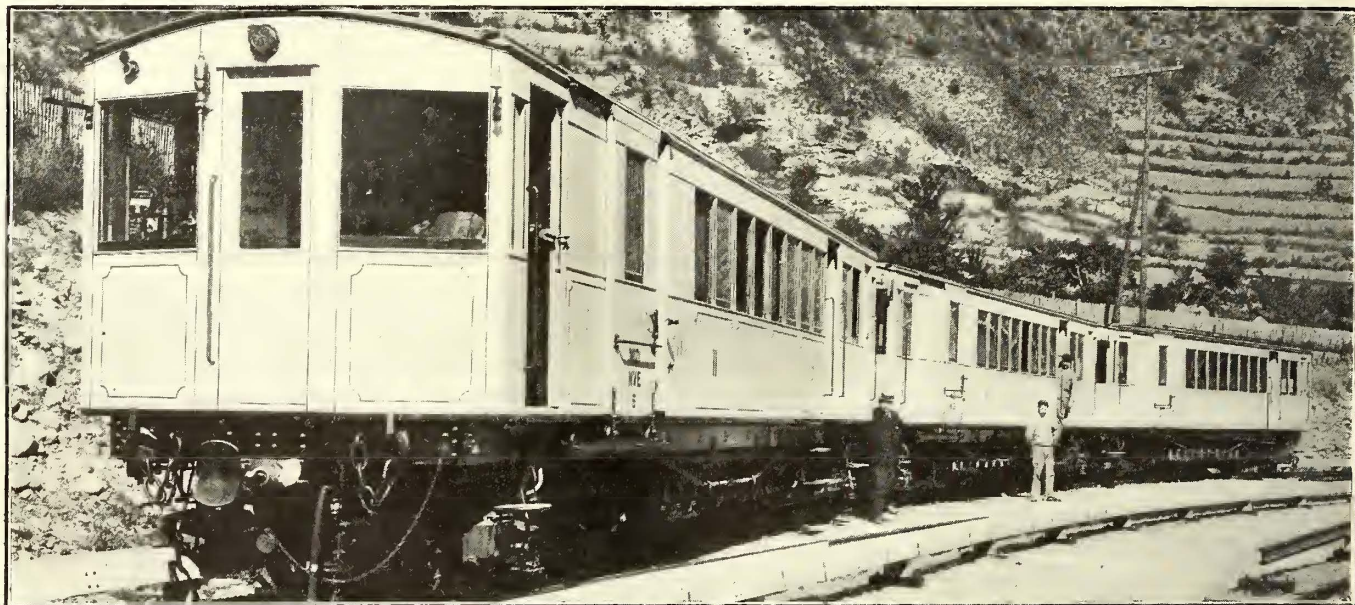
Several unusual features are embodied in the equipment installed for the third-rail standard-gage railway of the Midi Railway, one being the fact that the direct-current energy for traction and 25-cycle, six-phase energy for transmission are obtained from common generators.

The power plant is at La Cassagne, 12 miles from Villefranche, the terminal of the steam railroad. From this place the electric railway extends up-grade to the moun-

tain pass of La Perche, while the secondary end delivers it at 20,000 volts, three-phase. Each transformer has three vertical cores and is mounted in an oil tank, which is cooled by water circulation. Since each transformer on the lower floor is directly connected by a cable with the generator no bus-bars are necessary for these circuits. The advantage in using the double-current machine is the reduction in first cost, owing to the fact that no special direct-current generators are needed.

Rotary converters are placed in substations at five points along the road for feeding direct current to the third-rail at 850 volts. A step-down transformer of the air-cooled type receives energy at 20,000 volts from the three-phase line and delivers it at 600 volts, six-phase, to a rotary converter, which furnishes direct-current energy for the third-rail. The rotary converters are started as d.c. motors with energy taken from the third-rail through an oil rheostat, which is operated from the switchboard panels.

The three-phase transmission line comprises a double



Midi Electrifications—Train of Three Motor Cars on Direct-Current Line

tain pass of La Perche, at an altitude of 5220 ft. above sea level. After crossing the pass, the line proceeds upon a high plateau to the Rigat Pass and then descends into the Cardagne plain, ending at the terminal station of Bourg-Madame, which lies near the Spanish frontier, with an altitude of 3750 ft. The total length of the electric road is 35 miles, and the maximum grade is approximately 6 per cent.

The generators are of the so-called "double-current" type, each being provided with a bar-wound armature connected at one end to a commutator of the usual type and at the other to six collector rings. They are compound-wound machines so proportioned that the commutator emf rises from 800 volts to 850 volts when the load varies from the no-load to the full-load value. The machine has eight commutating poles, to eliminate sparking and allow the brushes to be kept in one position. Each generator, of which there are four, is a 650-kw machine driven by a 1500-hp Pelton waterwheel.

Each machine forms a unit with a step-up transformer, the primary circuit of which receives energy at 600 volts,

line of six wires mounted on pine poles, which have been impregnated with copper sulphate and are spaced from 115 ft. to 140 ft. apart. Two cross-arms of creosoted oak are used, fitted with large porcelain pin-type insulators. In the tunnels, of which there are eighteen, having a total length of 7800 ft., two underground cables of three wires each are mounted along the vaulting and are protected at each end by lightning arresters. A junction box is provided for connecting the cables to the overhead lines.

Between the main station and the Villefranche junction a special construction was used. It consisted of concrete poles carrying aluminum cables, of which two types were tried. Those on one line were 30 sq. mm (No. 2 B. & S.) in section and were made up of three conductors, while on the other line a single stranded conductor of 70 sq. mm (No. 00 B. & S.) was used.

The passenger and freight cars which are used on this line are mounted on double trucks, and the electrical equipment is the same for each. Each passenger car has a motorman's cab at each end, a first-class compartment with

eight seats, a second-class compartment with thirty-two seats, and a baggage compartment. The freight cars have a clear floor space with a motorman's position at each end. The motor equipment of each car consists of four 50-hp, 400-volt motors, using a gear reduction of 1:4.3. The two motors of each truck are permanently connected in series so that they may operate at from 800 volts to 850 volts. All cars have Sprague multiple-unit control. Use is made of three braking systems, to avoid trouble on the many steep grades encountered. The main system is the ordinary Westinghouse straight-air brake. The controller has three extra points for connecting the motor across a resistor carried under the car, and this type of brake is used on steep down grades. In addition to these two systems hand brakes are provided for a possible emergency. The rolling stock and the electrical equipment of the main plant and that of the substations were furnished by the Société Alsacienne de Constructions Mécaniques, Belfort.

SINGLE-PHASE LINE

The ELECTRIC RAILWAY JOURNAL for July 6, 1912, contained a description of two forms of catenary construction submitted for the experimental single-phase line of the Midi Railway, one of these being the design of Vedovelli, Priestley & Company and the other that of M. Paul, chief engineer of this railway. The following paragraphs contain a description of other forms of catenary equipment and also of the single-phase locomotives furnished by the French Thomson-Houston and the French Westinghouse companies. The Jeumont locomotive for this line was described in the ELECTRIC RAILWAY JOURNAL for Feb. 15, 1913.

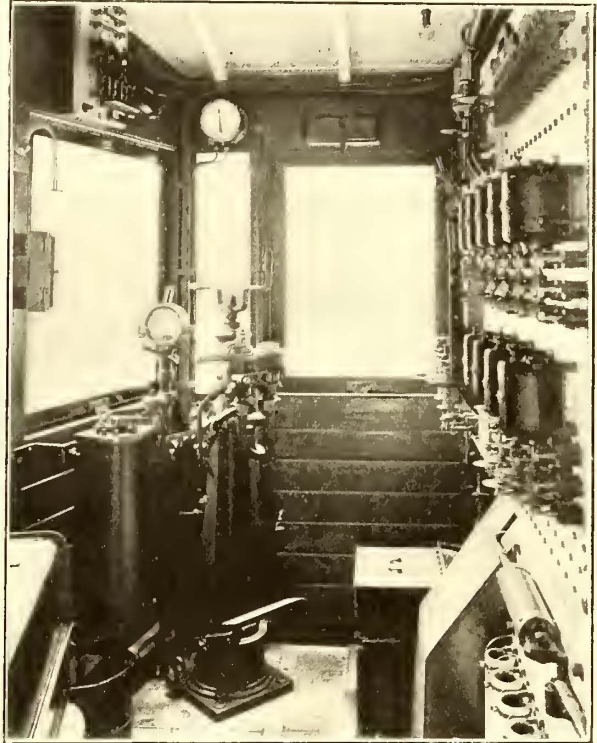
CATENARY SYSTEMS

The catenary equipment furnished by the French Thomson-Houston company is built with reinforced concrete poles for spans of 164 ft. and 328 ft. The curved bracket is composed of two pieces of angle iron which are held horizontally by a tie rod secured by a through bolt to the top of the pole. The outer end of the bracket is turned inward toward the rails. The insulator on which the catenary cable is carried is mounted on a saddle somewhat like the construction used in Germany. The trolley wire is suspended from a span wire which is attached to an insulator at each end, the insulator being supported as shown. On the longer span the catenary cable is carried on an independent horizontal arm with separate tie rod. The trolley wire is suspended from the auxiliary catenary by means of clips which allow it to be slightly displaced with respect to this auxiliary catenary. The trolley wire is zigzagged and it is also sectionalized at the point where the pole spacing is changed from 164 ft. to 328 ft. In a tunnel on this section the sus-

zontal arms. Tension take-up weights are used on one part of the line where the spans exceed 328 ft.

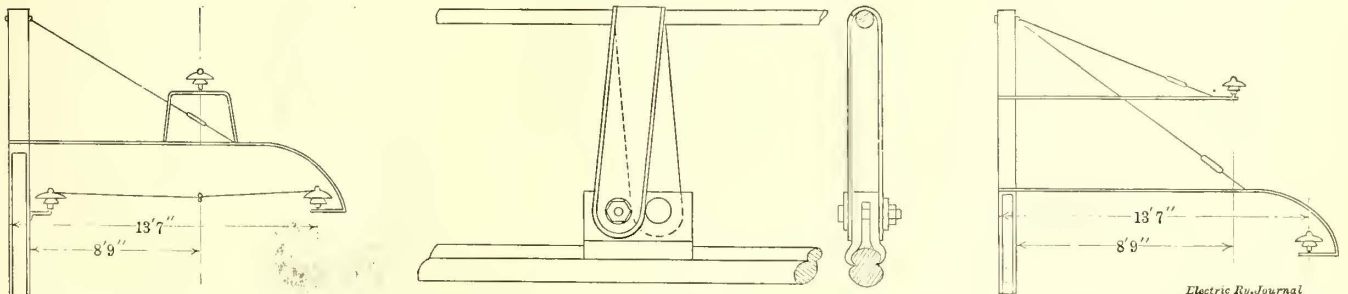
LOCOMOTIVE REQUIREMENTS

The requirements laid down for the six competing locomotive builders were that the locomotive should be capable of starting and hauling on any part of the line a trailing weight of 400 metric tons; that with a trailing load of 280 tons the maximum speed should not be less than 24.8 m.p.h. and with a load of 100 tons not less than 37.2 m.p.h.



Midi Electrifications—Motorman's Cab of D. C. Motor Car

The weight of the locomotives was limited to about 80 tons with a maximum of 18 tons per axle and an adhesive weight of 54 tons. It was specified that in running from Villefranche to Ille, upon which there are many grades of about 2 per cent, the motors should be capable of sending current back to the line and of being so regulated that half the normal speed could be obtained if desired; that when operating at the normal voltage each motor should deliver



Midi Electrifications—Overhead Construction for 164-Ft. Span, Hanger and Suspension Clip and Construction on Curves

pension has been simplified by omitting the main cable and carrying the auxiliary catenary and trolley wire from span wires suspended between insulators on the opposite sides of the tunnel.

The catenary construction of the French Westinghouse company consists of poles built up of old rails, to which horizontal brackets are attached for carrying the suspension insulators. The conductor is a copper wire attached to the catenary cable by hangers and to the poles by hori-

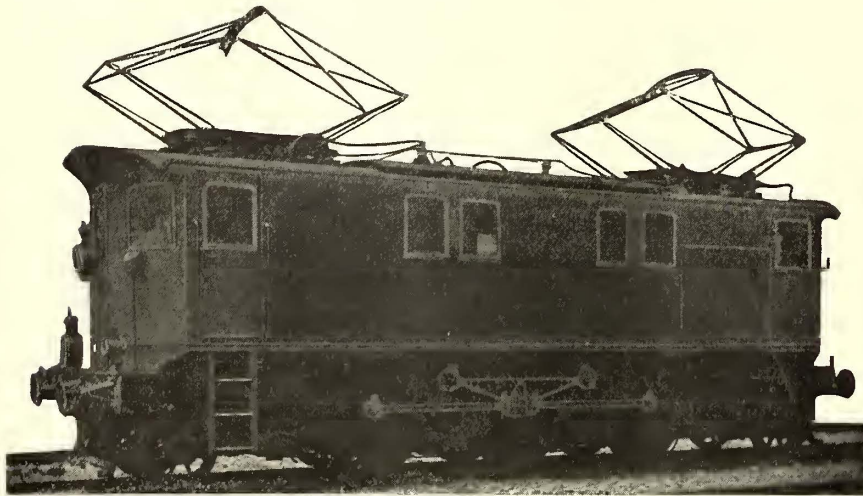
600 hp without a temperature rise exceeding 75 deg. C. after a run of six hours; that they should be capable of operating on 25 per cent overloads for one hour within the temperature limit mentioned; that the insulation of the windings should be capable of withstanding a temperature of 100 deg. C. continuously, and that they should be capable of carrying the currents corresponding to the following tractive efforts: 27,500 lb. at starting, 17,600 lb. at a speed of 27.9 m.p.h. and 9240 lb. at a speed of 37.2 m.p.h.

The accompanying Table I gives particulars of the three locomotives which have been accepted by the Midi Railway, as announced on page 157 of the *ELECTRIC RAILWAY JOURNAL* for Jan. 25, 1913.

TABLE I—COMPARISON OF LOCOMOTIVES

	Thomson-Houston	Westinghouse	Jeumont
Total weight, metric tons...	88	81	80
Total length.....	45 ft. 1 in.	37 ft. 3 in.	50 ft. 1 in.
Total wheelbase.....	28 ft. 2 in.	28 ft. 10 in.	34 ft. 10 in.
Diameter of motor wheel...	4 ft. 3½ in.	3 ft. 11 in.	4 ft. 11 in.
Number of motors.....	2	2	3
Hp of each motor.....	600*	600	400
Method of drive.....	Coupling rods and jack shafts.	Gearing and jack shafts.	Geared direct through quill.

*In constant service.



Midi Electrifications—Locomotive Supplied by the French Westinghouse Company

FRENCH WESTINGHOUSE LOCOMOTIVE

In the locomotive built by the French Westinghouse company the pinions on the two motor shafts mesh with two gear wheels mounted on intermediate shafts and the power is then transmitted to the driving wheels by a yoke and side rods. The locomotive is divided into two parts with a separate transformer for each motor. Its electrical equipment weighs 43 metric tons and the mechanical parts 38 tons. The two motors and gearing alone weigh 56,760 lb., the transformers and preventive coils 21,230 lb., the

control connections of this locomotive and the order of closing the contactors are shown in two accompanying diagrams. In the wiring diagram the motor switches are marked *A*, the transformers switches *B*, the field winding *C*, the motors *M-1* and *M-2* and the transformers *T-1* and *T-2*. The maximum pressure supplied to the motor terminals is 420 volts.

Originally this locomotive was designed for recuperation, but as the connections proved too complicated this purpose was abandoned and a system of electric braking was introduced. Instead of returning current to the line, resistances are now connected to the transformers. This arrangement eliminates recuperation but provides satisfactory braking. With the use of these resistances it has been found possible to brake a 100-ton train on a grade of 1.7 per cent and to regulate the speed between 6.2 m.p.h and 38.4 m.p.h.

The accompanying Table II gives the results of some trials carried out with this locomotive on a grade of 1.7 per cent when the weight of the train hauled was 280 metric tons and the approximate tractive effort 13,420 lb.

The accompanying Table III relates to a train weighing 100 tons, the tractive effort being 4840 lb.

The efficiency is calculated from the energy available for hauling and that measured by the instruments in the sub-station.

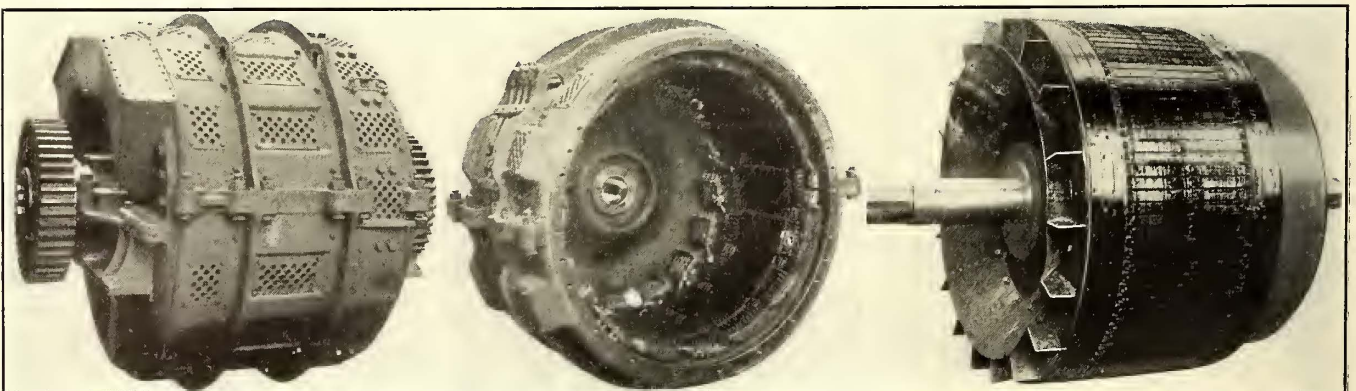
MOTOR CARS

The Westinghouse company has also received an order from the Midi Railway for thirty double-truck motor cars. Each truck will carry four 125-hp motors, operated at 16 2/3 cycles, and will take current through transformers from a 12,000-volt trolley. The motors are of the company's type No. 132 D, and

TABLE II—LOCOMOTIVE TRIALS

Speed in m.p.h.....	26	Kva.....	1100
Power (drawbar), hp.....	950	Kilowatts.....	970
Volts.....	11,000	Power factor.....	0.88
Amperes.....	103	Efficiency, per cent.....	72.4

the control system is of its well-known electro-pneumatic design. The cars will be 62 ft. 8 in. over all, 41 ft. 4 in. between the truck centers, 10 ft. 1



Midi Electrifications—Single-Phase Motor and Parts of Same as Supplied by the French Westinghouse Company

electro-pneumatic control 7524 lb., the compressors 1980 lb., and the ventilators, current collectors and accessories 1954 lb. The motors are of the series-compensated type and, like the transformers, are operated with forced ventilation. The gear ratio is 45:74. The contactors are closed with compressed air and opened by springs. The electro-pneumatic valves are supplied from a transformer tap at a pressure of 65 volts.

TABLE III—LOCOMOTIVE TRIALS

Speed in m.p.h.....	38.5	Kva.....	1100
Power (drawbar), hp.....	540	Kilowatts.....	790
Volts.....	11,700	Power factor.....	0.92
Amperes.....	73	Efficiency, per cent.....	47.4

in. from the top of the rails to the roof and will have wheels of 39.37-in. diameter. The body will be divided into four second-class compartments seating a total of thirty-

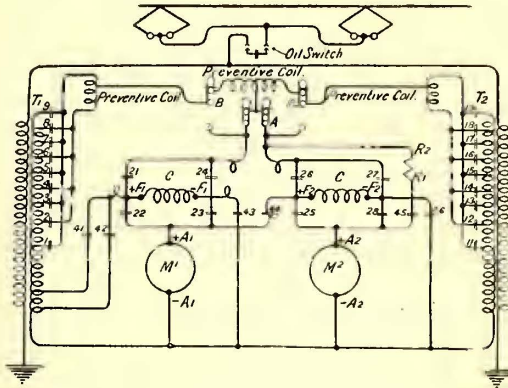
two passengers. A baggage room and toilet will be included. The total weight of a car without passengers will be 52 metric tons. The cars will be arranged for double-end operation.

FRENCH THOMSON-HOUSTON LOCOMOTIVE

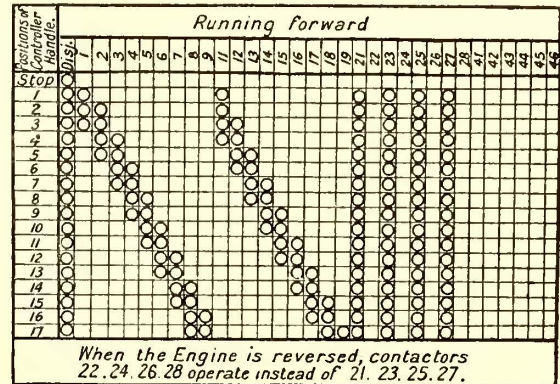
The French Thomson-Houston locomotive has two slow-speed motors with cranks at each end of their shafts. Connecting rods coupled to these cranks transmit the power

the armatures are connected in a series with the field windings the maximum locomotive speed is 48.4 m.p.h., more than three times the speed obtained when the motors run at synchronous speed.

The motors are designed to develop 600 hp continuously and 750 hp for one hour. The main oil switch is fitted with remote control so that it can be opened electrically from the motorman's platform. The main trans-



Midi Electrifications—Diagram of Connections for Westinghouse Locomotive

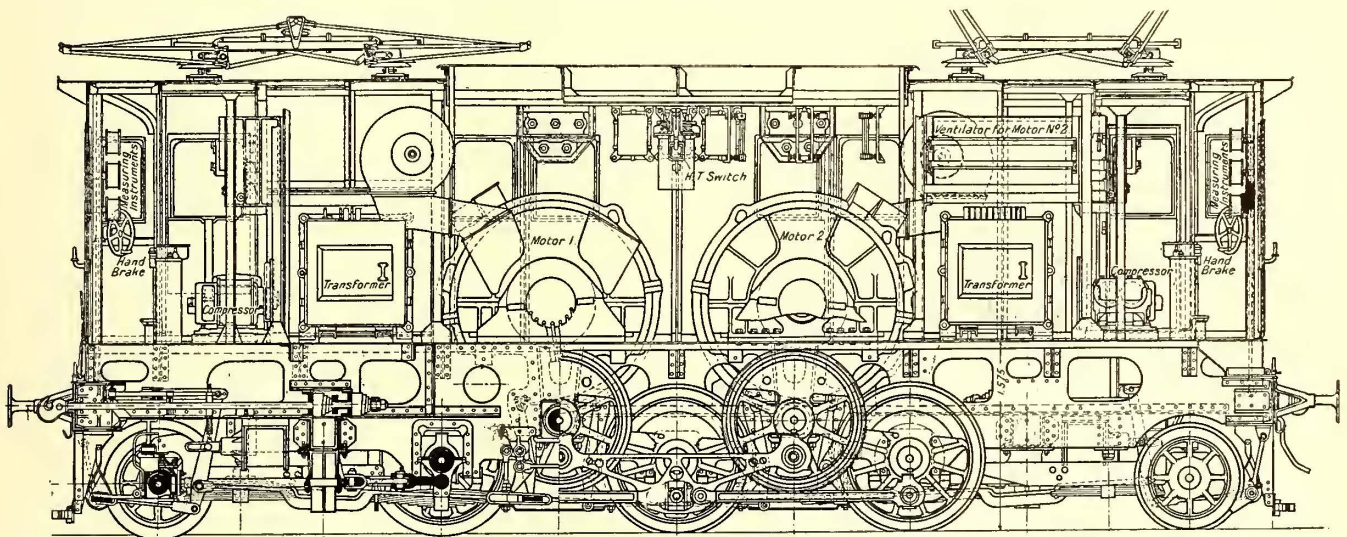


Midi Electrifications—Order of Closing Contactors on Westinghouse Locomotive

to the jack shafts, which are set in the same plane as the driving axles. From these jack shafts the power is transmitted to the six driving axles by horizontal side rods. The connecting rods are inclined at the greatest possible angle, the motors being placed close to the center of the locomotive. Only one transformer is used. The motors and other equipment are mounted to secure a high center of gravity approaching that of the steam locomotive.

The motors are started as repulsion machines. To insure their good commutation, twenty poles are used so that the flux per pole is reduced with a corresponding reduction in the emf induced in the short-circuited coils of the armature at starting. When starting, the brushes are short-

former is of the air-cooled type and is designed to stand four times the normal operating voltage. Its secondary has seven main taps giving various pressures for the auxiliaries, control, etc. The secondary circuits have twenty contactors. Seven contactors accelerate and reduce the speed of the locomotive, and three contactors control the resistances which serve to limit the current each time one of the secondary sections of the transformer is short-circuited. These resistances lessen the variations of the current of the motor each time a secondary section of the transformer is brought into service. More taps would be necessary in the absence of these resistances or their equivalent.



Midi Electrifications—Longitudinal View of French Westinghouse Locomotive, Showing Character of Drive and Mounting of Equipment

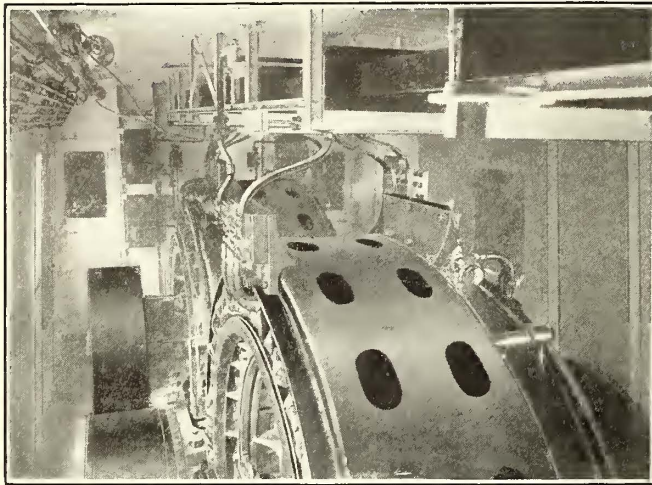
circuited and current is supplied to the stator terminals. After the motor has attained synchronous speed the armature is connected in series with the field windings. A voltage obtained from the secondary of the main transformer is also impressed on the compensating winding to produce a commutating flux. The synchronous speed of the motor when working as a repulsion machine is 100 r.p.m. at 16 2/3 cycles, corresponding to 15.5 m.p.h. When

A simplified diagram is presented on page 796 wherein the elements of the two motors—armature, compensating and field coils—are represented respectively as M_1, C_1, E_1 and M_2, C_2, E_2 . The elements M_1, M_2 and C_1, C_2 are connected permanently in series and E_1, E_2 permanently in parallel. The reversal of current in the two field coils E_1, E_2 is obtained by means of the contactors 11, 12, 13 and 14. Contactors 11 and 13 are used for one direction of run-

ning and contactors 12 and 14 for the opposite direction. The electric braking and regeneration depend in principle on reversing the rotating tendency of the motors. In reversing the connections of a single-phase series motor without changing the direction in which the locomotive is run the motor is made to act as a series generator which

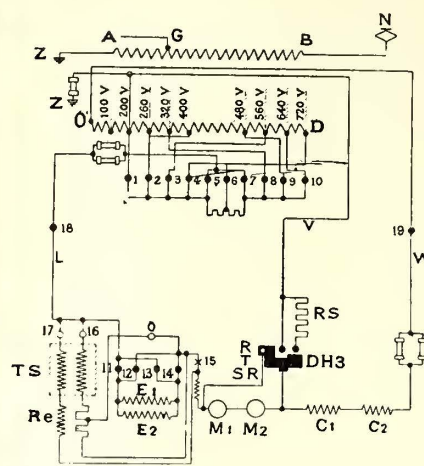
repulsion type to a series-repulsion machine. This is obtained by impressing a potential of from zero to 200 volts (by way of tap V of the transformer secondary) upon the compensating coils C_1, C_2 . The motors are connected in repulsion only at starting in order to permit easier commutation. To obtain this connection the brushes are short-

circuited and the exciting and commutating coils are placed in series between them and tap V on the secondary coil of the transformer. The proportion established between the ampere-turns of the stator and rotor under these conditions is such that the combination of strong current but weak flux insures good commutation. Whenever the speed of the motor exceeds synchronism this



Midi Electrifications—Interior of Thomson-Houston Locomotive

receives its exciting current from the line. During regeneration the connections are altered so as to convert the machines from motors to generators. In the simplest form the converted machines have a preponderating tendency to act as generators of direct current. In order to avoid this action and at the same time permit the generation of alternating current, there is included in the braking circuit a transformer, the primary of which is connected to the field coils E_1 and E_2 , and the secondary TS to the circuit formed by the armatures and the series-connected compensating coils C_1, C_2 . This transformer is placed in circuit by contactors 16 and 17, which are closed at the time of braking while contactor 15 remains open; when the machine acts as a motor contactor 15 is closed and contactors 16 and 17 are open. In some cases the regenerated

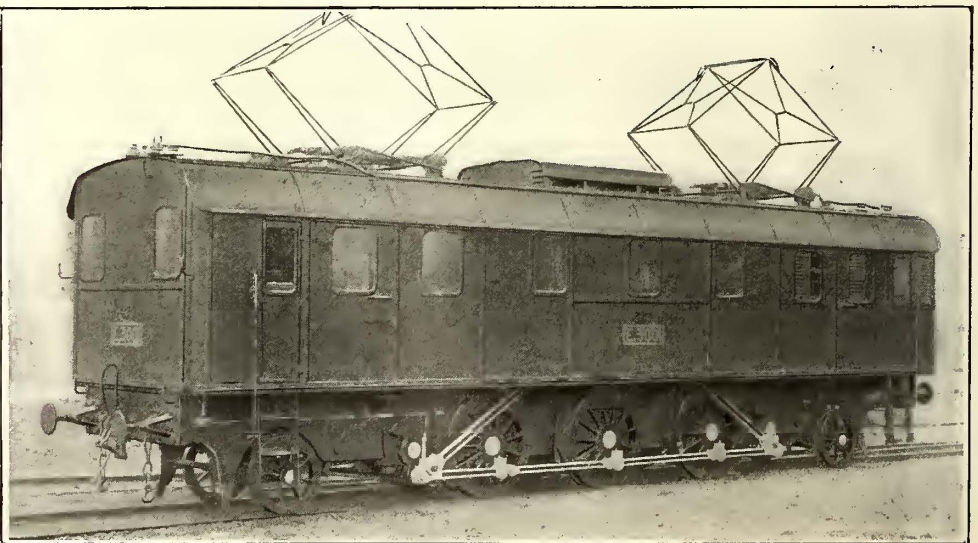
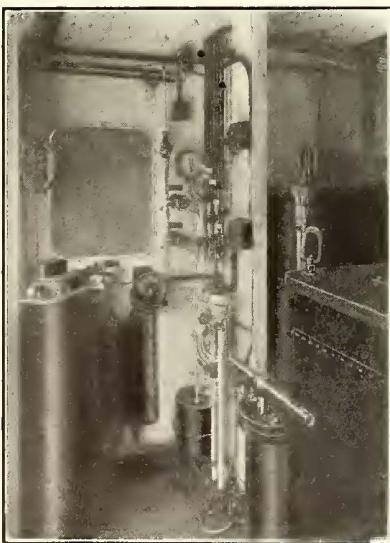


Midi Electrifications—Simplified Wiring Thomson-Houston Locomotive

method of connection fails to give satisfactory commutation and consequently the series-repulsion connection is established.

Each controller has three handles, the main controlling handle, the braking handle and that used for reversing. There are also three separate drums. When the controller handle is turned to the ninth position the motor connections are automatically changed from repulsion to series.

The Public Service Commission for the First District of New York has arranged with the Bridge Department and the Bridge Operating Company for a change in the operation of the surface cars at the Manhattan end of the Williamsburg Bridge, New York. Owing to the increase of travel on the local bridge cars congestion on the loop where



Midi Electrifications—Interior of Cab and General View of Thomson-Houston Locomotive

energy equals from 40 per cent to 50 per cent of the energy absorbed in climbing the grade.

As previously noted, the synchronous speed of the motors gives a traction speed of only 15.5 m.p.h. The higher normal speed obtained after starting is due to the change of the connections so as to alter the motor from one of the

such cars receive and discharge their passengers has greatly increased. Accordingly the loading and unloading place for these cars will be shifted from Loop No. 7 to Loop No. 1, which is closer to the Manhattan entrance and much longer. The change will be made as soon as the proper ticket booths can be provided for the latter loop.

Electrification of British Railways

A Survey of Past and Present Electrification Work by British Steam Railroads In and Out of London, Including Data on an 18-Mile 1500-Volt D. C. Electrification of a Freight Line Between Shildon and Newport

The recent official announcement of plans for the extensive electrification of the London & South Western and the London & North Western Railway lines in and out of London makes it opportune to review the work which has hitherto been done in this direction in England and to present maps and other particulars of the lines which either have been or soon will be electrified.

LINE OF THE LONDON, BRIGHTON & SOUTH COAST RAILWAY

The most extensive steam railroad electrification in England to-day, neglecting the old Metropolitan and District tunnels, is that of the London, Brighton & South Coast Railway. This company has not only been the pioneer in electrification on a large scale, but with the exception of the Heysham-Morecambe line of the Midland Railway, 8.5 miles in length, it differs from all others in the use of high-tension single-phase overhead conductors instead of a d.c. low-tension contact rail. Single-phase operation has proved so satisfactory to the directors of the Brighton company that they have authorized their consulting engineer, Philip Dawson, to prepare plans for trunk-line electrification in addition to the enlarged suburban mileage hereinafter mentioned.

The first electrification of this company was open for service December, 1909. It consisted of a 6600-volt, 25-cycle catenary line from Victoria to London Bridge, via Queens Road and Peckham Rye, following the route shown in the accompanying map and known as the South London line. This route is 8.7 miles long, embracing 22 miles of single track. The average distance between stations is 0.87 mile. The schedule speed, including stops, is 22 m.p.h. and the maximum speed is 37 m.p.h. to 38 m.p.h.

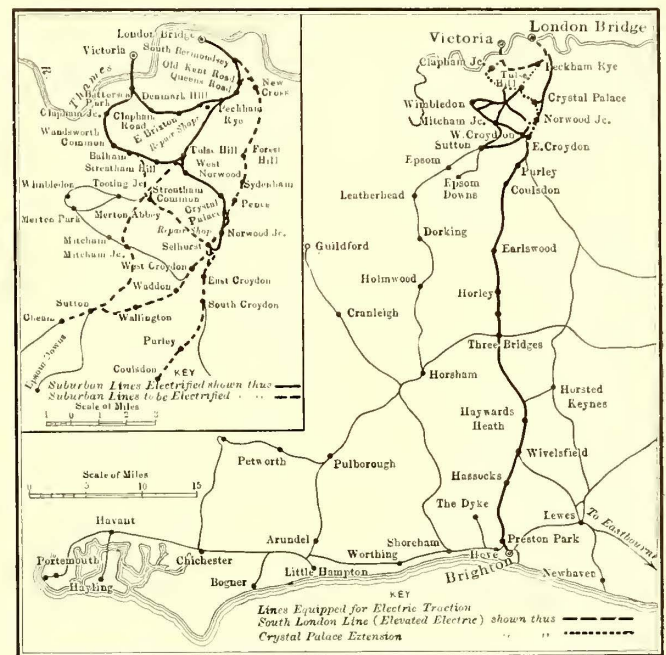
The second section, opened in May, 1911, is known as the Crystal Palace extension. This extends from Battersea Park to Balham, West Norwood and Crystal Palace, with a branch to the inspection shops at Norwood Junction. The route is 10.3 miles long, consisting of 41.5 miles of single track. The distance between stations is 0.96 mile. The schedule speed, including stops, is 23.4 m.p.h., and the maximum speed is 38.6 m.p.h.

The third section, which was opened in May, 1912, consists of a line from Peckham Rye to Tulse Hill with an intermediate section from Tulse Hill connecting the South London line with the Crystal Palace extension. This line has 3.3 miles of route, consisting of 7.2 miles of single track. The distance between stations is 0.75 mile. The speeds are the same as those on the Crystal Palace extension.

No other lines are under construction at this time, but in accordance with Mr. Dawson's estimates, the board of directors has decided to electrify the principal remaining portions of the suburban system as follows: the area extending from London to Croydon, Purley and Coulsden and from London and Sutton to Cheam. As the map shows, the routes include four-track lines between Balham and East Croydon and between London Bridge, Croydon and Purley. The other lines to be electrified are two-track routes. It is expected that the first section to be opened will be that from Balham through Thornton Heath and Selhurst to Wallington and Sutton. Contracts for the new work will shortly be made with the Metropolitan Carriage Company for the motor cars (including Allgemeine electrical equipment) and with Messrs. Blackwell for the overhead construction. It is estimated that the work will require four years to complete but it is anticipated that the first section will be in use within eighteen months.

When all the lines named are equipped the suburban

and outer suburban systems of the Brighton Railway, which are almost due south of London, will be electrically operated with the exception of some minor connections like the line from West Croydon to Mitcham and Merton Park, which has a very light service and is mostly single track. It has been proposed to double-track this line, and when this is done it will also be electrified. The additional suburban sections approved for electrification will amount to 54 miles of route. It should be stated that the non-electrified loop from Streatham Common to Tooting and Wimbledon is jointly owned by the South Eastern and Brighton railways. It is the intention of the Brighton company after the suburban electrification is completed to have all trains which make local stops electrically operated. Then the only important steam trains left would be the through trains which do not stop in the suburban area. It is obvious from this that the next step will be to haul to the terminals



English Electrifications—The London, Brighton & South Coast Railway

by means of electric locomotives all those trunk-line trains which now stop either at Sutton or Croydon.

The energy for the new suburban lines which the London Electric Supply Corporation will have to furnish from Deptford in addition to that supplied by the present plant will be about 50,000 kw. The company will also require 200 motor cars with four 175-hp motors each, making a total of 250 motor cars. The total trackage of new and old lines will amount to about 220 miles of single track.

The board of directors has also authorized surveys to cover the electrification of the trunk line. Estimates are being prepared for the main line from Coulsden to Brighton, a route distance of 36 miles, about one-half of which is four-tracked. Following this, estimates are to be made of the cost of electrification between Brighton and Worthing, a 10-mile double-track route running west from the main line through a seashore resort section; also, in all probability, for the main line running east to Eastbourne—this being a branch from Wivelsfield station via Lewes Junction, comprising 25 miles of double-track route.

RESULTS OF BRIGHTON ELECTRIFICATION

The principal reason for the electrification of the London lines of the Brighton Railway was the desire to regain traffic which had been lost through the development of electric tramways in the South London district. Electrification has not only recovered the lost business but has even resulted in drawing traffic from motor buses. The quickness with which electrification brought back the business is indicated by the following statistics covering the business at Peckham Rye station: For the year ended Dec. 31, 1902, just before the opening of the London County Council Tramways, the steam trains carried 1,213,281 passengers; for the year ended Nov. 30, 1909, the last year of steam trains, the traffic had dropped to 526,373 passengers on account of the tramway competition; for the year ended Nov. 30, 1910, the first year of electric operation, the travel was 1,051,264 passengers, and for the year ended Nov. 30, 1911, the old business had been more than regained.

A slight reduction in fares was made on the South London line when electrification was inaugurated, but the real causes for recapturing the traffic were betterments in running time and shorter schedules. Some comparisons between the service given by steam and electric trains respectively appear in the following table:

	Steam	Electric
Average schedule speed on South London line, m.p.h....	14.8	22
Increased speed, percentage.....		48.7
Average acceleration during total period of acceleration, m.p.h.p.s.....	0.4	1.0
Time of trip, Victoria to London Bridge, minutes.....	35	24
Average schedule speed, stopping trains Victoria and Crystal Palace, m.p.h.....	16.5	22.2
Time of trip, Victoria-Crystal Palace, minutes.....	31	23
Increase in speed, percentage.....		34.5
"Lay-over" time at Victoria as provided by timetable, minutes.....	6	1

Before the development of competing tramways the Brighton suburban lines carried about 8,000,000 passengers per annum. The actual number of passengers carried during the last year of steam operation on the South London line was 3,889,527, while during the first complete year of electrical operation the number was 7,918,059. In the second year of electrical operation the number of passengers rose to 8,941,481, an increase of 129.88 per cent over steam. At the present writing the travel amounts to about 10,000,000 passengers per annum. The Crystal Palace service was opened May 12, 1911, and from that date until the end of the year 5,870,241 passengers were carried, as compared with 4,182,396 passengers for the corresponding period of 1910, an increase of 40.36 per cent.

At a general meeting of the Brighton company held early in February, Lord Bessborough, chairman, said that the number of trains operating out of Victoria station had increased from 496 steam to 739 electric and at London Bridge had increased from 663 steam to 901 electric. The average number of passengers carried each year on the South London line since electrification was over 4,500,000 more than the number carried in the last year of steam service, or 14,000,000 more passengers during the whole period. Conditions will be still further improved when the electrification of the outer suburban zone makes it unnecessary to change at Crystal Palace from electric to steam trains and vice versa.

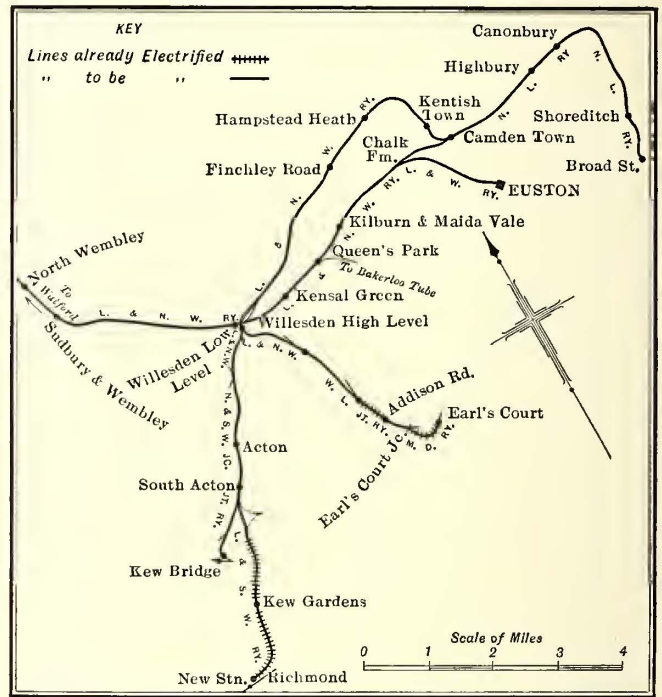
BRIGHTON MAINTENANCE FEATURES

Inspection of rolling stock is carried out at Norwood Junction, but heavy repairs are made at the first electrical shops at Peckham Rye. The cars receive a short inspection every day and a longer one once a week. The electrical equipment is thoroughly overhauled every 60,000 miles to 70,000 miles, corresponding to one year's service. The overhead work is inspected every day by a man who patrols the road and examines the line with field glasses. Any defects are reported to the foreman of the repair gangs which correct them at night after the traffic has been stopped. These repair gangs are provided with two gasoline-electric line cars which are fitted with roof platforms.

The schedule is so arranged that all of the overhead lines are examined at least once a week. The company has recently given all of the overhead iron work a coating of tar, and this will be repeated from time to time to prolong the life of the overhead construction indefinitely. Even the contact wire on the first line has yet failed to show any signs of wear. The average life of the aluminum contact strips is about 5000 miles. According to Lord Bessborough, the cost of maintenance of the entire overhead equipment to date has been £2,927, equivalent to only £27 per mile per annum.

ELECTRIFICATION OF THE LONDON & NORTH WESTERN RAILWAY SUBURBAN LINES

The electrification of the London & North Western Railway's lines in and about London will not only provide for the introduction of electric traction on 79 miles of track, but it is also of interest in view of the arrangement to enter the heart of London by means of the Baker Street & Waterloo tube of the London Electric Railways. The present scheme dates from a Parliamentary act obtained by the company in 1907, by which it was authorized to construct a new line from Euston to Watford, running along the main line and intended to relieve the latter of its suburban traffic. This line was open for traffic on June 15, 1912, and at



English Electrifications—London & North Western Railway

present is operated by steam. The scheme of electrification has now been made to include not only the electrification of this line, but also the electrification of the routes described below and shown in the accompanying map:

The North London Railway from Broad Street to Chalk Farm; the London & North Western Railway from Camden Town via Hempstead and Brondesbury to Willesden (high level), thence over the West London & District lines to Earls Court; also from Willesden over the North & South West Junction and the London & South Western lines to Kew Bridge and Richmond. An extension of the Baker Street & Waterloo underground railway will be made from Paddington to Queens Park to join the Northwestern Euston-Watford electrified line. This junction will thereby give access to the whole underground railway system of London.

The new train arrangements comprehend a five-minute service from Watford for passengers who are bound for the tube system and a fifteen-minute service for those who wish to travel to the Elephant and Castle station, London.

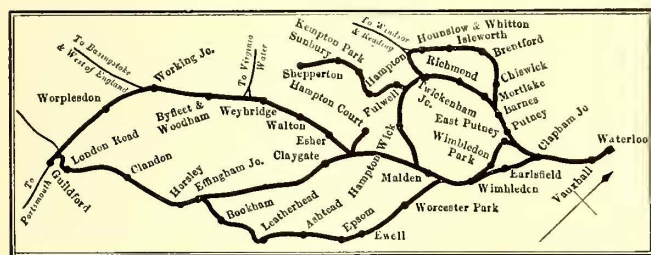
without change of trains. Part of the rolling stock will therefore be of the smaller size required to permit operation through the tube.

It is expected that about 100 end-door motor cars will be required, aside from trailers. These will be of the four-motor type and of sufficient capacity to permit high-schedule speeds and high acceleration. The inspection repair shops for rolling stock are to be located adjacent to the power station.

In accordance with the recommendations of the company's chief electrical engineer, F. A. Cortez-Leigh, it has been decided to adopt contact-rail distribution at 600 volts, using also a fourth or return-current rail to harmonize with the system of the Metropolitan District Railway and other London lines over which the North Western trains will run. Bids for some sections of the electrical equipment have already been invited, and it is hoped that all of the important contracts will be placed within a short time. The first section from which electric trains are to be operated is from Willesden over the West London line to Earls Court, the "White City" of London.

The company has already ordered from Siemens Brothers Dynamo Works, Ltd., London, four motor and eight trailer cars. Each motor car will be equipped with four motors, two per truck. The combined capacity of the motors is 230 hp on the one-hour rating. With the exception of the motors and compressors, all of the electrical equipment will be placed in a compartment adjacent to the motorman's cab.

The turbo-generator power plant is to be centrally located between the Stonebridge Park and Wembley stations on a



English Electrifications—Proposed Work of London & South Western Railway

site covering 17 acres. A remarkable feature of the station, which is to be completed within two years, is that the coal-handling arrangements will enable no less than three months' supply to be dealt with automatically, the old coal being used first. In addition to the reserve outside the power house, the usual bunkers will be provided above the boilers. The initial plant will have a capacity of about 25,000 kw. Energy will be generated at 11,000 volts, three-phase, 25 cycles, and will be transmitted by a duplicate system of cables to substations located at intervals of 3 to 4 miles. The 600-volt cables from the substations to the contactor rails will also be in duplicate. In addition to the customary transforming equipment, the substations will have automatic boosters and storage batteries of a capacity large enough to operate the entire line for some time aside from relieving the power house of peak loads.

LONDON & SOUTH WESTERN RAILWAY ELECTRIFICATION

The second extensive steam railroad electrification in London and vicinity involving the use of low-tension direct current is that of the London & South Western Railway. The directors of this company have approved the immediate electrification of the line between Waterloo, Wimbledon, Kingston, Twickenham and Richmond Loop, back to Waterloo, covering 73 miles of single track. The other portions of the scheme, which will follow in due course, will require the conversion of a further 173 miles of track. The estimated cost of the present work, which is to be begun imme-

diately, is about £1,000,000. During the past six years the railway has lost over £100,000 of local traffic per annum over the sections which it is proposed to electrify. After careful consideration the directors came to the conclusion that the only way to regain this traffic was to electrify the suburban system, trusting that the results would be as apparent as in the case of its neighbor, the Brighton & South Coast Railway.

The choice of a 600-volt direct-current contact rail was influenced not only by the success of that system of current collection on electrified railroads in England and the United States, but also by the fact that it is the one in use on the London lines, including the District Railways and others which already run to Richmond and Wimbledon over the South Western Company's tracks. The possibility of being able to run through trains over the different lines was therefore an important element in the decision of this company as it was in the case of the London & North Western Railway.

The power house of this company will also be of 25,000-kw capacity. Its site has not yet been decided upon. Substations for the first stage of the work will be provided at Chatham Junction, Raynes Park, Barnes, Twickenham and Kingston. There will also be a substation at the present generating station at Waterloo. Three-phase high-tension energy will be transmitted to the substations, and the latter in turn will transmit 600 volts to the third-rail.

Two classes of cars, namely, first and third, will be used. They are to be of compartment design, like those of the London, Brighton & South Coast Railway, in preference to cars with open interiors like those used on the local London lines. The more important routes will have a ten-minute headway, and the average interval between the electric trains leaving the Waterloo terminus will be three minutes. A normal train will consist of one motor car and two trailers, the motor car being located in the middle of the train.

The motor cars will be new coaches 60 ft. long with two motors on each truck. The trailer cars will be provided by the reconstruction of 51-ft. steam coaches. It is expected that 120 motor cars and about 210 trailers will be necessary, but only a comparatively small part of this number will be required for the first electrification. The Waterloo station is being rebuilt as rapidly as possible in anticipation of the enormous increase in traffic which electrification will bring. Several right-of-way improvements, such as an increase in the number of tracks, are also in process of development.

Sir Alexander Kennedy and his partners are consulting engineers for the electrification, but the electrical work generally will be in charge of the company's electrical engineer, Herbert Jones, who has recently returned from an investigation of electric traction work in the United States. Work on the permanent right-of-way will be under the direction of the company's chief resident engineer, J. W. Jacomb Hood, and the new electric rolling stock will be designed by the company's carriage and wagon superintendent, S. Warner, at the Eastleigh works, the entire scheme being under the supervision of the general manager, H. A. Walker.

ELECTRIFICATION OF NORTH EASTERN RAILWAY

The North Eastern Railway has just announced that during the past eighteen months it has been considering the possibility of electrifying a large portion of its main and branch lines serving the colliery and industrial districts in Northumberland, Durham and Cleveland. As a preliminary to this larger scheme it has decided to commence the electrification of the Simpasture branch leading from a mineral yard at Shildon near Darlington to the Erimus sidings at Newport, Middlesborough. This branch is about 18 miles long and is used solely for freight and mineral carriage. New Shildon is the collecting base for the heavy traffic from the south and southwest Durham

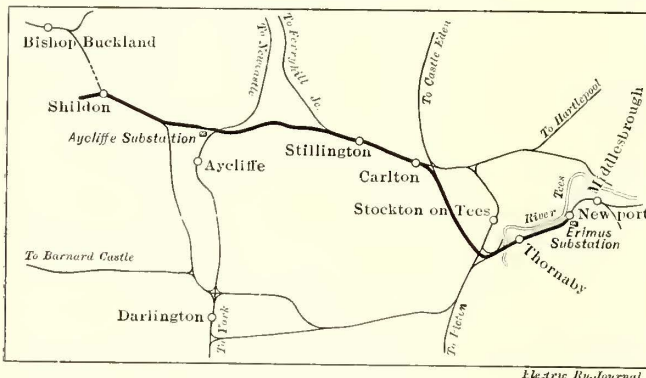
coal fields, and the sidings there are among the largest in England. Train loads average 900 tons and even the empties weigh as much as 350 tons. It is proposed to use locomotives capable of hauling 1400-ton trains at a minimum speed of 25 m.p.h. on the level.

For this purpose the locomotives are to be equipped with four completely inclosed motors driving through single reduction twin gearing and each capable of developing 275 hp on the one-hour rating at a speed of 20 m.p.h. The motors will be connected in pairs, each pair permanently in series, and on starting all four motors will be in series up to the full series position and then the two pairs will be put into parallel.

The control, which is purely electrical, will be of the automatic multiple-unit type. The tractive effort on the first notch will be quite small to enable the train to start without exerting unnecessary stresses on the couplers. This control will have seventeen steps, namely, eleven series and six parallel. The running in a forward or reverse direction will be controlled by means of four contactors instead of a reverser.

The compressor and heater circuits will be supplied direct by the line potential of 1500 volts direct current. Current at 750 volts for the lighting and control circuits will be taken from the two dynamotors, which will also drive fans for the ventilation of the motors.

The body of the locomotives will consist of a central cab and two sloping ends supported on two articulated trucks.



English Electrifications—Map of Shildon-Newport Section of North Eastern Railway

The mechanical part of the locomotives is being built at the Darlington shops of the North Eastern Railway Company at an estimated cost of £15,000. The complete locomotive will weigh about 72 tons.

The railway will purchase three-phase, 40-cycle current from local power companies. This energy will be transmitted at 20,000 volts for two substations, one at Erimus and the other at Aycliffe, to be converted to 1500 volts direct current for use on the overhead line. The route length from Shildon to Newport is 18 miles, but including additional tracks, sidings, etc., the electrification will comprise 44 miles of single track. The two substations will be 14 miles apart, one being 4 miles from one end, and the second one being at the other end.

The overhead line will be of the Siemens catenary system, in which a special auxiliary wire for the suspension of the trolley is used in addition to the catenary cable. The line will be supported by two types of steel lattice poles, namely, flat and square. Along the double-track section the poles will be set on both sides of the line to carry light steel bridges, but on single track the poles will be fitted with bracket arms. Current will be delivered via two overhead wires of 100 sq. mm section per track with a bare feeder along the side of the track, making the amount of copper per track approximately $\frac{1}{2}$ sq. in. The minimum overhead clearance will be 15 ft. Automatic tightening gear will be installed to compensate for alterations in length due to

temperature changes. Those sidings which are not in frequent use will normally be kept dead by means of cut-out switches. It is stated that steam locomotives will be retained on those tracks where overhead electric operation is impracticable on account of cranes.

Contracts have already been awarded to Siemens Brothers Dynamo Works, Ltd., for ten electric locomotives for £39,000 and for permanent way for £61,795, to the British Thomson-Houston Company for substations for £12,615, and to the British Insulator and Helsby Cables Company, Ltd., for transmission lines. The scheme will be carried out according to the designs of Merz & McLellan, consulting engineers. Should the initial electrification prove successful the lines will be extended throughout the Tees-side and Cleveland districts.

ELECTRIFICATION OF NORFOLK & WESTERN RAILWAY

As mentioned in last week's issue, the Norfolk & Western Railway has authorized the electrification of a portion of its mountain division. This will include the most congested section of the main line, and upon it will be handled a freight traffic that is one of the heaviest in the country. The electrified zone will extend from Bluefield, W. Va., across the summit of the Alleghanies to the town of Vivian, W. Va., which lies on the western slope of the mountains.

The Norfolk & Western crosses the mountain divide at the extreme southern part of West Virginia about 300 miles from the coast. The region is famous as the source of the widely known Pocahontas coal, which has been practically standard for steamship use during the last half century, and vast supplies of steam fuel are found at various points in the vicinity.

The main line of the railroad is double-tracked except for a comparatively short distance through a tunnel in which only one track is installed. The tunnel is, however, thoroughly ventilated, so that the problem of smoke and gas from the steam locomotives is not a serious consideration. The traffic is exceedingly congested, and, owing to the severe grades, among which is one of approximately 2 per cent from Vivian eastward to the summit, the work has become too heavy to be efficiently handled by steam locomotives. The firm of Gibbs & Hill, which also acts as consulting engineer for the Pennsylvania Railroad electrification projects, has been retained by the Norfolk & Western Railway and is now making the necessary investigations upon which is to be based the determination as to the most satisfactory system of electrification for the line.

The problems involved by the local conditions are unusual. The use of a third rail is impracticable because the line runs through a number of mining towns at street level and because there is in addition a large and extremely busy yard where coal trains are made up. It will therefore be necessary for an overhead conductor to be used, whether the system adopted is single-phase, three-phase or high tension direct-current.

The service will naturally be of the heaviest class yet considered in connection with electrification, as 3250-ton trains are contemplated and these, on the 2 per cent grades, will require a total drawbar pull per train of approximately 150,000 lb.

To handle the heavy traffic twenty-five electric locomotives of exceptionally high power are to be purchased, the design to depend to some extent upon the electrical system installed. These will be used for both switching and main-line service, as the 30 miles of route to be electrified contains enough yard trackage and sidings to bring the total single-track mileage up to 75. The service is, however, to be designed exclusively for freight trains, as the coal shipments are far in excess of the passenger traffic on this section of the railroad.

THE FIRST SINGLE-PHASE RAILWAY IN SPAIN

A recent issue of the *Electrotechnische Zeitschrift* states that during the past two years a single-phase line has been in successful operation in the province of Navarre, northern Spain, between the cities of Pamplona and Aoiz and Pamplona and Sanguesa, as shown in the accompanying map. The first of these lines connects with the Northern Railway at Pamplona, the capital of the province. The line from Pamplona to the Northern Railway station is but 1.24 miles long and some of the highway sections are on grades up to 7 per cent. Beyond Vileveta the line divides into a short branch to Aoiz and a long one to Sanguesa. The longest run is between the Pamplona station on the Northern Railway to Sanguesa, a distance of 34.72 miles, while the run from Pamplona to Aoiz is 20.22 miles.

The primary reason for building this line was to facilitate the transportation of timber from the mountain forests of the Irati Company, which is also the owner of the railway. Furthermore, this line connects the capital of the province with other important communities, the population of which is largely agricultural. The traffic of this road has already demonstrated that it will do much to develop a territory hitherto neglected.

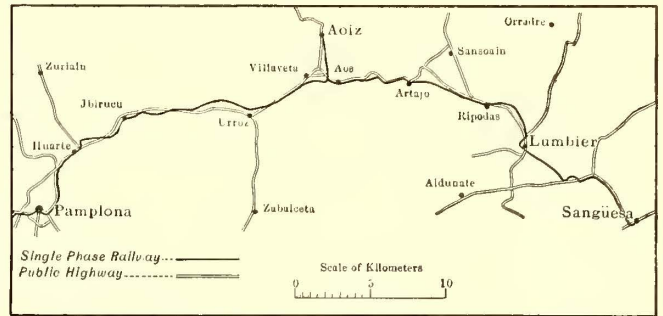
Single-phase energy for the overhead line is transmitted directly at 6600 volts, twenty-five cycles, from a hydroelectric plant near Aoiz, to a point between Huarte, Aoiz and Sanguesa, but the potential is reduced to 600 volts for use between the Pamplona station of the Northern Railway and Huarte and also in the city of Pamplona.

ROLLING STOCK AND ELECTRICAL EQUIPMENT

Both the single-truck and double-truck cars were built in Barcelona by the predecessor of the present Spanish Siemens-Schuckert company. The double-truck cars carry four 60-hp motors and the others two 60-hp motors. The large cars have room for thirty-three seated and sixteen standing passengers, and the small cars take care of fifteen seated and sixteen standing passengers. All cars are equipped with hand and air brakes. The compressor on the large cars is operated by a separate single-phase motor, but on the small cars it is axle-driven.

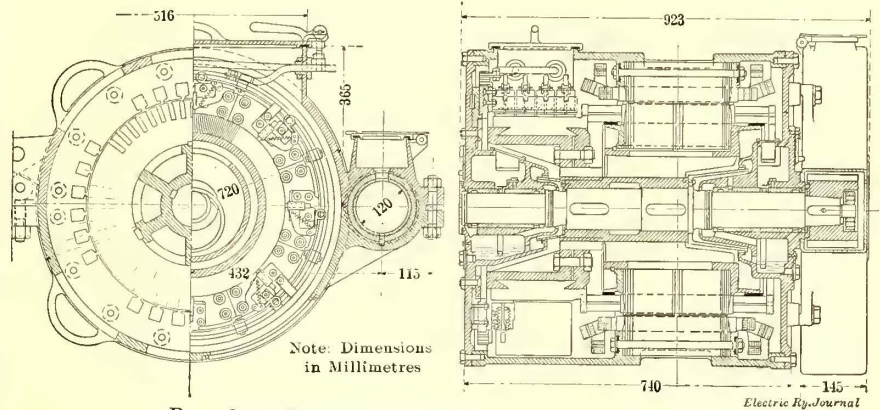
The electrical equipment consists of the motors, a trans-

four-pole design, rated 60 hp each, at 735 r.p.m., 600 volts. Efficiency, speed, performance and torque curves of this motor are presented in an accompanying illustration. Although the motor is so completely inclosed that it receives no outside ventilation, its dimensions are comparatively



Pamplona-Sanguesa Railway—Map

small, owing particularly to a compact arrangement of the winding and the bearings. Oil rings are used for the lubrication of the bearings, as in stationary machines. The gear ratio is 1:4.7. The diameter of the car wheels is 37 in. The weight of the motor, including gearing and



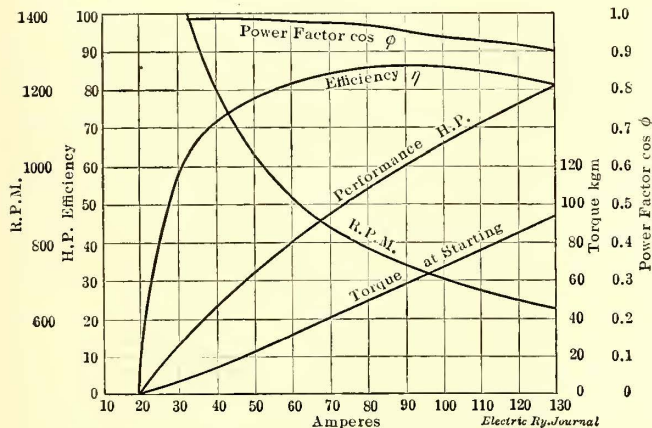
Pamplona-Sanguesa Railway—Sections of Motor

gear case, is 4410 lb. Acceleration and speed regulation are obtained by dividing the low-tension winding of the transformers in such a way that the manipulation of the controller will vary the voltage from 300 volts to 600 volts.

The transformers, which are hung in sheet-steel cases under both the double-truck and single-truck cars, are rated at 230 kva and 110 kva respectively. The large transformer weighs 3454 lb. and the smaller transformer 2420 lb. without oil. The respective oil requirements are 90 gal. and 50 gal.

The controllers are like those used for direct-current work except that they have no blow-out coils. The main cylinder has two different sets of contacts which are electrically separated. A choke coil, which is inserted between these contacts, prevents the short-circuiting of the disconnected transformer winding when the controller connections pass from one contact position to the next.

The cut-out switches, fuses and lightning protection are in the motorman's cab, the door of which is so connected to a cut-out switch that the circuit is grounded, and the current collector leaves the wire whenever the door is opened. The respective switches for cutting out the high-tension and low-tension circuits deserve special attention as they minimize false connections when going from one potential to the other. Both switches have maximum and minimum relays and are operated from the motorman's platform by means of compressed air in connection with a shield which displays the direction in which the handle



Pamplona-Sanguesa Railway—Motor Performance Curves

former to reduce the potential from 6600 volts to 600 volts, controllers, choke coils, cut-out switches, fuses for high and low potential, lightning protection and the usual lighting and heating equipment. The motors are of Latour

should be turned when air is applied to one or the other of the switches. The low-tension switch also has a second minimum relay with an interlock to prevent the circuit from being closed when the car is on a high-tension section.

The passage from the low-tension to the high-tension circuit occurs in the following fashion: The low-tension section terminates in a completely insulated contact wire about 39 ft. long. As soon as the current collector reaches this section the minimum current relay operates, and consequently the low-tension switch opens to break the circuit. When the car reaches the high-tension section the motorman operates the pneumatic change-over apparatus by moving his lever to the position marked "high tension," thus closing the high-tension circuit. A similar series of movements is made when the motorman changes from high tension to low tension, the only difference being that the handle of the change-over apparatus is brought to the position marked "low tension."

The current collector is of the pantograph type and is insulated from the roof by means of four bell insulators. It is air-operated and is equipped with springs which permit it to bear with uniform tension against the contact wire under all conditions of operation.

The pantograph collapses from its own weight when the compressed air is cut off. The removable contact piece is an aluminum strip with a longitudinal groove filled with graphite grease.

MEETING OF MANUFACTURERS' EXECUTIVE COMMITTEE

A meeting of the executive committee of the American Electric Railway Manufacturers' Association was held in New York Friday, April 25. Mr. Baker, chairman of the location committee for 1913, reported that the committee had visited Washington, D. C., with a committee of the parent association to look over the accommodations available for holding the 1913 convention in that city. While there they had discussed the matter with the Chamber of Commerce of Washington. The committee had also visited Atlantic City, from which it had received a proposition similar to that offered to the association in 1911. Upon motion, the committee decided to hold the 1913 convention in Atlantic City, provided that place was satisfactory to the parent association. This approval by the American Electric Railway Association was later given, so that the convention in 1913 will be held at Atlantic City. The dates are Oct. 13 to Oct. 17.

Mr. Baker also reported on the trip of the location committee to San Francisco, Cal., with a view to the selection of that city for the 1915 convention. He said that tentative arrangements had been made with a committee in San Francisco representing the Palace Hotel, the St. Francis Hotel and the Fairmont Hotel and also with the manager of the proposed Inside Inn. Mr. Baker said that, owing to the present situation in San Francisco, it was impossible to get anything very definite from the hotels or from the exposition company regarding the space for an exhibit, but the representatives of the association had been assured by the hotel committee that it will assist in every way possible to make as satisfactory arrangements as can be made under the conditions which will exist at that time. Mr. Baker further stated that the management of the Inside Inn had guaranteed 80 per cent of its rooms for the use of the association during convention week, and it also agreed to furnish meeting halls for the American Electric Railway Association at the Inside Inn. The Inside Inn will be a permanent building of 800 rooms with ballrooms and meeting rooms for conventions. It will be used after the close of the exposition for an apartment hotel. In addition to the main building of 800 rooms, the Inside Inn Company will

build two wings, making the total capacity about 1500 rooms. The wings will be taken down after the exposition is over. It was voted to report these arrangements to the executive committee of the parent association.

The president then called the attention of the committee to the fact that Mr. Colby had resigned from the executive committee on account of severing his connection with Pierson, Roding & Company and had accepted a position as vice-president of the firm of Allen & Peck, Inc. This resignation was accepted, and Mr. Colby was unanimously re-elected a member of the executive committee as a representative of Allen & Peck, Inc.

The question of raising the fund for the publication of *Aera* by the American Electric Railway Association was then considered and the committee approved a form of letter which is to be sent to members of the Manufacturers' Association.

The president then read a letter from Major H. C. Evans, vice-president in charge of entertainment, resigning this office on account of his continued illness. The resignation was accepted with great regret, and Mr. Colby was elected in his place as vice-president in charge of entertainment.

The president then suggested that a change be made in the meetings of the executive committee for organization so that the advantage of a complete executive committee can be obtained during the convention period. Upon motion the secretary was requested to prepare a letter ballot on the question of altering Article III, Section 1, of the by-laws to read as follows:

"Section 1. Following the annual meeting and prior to the close of the convention the newly elected executive committee shall hold its meeting for organization and shall elect annually from its own body a president and four vice-presidents respectively in charge of entertainment, finance, exhibits and relations with the main association. They shall assume their duties on Jan. 1 of the year following their election and shall hold office for one year until their successors are elected. The above officers are to be elected by a majority vote of the members of the executive committee present in person and voting. The executive committee shall elect a secretary-treasurer, who shall hold office during the pleasure of the committee."

The attention of the executive committee was then called to sundry civil bill H. R. 2441, now before Congress. In this bill the Department of Justice is forbidden to use any of its appropriation to prosecute, under the Sherman anti-trust law, combinations or organizations of labor. Upon motion, the secretary of the association was instructed to send a telegram of protest to President Wilson and the Senate.

The committee also decided to enter the association as a member of the Chamber of Commerce of the United States.

The Engineer contains an article in which a German engineer gives the results of experience on the maintenance of the line through the Simplon Tunnel during the last six years. Some of the overhead insulators appear to have been found defective, and it seems likely that the use of glass as a portion of the construction will be found to be an improvement, as it is more capable than vulcanite of resisting the combined effects of heat and moisture. There have also been found to be certain oxidizing effects produced on the overhead conductors, with consequent considerable wear. At first it was supposed that this was due to the generation of ozone, but it seems now more likely that it is caused by a deposit of soot from the steam locomotives that occasionally pass through the tunnel. An aluminum conductor would be free from this oxidizing effect, but appears unsuitable on other grounds. Some method of painting the conductor seems to have been tried with satisfactory results.

Accounting Versus Statistics

The Writer Points Out Concrete Instances Where the Standard Classification Makes It Impossible Justly to Compare Energy Production Costs and Other Data of Electric Railways—Certain Changes to Correct This Condition Are Proposed

BY MILAN V. AYRES

From time to time the writer has had occasion to make use of the published reports of railroad commissions and similar bodies for the compilation of statistical tables showing comparative unit costs of operation for various railway companies. While so doing he has been much impressed with the abundance of the cunningly concealed pitfalls which they contain for the feet of innocent seekers after truth. Whoever may have been at fault in the past, when each commission was a law unto itself, the American Electric Railway Accountants' Association must shoulder at least part of the responsibility for such of these traps as remain in reports compiled, as is now usual, in accordance with the standard classification of accounts.

The principal purpose of a standard classification is to make the reports of different companies available for comparative statistics, or, in other words, to insure that items of the same name shall always relate to exactly the same subject and be composed of precisely the same elements. Unfortunately the standard classification falls far short of accomplishing this object and in effect provides that, under certain conditions, particular like-named items shall not be made up of the same elements and shall not be properly comparable.

To illustrate the facility with which misinformation may be derived from the standard classification, I have prepared Tables I, II and III from the report of the New York Public Service Commission, First District, for the year ended June 30, 1910. In passing, it may be well to explain that the reason for not taking a more recent year is that, at the time of writing, the report of 1910 is the latest one published.

TABLE I.—COST OF ENERGY AND MAINTENANCE ON NEW YORK LINES

	Interborough Rapid Transit Elevated	Interborough Rapid Transit Subway	Hudson & Manhattan	Brooklyn Union Elevated
Cost of energy per car mile, cents.....	{ A 1.63 B 1.78	{ 2.26 2.46	{ 2.83 2.94	{ 4.59 4.59
Maintenance of way and structure per mile of track.....	{ A \$7,198 B \$6,537	{ \$8,108 \$8,044	{ \$15,745 \$ 9,391	{ \$3,223 \$3,366
Maintenance of equipment per car mile, cents.....	{ A 1.39 B 1.19	{ 1.58 1.23	{ 1.66 0.62	{ 2.00 2.34

In Table I are given, for each of the four principal rapid transit lines of New York City, the cost of energy per car mile, the maintenance of way and structure per mile of track and the maintenance of equipment per car mile. Two values are given for each item. "A" values are derived directly from the published data. "B" values are corrected, so far as the available information permits, to make them really comparable, as applying to the same subjects. It will be noted that the discrepancy is in some cases startling.

Table II shows in detail the items going to make up the cost of energy. A glance reveals the reason for the very high cost of energy per car mile for the Brooklyn company, namely, that the power is purchased. The Manhattan elevated system also purchases from the subway energy to the amount of \$114,000, the price of which is credited to the latter's power cost; and the Hudson & Manhattan Company is credited with \$43,000 for power "jointly produced," thus reducing its power bill 20 per cent.

If we may assume that the power exchanged between

the elevated and subway portions of the Interborough is charged for at operating cost of production, the cost per car mile is not invalidated by that transaction; but we have no assurance that it is not charged for at a price intended to cover overhead charges and profit.

TABLE II.—ITEMS MAKING UP COST OF ENERGY

	Interborough Rapid Transit Elevated	Interborough Rapid Transit Subway	Hudson & Manhattan	Brooklyn Union Elevated
Power plant employees.....	\$183,704	\$192,926	\$70,264	.....
Substation employees.....	54,952	68,047	13,455	.....
Fuel for power.....	591,949	862,681	104,511	.....
Other power supplies and expenses.....	93,169	125,382	11,704	.....
Power purchased.....			400	\$1,394,466
Power exchanged, balance.....	114,194	(Cr.)114,914		.....
Other operation (power jointly produced).....			(Cr.)43,406	.....
Total power.....	\$1,037,967	\$1,134,843	\$156,929	\$1,394,466
Repair of power plant buildings.....	6,871	10,957	111	.....
Repair of power equipment.....	86,263	92,567	5,753	.....
Total cost of power.....	\$1,131,101	\$1,238,367	\$162,793	\$1,394,466

It seems altogether probable that the power disposed of by the Hudson & Manhattan Company under the mysterious designation "power jointly produced" is really sold on a profit-making basis which unjustifiably reduces the apparent power cost of operating its cars. The case of the Brooklyn company has no uncertain elements except the doubt as to whether the power is supplied on a genuinely commercial basis or in accordance with a wholly arbitrary price permissible because of the fact that the power company is owned by the same interests. At any rate, a fair price would include the cost of repair on power plant buildings and equipment, as well as taxes, insurance, interest and depreciation on the same, all of which items are absent from the power cost as given for the other companies.

In Table II, I have added the cost of repairs to power plant buildings and equipment, making the final amounts comparable, except as affected by the purchase or sale of power; but as the latter element enters into each total, there is no assurance that any two are on a really comparable basis. However, the second line of numbers in Table I is computed from these totals as the best available.

It is quite impossible, in the very nature of things, to devise any system of accounting or any form of annual report that will provide an entirely satisfactory comparison of power costs between companies manufacturing their own power and those purchasing it. Nevertheless, the great and growing frequency with which this problem is encountered demands the adoption of a form of report that shall provide all the available data upon which to base those corrections that would make possible a reasonably intelligent comparison between different companies.

What is needed is a recognition of the fact that the manufacture of electric power is an entirely distinct enterprise from operating a railway or "conducting transportation." As an illustration of the absurdity of the standard classification, consider the supposititious but not improbable case of a railway owning a power plant of about twice the capacity demanded by its own needs and selling its surplus power at slightly more than twice its unit cost of operation. It would then appear on the face of the returns that its power was costing it less than nothing, in spite of

the fact that its income from power sales might not be sufficient, after meeting the bare operating costs, to pay for even the actual repairs on the power plant, to say nothing of the taxes and depreciation or the interest on the very large investment in this plant.

The production of electric power ought to be treated as a separate manufacturing operation, and every item essential to such treatment should be reported in a special account. This account should give the investment in the power plant, the detailed costs of operation, the output in kilowatt-hours, direct and alternating, the amount of this output used in operating the railway, the amount sold and the income from sale of power. It ought to be unnecessary to add that repairs of power plant and buildings should appear here, instead of being charged to two other entirely unrelated accounts, as at present. With such information available, it would be possible to make very useful and instructive comparisons between the power requirements of different railways, which it is not possible to make from the data given in the reports as now published.

Other errors caused by the present standard treatment of the power question are revealed in Table III.

TABLE III.—MAINTENANCE COSTS AS NOW CLASSIFIED

	Interbor- ough Rapid Transit Elevated	Interbor- ough Rapid Transit Subway	Hudson & Man- hattan	Brooklyn Union Elevated
Way and Structures:				
(1) Maintenance of way and structure, total.....	\$849,624	\$664,444	\$202,634	\$334,562
(2) Depreciation of way and structure.....	71,117(Cr.)	5,605	81,653(Cr.)	14,751
(3) Maintenance of way and structure, net.....	\$778,507	\$670,049	\$120,981	\$349,313
(4) Repair of power plant buildings.....	6,871	10,957	111	.....
(5) Net maintenance of way and structure, excluding power plant.....	\$771,636	\$659,092	\$120,870	\$349,313
(6) Percentage correction (1) to (5).....	-9.2	-0.8	-40.3	+4.4
Equipment:				
(7) Maintenance of equipment, total.....	\$881,566	\$792,221	\$92,361	\$608,285
(8) Depreciation of equipment.....	37,076	79,257	52,239(Cr.)	102,710
(9) Maintenance of equipment, net.....	\$844,490	\$712,964	\$40,122	\$710,995
(10) Repairs of power plant.....	86,263	92,567	5,953	.....
(11) Net maintenance of equipment, excluding power plant.....	\$758,227	\$620,397	\$34,169	\$710,995
(12) Percentage correction (7) to (11).....	-14.0	-21.7	-63.0	+16.9

In Table III, line 1 shows "maintenance of way and structures" as given in the report, and line 5 shows the actual expenditures for this purpose, excluding power plant buildings. Line 7 shows "maintenance of equipment" as given in the report, and line 11 the actual expenditures, excluding repairs of power plant equipment. Lines 6 and 12 show the percentage difference between the reported and corrected amounts.

It will be noted that "maintenance of way and structures" includes considerable sums spent for repairs of power plant buildings, except in the case of the Brooklyn company, which buys its power. Similarly, "maintenance of equipment" includes repairs of power plant, again with the exception of the Brooklyn company; and in the case of the subway this item alone swells the account by very nearly 15 per cent. The Brooklyn company, of course, pays for both these expenses in cost of "power purchased," so we have here a demonstration of the fact that the standard classification puts these two items sometimes under one account and sometimes under two totally different ones, with the result of making all three accounts absolutely unreliable for comparative purposes.

Referring again to Table III, observe the tremendously disturbing effect of the items of depreciation. "Maintenance of way and structures" and "maintenance of equipment" each include an item of depreciation, usually as a

debit, sometimes as a credit. In the former case it has been set aside, on the books, for future replacements; in the latter the fund thus established has been drawn upon for actual renewals. This is in strict accordance with the standard classification, but it results in robbing the totals of the two maintenance accounts of all significance.

As a matter of fact, an amount set aside for depreciation is not a maintenance expense and money taken from a special fund and spent for renewals is not a diminution of maintenance expense.

The first essential of statistical work is that the numbers used shall represent facts and not opinion, guess or estimate. Now, cash expended for maintenance is a matter of fact, but depreciation is a matter of opinion, and wedding matter of fact to matter of opinion is apt to produce a vicious hybrid having the good qualities of neither parent.

Several striking cases of this kind are to be found in Table III. The Hudson & Manhattan Company actually spent \$120,981 for maintenance of way and structure and set aside \$81,653 for depreciation in that account. In other words, this item was arbitrarily increased 67 per cent. In the same manner, its expenses for maintenance of equipment were increased 130 per cent. On the other hand, the Brooklyn Union Elevated spent \$710,995 for repairs and renewals of equipment, of which \$102,710 was withdrawn from the depreciation fund, and its expenses on this account were therefore reported 14 per cent less than the facts.

I suppose it will be asserted, for instance, in the case of the Hudson & Manhattan Company, that its maintenance is low because its "ways, works and machinery," to use a legal phrase, are new, and that the amounts allowed for depreciation only bring up the totals to a point they may be expected to reach on the average after a few years of operation, the result thus being a fairer indication of the real cost of operation than a true statement of expenditures would be. Similarly, it may be claimed that the Brooklyn company spent more than the average amount on its equipment in 1910 and that the result reached by subtracting the \$100,000 taken from the depreciation fund is a true measure of the average expenditure for that account.

There are two answers to this kind of argument. First, in actual practice depreciation allowances are not made up in that way, as anyone familiar with the facts will testify. Second, even if they were, a maintenance cost arrived at by the process in question would have the same value for statistical purposes as a figure purporting to give the number of deaths by tuberculosis would have if it had been increased 25 per cent by the compiler on the ground that it was, in his opinion, that much below a proper average.

The treatment of depreciation is too controversial a question to be here discussed in all its ramifications, but it is permissible to express the opinion that there is no necessity, and no decent excuse, for intruding the controversy into the maintenance accounts. These accounts should cover the actual expenditure for repairs and renewals and nothing else.

It seems to me that depreciation should be handled as a special fund which might, if desired, be divided into three portions—"depreciation of ways and structures," "depreciation of power plant" and "depreciation of equipment"—although I think such a division would be of dubious advantage. Amounts paid into or taken from this fund should be treated in the annual report as debits or credits under "deductions from income." "Depreciation" should be placed as close as possible to "dividends," because, like the latter, it is not a result of operation but a matter of arbitrary decision and because it ruins for statistical purposes all operating items into which it enters as a constituent.

As a means of improving the value and availability of electric railway statistics, I suggest the adoption by public service commissions, municipal, state and national, of a standard form of report, to be based upon a revised stand-

ard classification of accounts. The principal revision of the standard classification should be, first, the removal of the items of repairs of power plant and buildings and power plant equipment from the two accounts, "maintenance of way and structures" and "maintenance of equipment," where they now appear and their segregation in a new account, "maintenance of power plant"; second, the inclusion in the general balance sheet of a separate item, "investment in power plant," and, third, the elimination of depreciation from the maintenance accounts and its treatment as a special fund classed with "deductions from income." The standard report should also include under "statistics of operation" the number of kilowatt-hours, direct and alternating, manufactured, sold and purchased.

Moreover, some of the other pitfalls referred to at the beginning of this paper but not yet touched upon could be avoided by wise provisions in the "statistics of operation." For instance, in the usual commission report "car miles operated" includes the mileage of all cars, home and foreign, on the company's own system. If this is the case, the derived statistics, "cost of power per car mile" and "maintenance of way and structures per car mile," are probably quite correct, but "maintenance of equipment per car mile" will certainly be wrong if there is much interchange of cars. A company which sends many of its cars over foreign tracks will be paying for a maintenance due to mileage which does not appear in the report, while the foreign company in question is credited with more mileage than its cars perform. For this reason "maintenance of equipment per car mile" as calculated from the commission reports usually appears higher than the facts justify in the case of interurban companies and correspondingly too low for the city companies concerned.

When the trainmen of the interurban company operate its cars on the city tracks, its cost of "operation of cars per car mile" is also unfairly inflated. These statistics could be accurately calculated if the necessary data were included in the proposed standard report, as also some other matter occasionally in error as a result of inter-company operations.

The form of standard report to be used by the commissions, should prescribe a complete set of original and derived statistics, and the exact meaning or method of derivation of each item should be authoritatively defined. The companies would, of course, report only their original accounts and statistics, the derived values being computed and tabulated by the commission.

An authoritative selection of the most significant statistical facts and their embodiment in a standard classification for general adoption is to-day recognized by professional statisticians in all branches as of fundamental importance. This has been partially done for electric railway statistics by the adoption of the standard classification of accounts, but that work was done primarily for accounting purposes, principally by accountants, and from the accounting point of view. It needs to be revised now from a statistical point of view and merged into a new and more complete classification drawn by statisticians for statistical purposes.

NEW GERMAN NARROW-GAGE RAILWAY

The Allgemeine Elektrizitäts Gesellschaft has arranged to construct a meter-gage (39.37 in.) passenger and freight electric railway in the Prussian Riesengebirge for a total length of 17.2 miles, joining the towns of Schmiedeberg, Krummhübel, Brückenberg, Hermsdorf, Birkigt and Steinseiffen. The ruling grade will be 1.2 per cent. The maximum operating speed of the line will be about 18.6 m.p.h. The capital for the construction is \$900,000, consisting of two lots of shares of \$375,000 each, held respectively by the contractor and the communities concerned, and \$150,000

in 4 per cent bonds, held by the latter. The communities will provide the right-of-way free in addition to which the town of Schmiedeberg will give a cash subsidy of \$12,500.

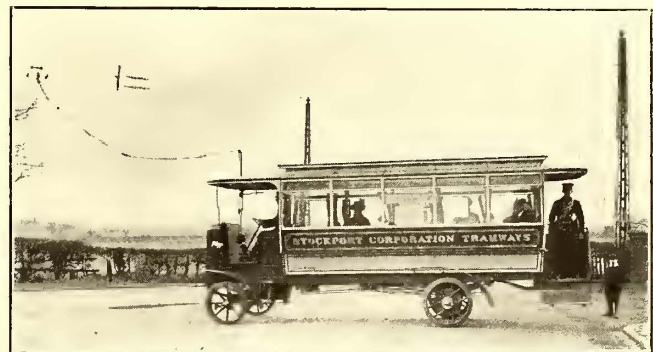
STOCKPORT TROLLEY OMNIBUS SERVICE

Another addition to England's trackless trolley installations is that of the Stockport Corporation, which has now been in operation for several weeks on a route nearly 2



Stockport Trackless Trolley—Opposing Cars Interchanging Current Collectors

miles in length, starting from the center of the town. The undertaking is the first in England which is equipped with a flexible trolley connection, so that one pair of wires is sufficient for vehicles traveling in either direction. As shown in one of the accompanying illustrations, the current collector gear is unhooked and is then exchanged anywhere by the drivers of meeting cars. The Bremen system of current collection was adopted, the two wires being erected in perpendicular parallel, an arrangement which permits the upper or return wire to serve as a guard wire if necessary. Another special feature of this installation is the adoption of lattice steel poles, which are uncommon in England. R. Lomax, the corporation's electrical engineer, su-



Stockport Trackless Trolley—Standard Omnibus

perintended the erection of the overhead work, which was carried out by the corporation's own staff.

The vehicles were supplied by the Brush Electrical Engineering Company, of Loughborough. They have a change speed control system which is operated entirely by means of pedals, leaving both hands of the driver free for steering purposes. A single 35-hp interpole motor is employed and in most respects the vehicle is similar to the best types of gasoline-electric motor omnibuses, but substitutes for the engine and generator the current collector device, which enables the use of central-station energy.

Public Service Publicity Work

An Account of the New Jersey Corporation's Experience Under a Policy of Keeping the Public Fully Informed—
Methods and Results of a Four-Year Experiment in Publicity

The first door on the left of the street entrance to the Public Service Corporation Building in Newark, N. J., opens into the office of the corporation's publicity department. Note the accessibility of this department, for this is important; it is representative of the first fundamental of a policy of publicity, namely, to make it easy to get information.

Some four years ago the Public Service Corporation of New Jersey decided that there was need for the services of a publicity representative. The corporation was tired of misrepresentation. It was not trying to conceal anything, befuddle anybody, or to control the press. It had something to say; it had facts to present in place of popular misconceptions; it had to satisfy the entirely proper and natural curiosity of some 2,000,000 people as to why it did this, why it did not do that, or what it was going to do about something else affecting the interests and convenience of these 2,000,000 car riders and users of the electricity and gas supplied by the corporation. And so it employed a publicity man whose business it is to keep the press and public informed about everything that they want to know or ought to know about a public utility company.

The corporation's publicity experience is worth knowing about; it rests on successful methods, the emulation of which will prove useful to other companies, and it amply confirms the conviction long held and often expressed in these pages that educational publicity is not only feasible, but is a thoroughly practical and necessary activity of the public utility company that stands four-square to the world and asks only for a fair hearing.

THE MAN FOR THE WORK

Following a decision to adopt a policy of systematic publicity, the next step is to find the man for the work. The Public Service Corporation found its man in John L. O'Toole, who had been in newspaper work for seventeen years, seven years of the time as city editor of the Newark *Evening News*, the most influential newspaper in New Jersey. He knew news and newspapers, and he was told that there were a desk and a chair and a stenographer; that the corporation wanted the public to know the facts about its operations and that the details were up to him. At first neither the corporation nor Mr. O'Toole knew exactly what he was to do—what was expected of him. Now his problem is to find time to attend to the duties that have steadily multiplied in number and character until they run all the way from a morning call for information from a commercial organization to a midnight telephone message from a newspaper that wants to know the details of the terrible accident at Pensauken which, when sifted down, proves perhaps to have been no more than that which often happens to a late car rider who alights backward while passing a trolley pole.

"TROLLEY TALKS"

At the start of its publicity campaign the publicity department ran, at weekly intervals for six months, a series of "trolley talks." These were paid advertisements covering every phase of electric railroading in which the public has an interest. This series laid the foundation of the campaign and was of no little educational value to employees of the company, as well as to the public at large.

Almost as important as the substance of these talks was the tone or style in which they were written. There was a man-to-man flavor about them that ought to have and probably did carry conviction. Facts were given about the trolley system and the business of supplying gas and elec-

tricity that were commonplaces to the corporation officials but eye-openers to the man in the street. In one of the early articles there was this statement:

"We are well aware of the fact that many of the criticisms leveled at us have been unjust and unmerited because they were based on a misapprehension of the facts. We are not finding fault with honest criticism. On the contrary, when just criticism is offered in a spirit of fairness, we will welcome it and try to profit by it, but we do not think that we should be measured by the standard of the irresponsible critic who puts surmises forth for facts, lets prejudice supplant judgment or permits a plain grouch to take the place of reason."

Another article contained these paragraphs:

"When you hear a young man talking about what he

would do if he were only running the trolley roads it doesn't necessarily follow that the speaker is endowed with superior talent which would enable him to stand out pre-eminently as an operator in the street railway world. Maybe, when it came right down to facts, the same fellow wouldn't be able to tell the difference between a deck sign and a switch iron.

"But we all talk, and it seems to be one of the weaknesses of human nature that makes men believe they could do so much better than the other fellow if they were in the other fellow's place. That's why so many people think they could run

Trolley Car As a Builder of Cities

HAVE you ever considered the electric street railway as a developer of property? If you haven't, let PUBLIC SERVICE give you a few facts to think over.

It is natural for people to want to live as comfortably as their means will permit.

It is essential that the home surroundings should be as healthful as it is possible to make them.

It is equally true that people must live within easy reaching distance of their places of employment.

Without reasonable transportation facilities people would have to live closer and closer together as the population of the cities increased.

That would mean congested districts. It would be detrimental to health and comfort.

TROLLEYS MAKE HOME SITES AVAILABLE.

With trolley cars operated at regular intervals and under short headway the available area for home sites is greatly extended.

This means a chance for the urban population to disperse. It affords an opportunity for the relief of congested districts. It adds to the comforts of living. It promotes the public health.

In making it possible for people to live under more healthful conditions the street railway also confers material benefits of incalculable value.

No other single influence has contributed as much to the development of outlying city property and suburban territory as has the electric street railway. No other one factor has added as much to the public wealth.

TROLLEYS ADD TO PROPERTY VALUES.

Every outlying place of property brought within easy access of a trolley road is thereby increased in value.

Every dollar of value added to a property by the proximity of a trolley road is a benefit conferred on the owner of that property.

Every increase in the value of a property benefited by a trolley road is an addition to the public wealth in which all the inhabitants of a community indirectly share.

Municipalities base their ability to perform the functions of government which add to the comforts of living on their taxable rateable. Street railways increase the land values, which means that the trolley car does more for a community than simply carry its inhabitants. It helps to build up cities.

Public Service Publicity—Typical "Trolley Talk"

a hotel, a newspaper or a baseball team."

The articles pointed out that from 1903 to the time they were written the company had expended more than \$30,000,000 in improving its railway and gas and lighting systems, built or rebuilt 156 miles of track, added 860 cars to its rolling-stock equipment, and increased its power station capacity from 47,700 kw to 102,900 kw; that it was carrying annually about 300,000,000 passengers; that about 65 per cent of each day's riding was done within five hours, and that the cost of supplies of every kind and the cost of living had increased, but that more transportation was being given for 5 cents in the district served by the company than ever before.

RELATIONS WITH THE DAILY PRESS

Since the corporation's advertisements were completed, three and one-half years ago, the publicity work has been carried on by means of statements to the press in general and by supplying specific information to individuals and individual papers. Occasionally, if there is an event such as the gathering of a fleet of warships in the Hudson.

advertisements will be inserted calling attention to the fact and telling how best to reach the scene by means of the company's cars. But with such exceptions there is very little paid railway advertising put out by Mr. O'Toole's department.

When he began his work Mr. O'Toole advised every newspaper in Public Service territory—170 weeklies and thirty-two dailies in 202 municipalities—that he was at its service day or night whenever it wanted information. He told the newspapers that he would tell them the truth about Public Service affairs; that if he could not give them the details of any particular matter, he would tell them so, but he would not mislead them by the easily spoken formula, "There is nothing at all in that." As to the information sent to the press in general, Mr. O'Toole's rule has been this: "Never send to the newspapers a story that as a city editor I would not send for if I knew it was to be had." It is this rule that keeps publicity matter out of the editor's waste basket and lands it on the front page or near it.

As an example of the way news notes are handled, the statement sent out by the department on the progress of the corporation's welfare plan is reproduced herewith:

"A report has just been made to the executive committee of the Public Service Corporation of New Jersey showing the first year's operation of the company's welfare plan for employees. Put into operation Jan. 1, 1911, the system of paying life insurance, sick benefits and pensions to employees or their beneficiaries has cost the corporation and its subsidiaries \$48,788.87 in twelve months. This money was paid without any assessments or dues levied on the men.

"When the plan was put into effect it was estimated that it would cost the corporation \$50,000 a year to carry it along. This figure was based on 10,500 employees at a per capita cost of \$5. In actual operation the per capita cost was below the estimate, for the \$48,788.87 spent covered 10,215 employees on an average of \$4.78 each.

"As might be expected, the sick benefit feature cost the most money. During the year 1068 employees were helped to the extent of \$22,955.67. The list of ailments included pretty nearly every form of illness to be found in a hospital's catalog. There were sixty-three deaths which resulted in insurance payments amounting to \$18,375.89, the odd amount being accounted for by the fact that the committee paid funeral expenses in several instances where the deceased had not been eligible for the insurance payment. Twenty-four employees were placed on the pension rolls after faithful service, for which the companies paid \$5,495.65.

"Most of the burden of the welfare plan fell upon the Public Service Railway Company, owing to the fact that this company employs about 58 per cent of the Public Service army. These 58 per cent received 62 per cent of the total benefits conferred. Of the applications for insurance thirty-one were railway men, thirteen from the gas company, fifteen from the electric companies and four from other affiliated companies. Of the causes of death, pneumonia and tuberculosis led with twelve each, and heart disease followed with ten. Of fatal accidents there were only five out of the 10,215 employees, and these five were linemen. The railway company furnished 860 of the total number of applications for sick benefits, the gas company 111, the electric company sixty-two and other companies thirty-five. On the pension roll the railway company again leads with thirteen names, the gas company has seven, the electric company one and other companies one. Five men were eligible for pensions when the plan went into effect and these were at once placed on the list. Nineteen others were added and two died, leaving twenty-two on the roll at the close of the year.

"The welfare committee, which is in charge of the work

and of which Second Vice-president John J. Burleigh is chairman, announces that it has not strictly adhered to the rules laid down in administering the work, 'but has many times exercised its discretionary powers and provided for the alleviation of suffering and want even in situations not contemplated by the act.' The committee also points out that the sick benefit payments in the aggregate provided for 22,956 days, or sixty-two years, nine months and twenty days' time."

RELATIONS WITH OTHER OFFICIALS

In an organization as large as the Public Service Corporation news of real value to the public and the company may easily be overlooked by officials who are busy with other things than publicity. The same thing happens in all public utility corporations, large or small. It is the publicity man's particular business to see that these opportunities do not go to waste; he keeps in touch with all departments all the time—something that very few officials are supposed to do. That the Public Service Corporation has a clear conception of the possibilities of the right kind of a publicity man, his work and its relation to the corporation's aims as a whole is shown by the fact that its publicity representative is a member of the executive committee on which the railway, gas and electric companies are represented. In that position he knows things in time to make good use of them; he can anticipate and advise in so far as publicity matters are concerned. He is not kept on the outside of affairs and limited as are so many publicity men to the "canned goods" that might as well be given out by an office boy if they are to go out at all.

RELATIONS WITH THE PUBLIC

Not all of the publicity man's work is with or for the newspapers. There are commercial bodies, improvement associations and civic clubs to keep informed; there are complaints from individuals to answer, and these go to Mr. O'Toole's desk and receive prompt attention; there are innumerable questions to answer from all sorts of sources, and where sore spots develop there is need for a presentment of the company's explanation, perhaps to a section of a community, perhaps to an individual. All of this work is done by one man and a stenographer, aided by the telephone exchange that covers every point on the Public Service system. Incidentally it may be mentioned that anybody anywhere in Public Service territory can reach the company's main office by telephone without any further cost than a local call.

No complaint is too trifling or from too humble a source to receive attention. If a rider complains of incivility or poor service or what not, his letter is first acknowledged, with the promise that the matter will be investigated. Then this investigation is really made, and the result promptly communicated to the complainant. If it has been found that the company or one of its employees is at fault, this is acknowledged, and the patron is told what has been or will be done to correct the fault. Aside from specific good results from this policy, the conviction is generally established that it is worth while to make a complaint, and that the corporation not only welcomes complaints, but what is more important, acts on them. Of course, the real or supposed grounds for complaint cannot always be removed, but at least the receipt of a complaint gives an opportunity to explain the reasons for a condition that may be objected to, and the opportunity is valuable; it results in removing soreness that if unknown or ignored might develop into serious trouble.

The publicity department does not wait for complaints to come in. It goes out and looks for them. It may find them in the press, which is carefully watched, or on the street or among the members of local associations. The latter often ask the publicity man to address them, and such occasions afford a splendid opportunity not only for educational work but for establishing a personal relation that

counts for future good understanding. If a neighborhood club or association starts a complaint about some feature of service, an opportunity for the railway company to be heard will be sought by the publicity man. "Sometimes I have to listen to pretty hard knocks at these meetings," Mr. O'Toole says, "but the discussions are usually productive of some good."

ONE INSTANCE OF PUBLICITY WORK

Quite recently the Public Service Corporation worked out the plans for a four-million-dollar trolley terminal in the heart of Newark, which made necessary legislative and municipal action and for which public support was highly desirable. The way in which this project was introduced is representative not so much of publicity work in general as of the consciousness that the way to get good will is to

take the trouble

to explain. Acting along these lines, there was prepared a full story of the terminal project, with pictures, maps and plans. This was given to the newspapers subject to release the day when the plans were presented to the city authorities for consideration. The result was thoroughly adequate and favorable announcements in the press. These were followed up by President McCarter, who gave what amounted to an illustrated public lecture on the terminal plans before the Board

of Trade. Later this exposition was repeated at a public meeting arranged by the Board of Works of the city. As a means of more permanent publicity than the newspapers afforded, an elaborate illustrated article was prepared for a publication, *The Newarker*, issued by the Public Library. The result of this effort is that there is virtually no opposition to the terminal project, mainly because people know what it is. The prospect is that the company will get what it wants, the public will get an improvement of great value to it, and everybody will be happy, largely because publicity made the corporation's plans understood in advance.

The Newarker

Published Monthly by the Free Public Library of the City of Newark New Jersey

One dollar per year Ten cents per copy

Volume 2 February, 1915 Number 4

Growth of Street Car Habit in Newark

1893: 200,000 Newarkers took eighteen million street car rides.
 1903: 285,000 took forty-five million rides.
 1912: 370,000 took seventy-eight million rides.

In 20 years the population increased 85 per cent.; rides in street cars, 330 per cent.

1893: Newarkers took 90 rides apiece.
 1903: 157 rides apiece.
 1912: 210 apiece.

In 20 years the street car habit grew 233 per cent

And Newarkers not only kept asking for more cars to give them more rides apiece, they also quite properly insisted that the cars be cleaner, warmer, better lighted and swifter.

And today the central point, the great meeting place of the cars which carry these seventy-eight million rapid travellers, is the center also of an immense foot, motor and truck traffic, and is the same curious maze of wide, narrow and crooked streets that was laid out for a country village over 200 years ago.

Newark has a street car problem, of course

Within is a very full and careful statement of a proposed solution of the problem which Mr. John L. O'Toole, of the Publicity Department of the Public Service, prepared at the NEWARKER'S request J. C. D.

Public Service Publicity—Front Cover of Library Paper Containing Story on New Terminal

THE RESULTS

What are the tangible results of the publicity work as a whole? Obviously, the corporation is measurably satisfied with the results or the work would not be continued and have an increasingly important place in the organization. More definitely speaking, the publicity work has lessened senseless and uninformed criticism; it has replaced misinformation by facts; it has created the habit of seeking information, always easily obtained, instead of printing unfounded rumors; it has convinced most people and most newspapers that the corporation is trying to do the right thing by those it serves, and that there is a reason, other than indifference on the part of the company, even for the things that nobody likes about the operation of an electric railway. Criticism and attack have not been

stopped. It would be a miracle if any company could please 2,000,000 people, but publicity has resulted in keeping criticism down to what may be called the normal level of human dissatisfaction with anything that so vitally concerns the public as do light, heat and transportation. The corporation has not been nor does it seek to be placed in a position where it can give poor service or endeavor to get more than its due without bringing down anathemas on its head. It has succeeded in creating an atmosphere and an attitude on the part of the public which secures it a fair hearing and a square deal most of the time, and which tends to establish the feeling that the corporation is progressive and ably managed—a very different situation from that in which the public utility is always assumed to be in the wrong and its shortcomings attributed to incompetency or worse causes.

This is all that publicity can do, but this accomplishment makes it worth much more than it costs.

MACHINERY EXHIBITS AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION

Rapid progress is being made in the construction of the main exhibit buildings at the Panama-Pacific International Exposition at San Francisco. The first of the buildings is now completed and five other structures are under way. There will be fourteen main exhibit buildings all told, and contracts will be let upon the remainder to bring all to completion by July, 1914. Work upon the Machinery Building, the largest of the exhibit group, was begun early in the year and the framing of the main portion of the structure is partly completed. This will permit the complete installation of exhibits by the opening date, Feb. 20, 1915. The Exposition management plans a record not only in construction but by presenting a finished spectacle on the opening day.

The department of machinery exhibits is thoroughly organized and filings for exhibit space have been received to an extent that assures a display commensurate with the importance of the industry. Early applications are especially welcomed by the Panama-Pacific management and will facilitate the proper grouping of the exhibits and the perfection of other arrangements essential to the interests of exhibitors as well as to the Exposition.

For the information of exhibitors the following brief data have been forwarded by the Exposition company:

The Machinery Building will have nearly 8 acres of floor space. In addition there will be an auxiliary structure to be known as the Gas and Fuels Building. Electrical machinery, instead of being placed in a separate building, will be located in the Machinery Building and classed under the general heading of machinery. All parts of the building will be served by adequate crane facilities. Electric current, alternating and direct, gas and water, will be available in any portion of the building; compressed air and steam will be provided in a section adjacent to the Gas and Fuels Building. General illumination is to be provided by the Exposition company, but a nominal charge will be made to exhibitors for other utilities service they desire. Special rates for power will be made to exhibitors who use it to show machinery in motion.

The floor of the Machinery Building is designed for a load of 200 lb. per square foot. The soil conditions will permit adequate foundations for heavy machinery to be readily constructed. No charge will be made for space.

The management urges that concerns and individuals desiring to participate lose no time in getting into touch with the Exposition company and filing applications for space.

Copies of the rules and regulations, documents as to the classification of exhibits, blank applications for space and other information prepared for the guidance of exhibitors will be promptly forwarded on request to the Panama-Pacific International Exposition Company, San Francisco.

Report on Chicago Conditions

A Summary of the Report of the Board of Supervising Engineers Just Published, Discussing Financial Statistics, Improvements in Method of Welding Rail Joints, Proper Location of Carhouses and Fire Insurance of Railway Properties

The Board of Supervising Engineers, Chicago Traction, has issued its fourth annual report covering the year ended Jan. 31, 1911. In the introduction the board says that the results of operations, considered in connection with the increasing complexity of operation in the central business district and the correspondingly greater difficulty of providing proper service for railway patrons, "lend additional emphasis to the insistent demands for immediate progress toward improved rapid transit facilities and the unification of the operating properties."

The cost of the rehabilitation work at the close of the year stood as follows:

TABLE I—SUMMARY OF REHABILITATION VALUES TO JAN. 31, 1911

Company	T. V. C. Valuation	Rehabilitation Value to Date	Total Capital Value to Date
Chicago City Railway.....	\$21,000,000	\$20,000,243.27	\$41,000,243.27
Chicago Railways.....	29,000,000	35,295,927.25	64,295,927.25
Calumet & South Chicago Railway.....	5,000,000	2,888,012.75	7,888,012.75
Southern Street Railway.....	775,000	735,963.72	1,510,963.72
Chicago Consolidated Traction Co. (within the city limits).....		*3,930,684.51	*3,930,684.51
	\$55,775,000	\$62,850,831.50	\$118,625,831.50
North and West Side Systems:			
Chicago Railways, including Chicago Consolidated Traction Co.	\$29,000,000	\$39,226,611.76	\$68,226,611.76
South Side Systems:			
Chicago City Railway, †Southern Street Railway and Calumet & South Chicago Railway.....	26,775,000	23,624,219.74	50,399,219.74
	\$55,775,000	\$62,850,831.50	\$118,625,831.50

*Consolidated lines within the city limits at "rehabilitation value" purchased by Chicago Railways as an extension to its property.

†Southern and Calumet lines operated by the Chicago City Railway under ordinance agreement.

The expenditures of the board amounted to \$282,164 for the year as compared with \$301,278 for the year previous, or a total to date for the four years' work of \$980,667. For the four years' operation the engineering and supervision of such construction work, represented by \$62,850,831 capital value, average 1.56 per cent, which is slightly reduced from the previous year. If to this be added the engineering expenses of the individual companies, the total per cent expenditure incurred in supervising the rehabilitation of the Chicago traction systems under the terms of the ordinances will be obtained, which at the end of the fiscal year covered in the report was 1.95 per cent of the total cost of the work.

STATISTICS

The chapter devoted to the review of statistics says in part:

"Earnings have rapidly increased during the past three years, and for the year 1910 increased \$2,323,000, making the total gross receipts for the year \$25,156,000. This is an increase of 10.2 per cent. Operating expenses, not including taxes, decreased during this period from 66.5 to 62.2 per cent, showing clearly the result of rehabilitation in promoting efficient operation. Total operating expenses, including taxes and a small portion of renewals, were fixed by ordinance at 70 per cent during the rehabilitation period. Since the closing of the rehabilitation period of the City Railway in April, 1910, this total operating ratio has decreased.

"The maintenance account stands at practically the same level of actual cost as in 1907, naturally resulting in decreasing per cent expenditure. This reduction from 14.4 to 10 per cent reflects the effect of improved physical condition of the properties.

"While the actual cost of power and car operation has increased with the growth of traffic, the percentage cost is lower than in any previous year. Taxes stand as in 1909.

"The city's share in traction earnings has progressively decreased from year to year (likewise the companies' share), owing to the purely temporary condition that capital invested is increasing twice as fast as the earnings, due to rehabilitation. Thus, increasing interest charge on this growing investment overbalanced the growth in divisible net receipts during 1907, 1908 and 1909, but during the past year, with the cessation of active rehabilitation on the City Railway lines, the divisible net receipts began to grow and the earnings will henceforth increase much more rapidly than the investment or the interest thereon. The total income to the public in the form of the city's share and taxes has increased from \$2,000,000 to \$2,700,000 per year, or practically 11 per cent of the gross income during the past four fiscal years. Within the same period the total return to the companies has increased from about \$4,000,000 to \$6,620,000 annually, corresponding to 26.3 per cent of the gross receipts. In the future the companies' increase in returns should be largely a matter of increase in the net earnings, owing to the relatively slow increase in capital account as compared with the past.

"Maintenance still requires an expenditure of about 10 per cent of the gross receipts, which is considerably in excess of the amount contemplated by the ordinances (6 per cent). However, this 6 per cent represents the minimum to be expended, additional maintenance being compulsory if deemed necessary by the board.

"The power account stands practically stationary at 11 per cent. Damages have increased slightly, to 7.8 per cent, and general expenses have decreased to about 4 per cent.

"The major operating account—operation of cars, including platform expenses, carhouse service, etc.—shows a continued decrease to 28½ per cent. This decrease is largely due to the more efficient operation possible after completion of rehabilitation. While work was being conducted with torn-up streets and diverted routes, operation could hardly be maintained with the same degree of efficiency as with the new and unobstructed permanent way.

"Capitalization has increased to \$118,625,831 since 1906, including three new properties valued at \$9,705,684—the Consolidated, Calumet and Southern properties. The gross increase of about \$68,600,000 is equivalent to \$17,150,000 per year; or, deducting the original values of the above properties, the net increase in capital value due to rehabilitation work and betterment on all properties was about \$58,900,000. This is equivalent to a net annual increase of \$14,725,000, or of 16.6 per cent on a mean value of \$88,450,000 for all the properties now under the supervision of the board for the four years of the reconstruction ended Jan. 31, 1911.

"Since 1907, inclusive, all properties have earned a total of \$87,231,254, with an average annual increase of \$2,110,845, or 9.6 per cent. Thus it appears that the investment has increased nearly twice as fast as the earnings.

"The public has received in direct cash payments for city's share and taxes \$9,372,052, or an average of \$2,343,019 per year. Of this amount the citizens of Chicago received 63.3 per cent direct in city's 55 per cent, and 93.8 per cent including the portion of the taxes, 83 per cent, that went to city corporate, school, park, lake shore protection, Sanitary District and town government, the balance going to county and state government for taxes.

"The companies have retained out of operation a total of \$21,017,562 in interest and operating share. The latter amount aggregates about 23 per cent of the total gross receipts, which is applicable to the companies' outstanding capitalization.

"The respective returns to company and the public in per cent on capital value, as defined by the ordinance, stand as follows for the year 1910: Traction companies (including interest), 5.585 per cent; return to the public (including taxes), 2.295 per cent; total (including interest and taxes), 7.88 per cent."

TRACK CONSTRUCTION

The portion of the report devoted to track and roadway gives considerable space to a new type of track construction known as No. 2-B. The other previous standard sections were described in the ELECTRIC RAILWAY JOURNAL of Oct. 5, 1912. On the new section and on improvements made in the process of electric welding, the report says in part:

"A new type of track, which in foundation is the same as type 2-A, was designed during the year to permit the use of a 7-in. 91-lb. T-rail. This type was called type 2-B. Approximately 3 miles of this type of construction was placed on Grand Avenue, between Sixtieth and Seventy-second Avenues, in the territory of the Chicago Railways Company. The pavement was granite and the blocks between gages were headed under the rail, set in cement and sand, and grouted. This type was constructed in order to obtain comparative data for T and girder rail on the same type of foundation, as well as to determine the wearing value of granite pavement when used with T-rail.

ELECTRIC WELDING

"A continued improvement in the process of electric welding, which has been employed throughout the city on nearly all of the rehabilitated track, is reflected in the record of rail joint failures for the past year. At the end of the fiscal year 1910, 61,700 joints had been welded, which will have been increased to about 100,000 at the end of the 1911 fiscal year. The results for the past four years have been recorded in Table II.

"The improvement inaugurated after the first year's experience has continued, and it will be of interest to record briefly several apparent reasons therefor:

"(1) The general conditions which exist in the rewelding of any large rehabilitated property are that, as a rule, construction work begins on the outskirts and progresses toward the business center, so as to introduce the minimum interference with traffic. In the early Chicago work the extremely poor conditions of the existing track return made it difficult or impossible to draw from the trolley system sufficient energy for welding under normal conditions, which resulted in taking two or three times the amount of time to make the weld that would have been the case if the normal voltage could have been maintained.

"(2) The standard 129-lb. rail, adopted for Chicago, was considerably heavier than sections previously handled in re-welding processes, and it was developed that the additional metal in the head of the rail interfered somewhat with the capacity of the welding transformer, apparently due to magnetic stray currents flowing through it. Under the above-mentioned condition of low trolley voltage, this interference rendered effective work difficult.

"(3) The carbon content of the Chicago rail was somewhat higher than usual, it being the practice to use a higher carbon with a heavy section rail than is customary with light sections. The welding difficulties apparently increase with the increase in percentage of carbon.

"Soon after the extensive failures began to develop, experiments were begun by the welding company, resulting as follows:

"(1) By the use of a flux, a more perfect metallic weld was produced than without fluxing, and the strength and uniformity of the welds increased by two or three times in

many cases. The use of this flux began with the 1908 work.

"(2) By applying pressure gradually during welding and keeping the weld under compression in the jaws of the machine until the metal had set, a much tougher weld was produced.

"(3) The size of joint bars was increased, as a number of failures had occurred through the bar section, but owing to the excessive power required for a satisfactory weld, the dimensions were reduced to 1 1/16 by 3 1/2 in."

TABLE II—SUMMARY RECORD OF ELECTRIC-WELDED RAIL JOINTS BY YEARLY GROUPS

		Year Joints Originally Welded			
		1907	1908	1909	1910
1907	Welds	8,281			
	Breaks	417			
	Per cent	5.04			
1908	Welds	8,297	18,371		
	Breaks	119	297		
	Per cent	1.43	1.62		
Total to 1909	Welds	8,297	18,371		
	Breaks	536	297		
	Per cent	6.46	1.62		
1909	Welds	8,299	18,380	21,716	
	Breaks	92	91	104	
	Per cent	1.11	0.50	0.48	
Total to 1910	Welds	8,299	18,380	21,716	
	Breaks	628	388	104	
	Per cent	7.57	2.11	0.48	
1910	Welds	8,320	18,413	21,734	13,233
	Breaks	82	113	213	35
	Per cent	0.99	0.61	0.98	0.26
Total to 1911	Welds	8,320	18,413	21,734	13,233
	Breaks	710	501	317	35
	Per cent	8.53	2.72	1.46	0.26

BUILDINGS AND FIXTURES

In discussing this subject the board takes up the question of open storage, carhouse location and insurance. It refers to the arguments in favor of open and closed storage and says that while closed storage has been employed the board has authorized the trial of two open storage yards. One is at Forty-eighth and North Avenues, where one inclosed bay has been constructed along the lines of closed carhouses, but the construction of the remaining bays has been stopped at the track level so as to afford the open storage yard. At the same time the erection of a superstructure in the future is easily possible should open storage prove undesirable. At Lincoln and Wrightwood Avenues the yard is inclosed by a brick wall and has a frontage similar to a carhouse front with entrance openings provided with rolling doors. This unusual feature has been adopted partly because the frontage of the property would be marred by an open yard and partly because owing to the densely built up neighborhood the demands for fire protection necessitate the complete inclosure of the open storage area. The storage yard is paved with wooden blocks.

In discussing carhouse locations the report says that while the carhouse should be located so as to reduce the dead revenue mileage to the lowest possible point, three considerations should be borne in mind: (1) In order best to serve the all-day cars, the carhouse should be located directly at the outer extremity of the route; (2) in order to best serve the rush-hour cars, the storage yard should be located reasonably near the center of the city, and (3) as the size of the city increases these opposing conditions become greater. Hence the board recommends a zone system of carhouses with the limits of the two zones tentatively located at the 4-mile and 7-mile circles respectively but varying widely for individual lines. This plan contemplates the housing of equipment operated continuously throughout the day in the outer zone buildings, while those of the inner zone could be used to good advantage for housing during the daytime extra rush-hour equipment originating in the carhouses of the outer zone, as well as housing the cross-town cars. The report continues:

"This plan admirably facilitates the working out of a further extension of this zone system of operation. Owing to the large percentage of short-haul riders out of the total surface traffic, it occurs that a very large proportion of the extra rush-hour cars are not required to run to the extreme

end of the route, but by switching back after the load has been dropped, more extra rush-hour trips may be accomplished and correspondingly better service may be given to the majority of riders with the same amount of equipment and expense of operation. Thus long thoroughfares intersected by numerous heavy transfer lines may have from two to four short runs superimposed upon the through run. This is in effect scientifically grading the service according to the traffic occurring along the route.

"It will now be evident that the carhouses of the inner zone will admirably fit into such a scheme of 'zone operation' which may ultimately be developed to cover the entire system. This would be especially advantageous in the event that all lines of the city are co-ordinated under one management. At the present time this plan could be only partially carried out. There are, however, eight carhouses approximating the inner zone—3 to 4 miles—and six approximating the outer or terminal zone—6 to 9 miles."

FIRE INSURANCE

The report also shows the record of expenditures of all companies by years for fire insurance. Thus while the total payments have increased from \$122,000 to \$169,000 in four years, the insurable property values have increased from \$18,000,000 to \$35,000,000. Expressing this in per cent of capital value, the insurance expenditures of all companies have progressively decreased from 0.727 per cent in 1907 to 0.486 per cent in 1910, or to 49 cents per \$100 value.

The report continues:

"The major part of this reduction has resulted from the use of fireproof construction in carhouses, but there still remain some buildings upon which it was thought that insurance premiums could be reduced, and the use of the automatic sprinkler system was investigated for this purpose in connection with car shops. The first installation considered was at the shops of the Chicago City Railway, at Seventy-eighth Street and Vincennes Road, which plant is located adjacent to the carhouse buildings. The then existing rate on this plant was an average of 1.15 per cent for the entire group of buildings.

"With the installation of automatic sprinklers for the car shops, the premium rate as proposed by the Chicago Board of Fire Underwriters was reduced to 0.41 per cent, a difference of 0.74 per cent, or 74 cents per \$100 insurance value. Deducting all fixed charges on the sprinkler system installation, including 6 per cent per year for depreciation, the net annual saving by the Chicago Underwriters' rate would be \$2,200 per year, which amounts to 6.3 per cent return on a total investment of \$35,000 for a sprinkler system, or, considering both depreciation and net saving, the total result will be that the system will pay for itself on the above rates in about seven years. If lower rates are obtainable on the structures protected by sprinklers, this net saving will appear to all the better advantage than shown here.

"It should be clearly understood that the use of automatic sprinklers has been considered here only in connection with non-fireproof and semi-fireproof shop structures. The advantage of using sprinklers in carhouses as now constructed by the Chicago traction companies is a matter of some question. With the subdivision of the present carhouses into bays limited to a capacity of about thirty cars each, the fire risk has been greatly reduced: consequently, the rates thereon are now so low that the further protection offered by the installation of a sprinkler system in such carhouses will not result in sufficient reduction in insurance rates to cover the fixed charges on the cost of installation, together with the maintenance thereon, i. e., allowing for interest and depreciation of the investment as well as operating costs. It will here be recognized that the installation of sprinklers in fireproof carhouses is purely a question of fire rates and entirely independent of the question whether additional protection is desirable to limit further possible destruction of cars. Under the present Chicago conditions,

where the loss of an entire bay of cars would represent but a small part of the entire equipment available (until destroyed equipment could be replaced), it is clear that the

TABLE III—INSURANCE EXPENDITURES, CORPORATE PROPERTY

Insurable capital value, Jan. 31 of previous year:*	Fiscal Year			
	1907	1908	1909	1910
C. C. Ry. †.....	\$9,296,353	\$12,788,631	\$14,918,542	\$15,899,317
C. Rys.	8,948,479	9,505,550	12,757,021	16,949,991
C. & S. C. Ry. ....	.....	1,536,002	1,571,267	1,819,254
All companies....	\$18,244,832	\$23,830,183	\$29,246,830	\$34,668,562
Insurance premiums paid for fiscal year shown:				
C. C. Ry.	\$63,337	\$66,662	\$76,725	\$71,115
C. Rys.	69,329	68,621	80,400	88,384
C. & S. C. Ry. ....	.....	10,101	10,238	9,077
All companies....	\$132,666	\$145,384	\$167,363	\$168,576
Per cent of capital value:				
C. C. Ry. ....	.681	.521	.514	.447
C. Rys. ....	.774	.722	.630	.521
C. & S. C. Ry. ....	....	.657	.651	.499
All companies....	.727	.610	.572	.486

*Insurable items only. †Including Southern Street Railway.

question of rates is the controlling one, whereas in a small system of limited car equipment, the conditions might be exactly reversed."

IMPROVEMENTS AT SAN DIEGO, CAL.

The San Diego Electric Railway has made some improvements in the type of the center-entrance car which was described by H. McNutt, superintendent of motive power San Diego Electric Railway, in the *ELECTRIC RAILWAY JOURNAL* for Sept. 21, 1912. All of the cars of the company are half open and half closed, as this type of car can be used in California throughout the year. Originally all were of the "California" type, in which the closed section is at the center and the ends of the car are open. The recent center-entrance cars in San Diego have the closed section at one end and the open section at the other, with an open platform 5 ft. 7 in. in length in the center of the car.

The principal change made in the latest center-entrance car of the company as compared with the car described in the issue of Sept. 21 is that the center entrance is no longer in a well. Instead, the floor on each side of the center entrance is at an incline of $\frac{3}{8}$ in. to the foot. This incline is carried as far as the bolster, beyond which the floor of the car is level. The floor of the center entrance is 35 in. above the head of the rail and is reached by three steps, the lowest being 15 in., the second 10 in. and the upper 10 in. The car is double-ended and has an entrance on each side, and both sets of steps are folding. The entrance is protected by gates 4 ft. 6 in. high.

The car has five lamp circuits of five lamps each and is wired so that one lamp of each circuit is over the center entrance. In this way, if one circuit goes out through injury to the filament of one lamp the illumination of the step is not seriously impaired.

NEW SHOPS

The company is now building some new repair shops which have several novel features. One of these is the use on the main floor of hard-wood planking. This might be considered too expensive in the East, but the company is using a Mexican oak which is only slightly more expensive in San Diego than soft wood. The hard-wood floor has all the advantages of a soft-wood floor so far as the workmen are concerned, as it is very easy on the feet. At the same time it is practically no less liable to injury from being dented than a brick or concrete floor. The shops will be well equipped with cranes and have an inside elevator for carrying apparatus to the armature room upstairs. Another interesting feature is that the washroom has no door so that it is always open to the inspection of the shop foreman.

Proceedings of Iowa Street & Interurban Railway Association Convention

At the Meeting in Waterloo Extended Discussions Took Place in Connection with the Different Papers Presented of Which Two Were Published in Last Week's Issue—With the Account of the Proceedings the Papers on Interurban Terminals, Selection of Trainmen and Effective Shop Equipment Are Published

The tenth annual convention of the Iowa Street & Interurban Railway Association was held at Waterloo, Ia., April 24 and 25. The first session opened with President Cass presiding and approximately sixty members and guests in attendance.

SELECTION AND INSTRUCTION OF TRAINMEN

Following the reading of the minutes and the report of the secretary and treasurer, a paper on "The Selection and Instruction of Trainmen," by D. C. Bell, trainmaster Cedar Rapids & Iowa City Railway Company, Cedar Rapids, Ia., was read. This paper is published elsewhere in this issue. At the close of the reading of this paper President Cass emphasized the importance of the subject at hand, not only from an operating standpoint, but because the class of men desirable for trainmen was becoming very scarce. This being true, in a great many cases, the employment agent is forced to accept men of lower average intelligence than would be necessary if the labor market were plentiful.

R. A. Leussler, assistant general manager Omaha & Council Bluffs Street Railway, advised the association that the method of employing and instructing trainmen on his road was practically the same as that described by Mr. Bell. It required, however, that each employee should give his record for the previous ten years, and if the man was accepted he had to take a course of instruction extending over a period of twelve days without pay. Another point wherein his methods of employment differed from those described in Mr. Bell's paper was that the men were broken in for a particular position. The superintendent of transportation, when employing a man, after a preliminary examination, would suggest that he apply for a position either as a motorman or a conductor. If a few days later it should be found that the man was better fitted for the other job his course of instruction was changed accordingly. The duties of the motorman and conductor, in his opinion, were very dissimilar and required two distinct types of men. Before any applicant was accepted for instruction in the train service he was advised that he would be required to take the twelve-day course of instruction without pay and that he must serve on the extra list for an indefinite period at a pay averaging approximately \$50 per month. If he was not financially able to tide himself over this period of no pay and the short hours of employment as an extra man, he was not accepted for service. It was customary on the Omaha & Council Bluffs Street Railway to pay the instructor \$2 for each of his pupils.

E. L. Kirk, general manager Sioux City Service Company, stated that his company employed and instructed its men in a way somewhat similar to that described in the paper except that at the close of the instruction period the men received a list of questions to answer in writing. He also said that the men seldom interchanged the position of motorman and conductor, owing to the dissimilar character of the work.

C. F. Hewitt, vice-president and general manager Des Moines City Railway, said that his employment agent did not fix any definite period for which each applicant must give an account of previous service. It might be any length, depending on the man's reply. A hard and fast rule as to how much stress to lay on a man's previous service was undesirable. Each applicant should be examined carefully as regards his qualifications for either a motorman or

conductor, and if there was any question as to his past record it should be thoroughly investigated. Mr. Hewitt also said that he did not pay the students or the instructors on his road, but he thought that better results would be obtained if they received extra pay for this work. A certain number of motormen and conductors were appointed as regular instructors, and during the course of instruction the students were transferred from one line to another until they had become familiar with each of the different runs. The division superintendent followed each student's course of instruction carefully and finally passed upon his fitness for service. If he failed to meet the requirements of the different instructors, he was questioned closely, and if he was thought to have the possibilities of a good man he was sent back for additional instructions. Mr. Hewitt said that interurban trainmen were required to pass a standard steam road examination before they were accepted for service, and for either the position of motorman or conductor experienced men were considered desirable.

Continuing the discussion, Mr. Leussler added that on the Omaha & Council Bluffs Railway, in addition to investigating a man's past record of employment, the company required him to furnish to it a statement of his finances. If he was deeply in debt, due to improvidence on his part, he was not accepted for service. Experience with men of this character had demonstrated that they were not only undesirable for train service, but that the company was put to considerable trouble by different creditors in their effort to collect the debts.

At this point the discussion turned to employees' welfare and benefit associations. Mr. Hewitt stated that his company advanced to the superintendent of transportation \$100 which he was authorized to use in relieving the distress of employees. He would investigate the merits of each case before he advanced any money. Each loan was collected by deduction from the man's wages when he was able to pay it back. This method of assisting trainmen brought the superintendent much closer to his men and thus encouraged an esprit de corps.

President Cass said that his company had organized a relief association to which the company contributed liberally. This association was under the control of a board of directors, consisting of three trainmen and two officials of the company. It held meetings weekly, one in the afternoon for the night men and one in the evening for the day men. At each meeting the business of the association was first transacted and then the program turned to a discussion of operating problems, the superintendent or trainmaster presiding, so that all questions might be correctly answered. From time to time papers were presented, discussing mechanical and operating problems of especial interest to the trainmen.

PREVENTION OF ACCIDENTS

Continuing the regular program, Arthur G. Rippey, claim attorney Des Moines City Railway, read his paper entitled "Successful Methods of Preventing Accidents." This paper was published in abstract last week. The points embodied in Mr. Rippey's discussion of this subject developed considerable debate. Accident prevention campaigns were first taken up, and President Cass, in emphasizing the importance of this subject, briefly described a systematic campaign recently conducted by his company. A large number of blotters of different designs setting forth common forms

of accidents and hints for safety, either through pictures or concisely worded sentences, were distributed each week to all the schools in all the cities touched by the Waterloo, Cedar Falls & Northern road. In addition to the blotter distribution, car cards were placed in both the interurban and city cars in the most conspicuous location, and advertising space was purchased in the local paper. The campaign was pushed vigorously for a period of fifteen weeks, and in addition to the printed matter slides were prepared for a number of the picture shows in the different towns along the line, depicting common forms of accident and hints for safety. This campaign finally was closed by a contest in which the company offered the school children prizes for the twenty best rules for preventing accidents. In order to give each child an equal chance to win a prize, the contestants were divided into three groups, depending on their school grades. One of the requirements of the contest was that the papers should be written at home. The purpose of this was to encourage the parents to assist the children in the preparation of their answers. At the time the contest was closed the company had received over 600 papers, and the intense interest of the public in the contest resulted in its receiving considerable publicity from the local papers.

Mr. Hewitt stated that his company had under way a campaign somewhat similar to that described by President Cass and expected to continue it, closing with a contest of some kind. In emphasizing the importance of the different points brought out in Mr. Rippey's paper, he said that the recommendations were not based on theory but had produced tangible results in actual service. In closing he said that accident prevention was a channel of saving which electric roads could not ignore. In the past it was regarded as inevitable, the problem being one of obtaining a release for the smallest cash payment. Now there appeared to be a general awakening throughout the country, and vigorous accident prevention campaigns were being conducted.

As evidence of tangible results possible to obtain from a vigorous accident prevention campaign, Mr. Leussler stated that previous to conducting one his company paid out for accidents an average of 4.76 per cent of the gross receipts, or approximately \$100,000 a year. After the campaign, which included a series of lectures and instructions to employees and the public, this amount was reduced to 2.75 per cent. Advertising space was purchased in the newspapers, and upon request the superintendent of schools lectured to the school children on the subject of accident prevention. Women were instructed through the Young Women's Christian Association how to alight from cars, and the probation officers made a special effort to prevent newsboys and other children from attempting to steal rides on the cars. Mr. Leussler also emphasized the importance of "eternal vigilance."

Continuing his discussion of other points brought out in Mr. Rippey's paper, he took up the question of near-side and far-side stops. He said that his company had been requested to adopt the former, but as it was largely a question of convenience to the public it was submitted to popular vote, resulting in approximately eight votes to one for the far-side stop. Previous to submitting the question at issue to the public, Mr. Leussler made a careful analysis of collisions on his road from the records of several years. Out of a total of 138 accidents, sixty occurred between street intersections, sixty-eight at intersections where the car had not been signaled to stop and ten where there was a possibility that the near-side stop would have eliminated the accident. He said, however, that the near-side stop was not a positive guarantee that these ten collisions would have been eliminated, as there was as much chance of accident from a car increasing its speed as from its decreasing it across a crossing. To substantiate his argument he referred to the result of the discussion at a meeting of the Pacific Coast Claim Agents' Association, which finally concluded that there were few arguments for the near-side as against

the far-side stop. Mr. Leussler added that he believed that inclosed platforms would reduce accidents slightly but would materially retard the schedules.

Replying to Mr. Leussler, Mr. Hewitt stated that although his road had not adopted the near-side stop, it was being seriously considered. He did not believe that the question of near-side and far-side stop should be left entirely with the public, as the question of convenience must be weighed against the prevention of accidents at street crossings. There was no doubt in his mind that the ten collisions referred to by Mr. Leussler would have been eliminated had the near-side stop been adopted. In support of his argument he presented the mechanical proposition that it was easier to stop an accelerating car than one which was being slowed down. The near-side stop also gave the motorman ample time to view the ground and control the movement of his car according to the conditions presented. As to the question of retarding schedules, he said that while this might be true, the amount of delay was not worth consideration. Again, if the delay was a consideration, it was more than offset by the resulting reduction in boarding and alighting accidents. In support of this statement he said that 50 per cent of all the accidents on the Des Moines Street Railway were of this character. The adoption of a closed vestibule and folding step had reduced this proportion to less than 23 per cent.

H. E. Weeks, secretary Tri-City Railway & Light Company, stated that about the first of the present year the city of Davenport passed an ordinance requiring all cars to stop on the near side. The order became effective, and the change was made without friction with the public. In fact, it had proved so satisfactory that Moline and Rock Island, Ill., also served by this property, had adopted a similar ordinance.

The discussion of this paper was concluded by statements from a number of other managers concerning the reduction in money paid out for claims resulting from both the near-side stop and inclosed platforms. Although no definite conclusion was reached as a result of this discussion, it was evident that both the near-side stop and the inclosed platform received the support of the majority of the members. Just before this session adjourned the president appointed a nominating committee to select a director for the ensuing five years. He also announced that the Waterloo, Cedar Falls & Northern Railroad Company would run a two-car inspection train over its lines, and all members were invited to make the trip.

FRIDAY MORNING SESSION

The first paper on the program at the Friday morning session was presented by F. J. Hanlon, general manager Mason City & Clear Lake Railroad, and was entitled "Interurban Terminals." This paper is published in abstract in another column.

INTERURBAN TERMINALS

In the discussion following the reading of this paper, which was of particular interest to the Iowa interurban roads, the question of proper procedure in objecting to the proposed elimination of Rule 5 of the per diem agreement effective in the American Railway Association was raised. This rule permits a switching line to reclaim from delivery time a certain number of days free of the per diem charge. Mr. Hewitt suggested that it would be a good idea for interurban roads to present some form of organized exception to the proposed elimination of this rule so far as short lines were concerned. It appears that the only remedy for short lines to pursue if Rule 5 is rescinded is to withdraw from the per diem agreement. At the conclusion of the discussion it was recommended that all the electric lines give the American Railway Association notice of withdrawal if any change is made in Rule 5 affecting short-line reclaim.

POWER COSTS

Continuing the regular program, John J. Lichter, consulting engineer, St. Louis, Mo., and B. W. Gilbert, superintendent of power stations, Omaha & Council Bluffs Street Railway, presented their paper entitled "Modern Methods of Reducing Generating Costs." Mr. Gilbert read the paper, which was published in abstract last week. It was followed by brief discussion. Mr. Hewitt raised the question of the proper method of setting boilers, particularly as to the kind of mortar to use in the brickwork. Mr. Gilbert replied that in his station the boilers were in steel-case settings with 16-in. walls of firebrick and 2 in. of vitrified asbestos next to the sheet metal. The outside course of firebrick was laid in pure cement mortar and the inside course in fireclay. In recommending the quality of mortar to use, Mr. Gilbert stated that the cement setting was not entirely satisfactory for horizontal boilers but appeared to give good results with vertical boilers. He recommended a mixture of lime and cement for brickwork in the former.

SHOP EQUIPMENT

The next paper on the program was presented by G. A. Mills, electrical engineer Waterloo, Cedar Falls & Northern Railway, entitled "Effective Shop Equipment for Reducing Maintenance of Equipment." This paper dealt with the problems particularly applicable to the small street and interurban railroad shops, where shop economy did not warrant the purchase of a full line of machine tools. C. M. Feist, master mechanic Sioux City Service Company, stated that he believed that the most flexible and economical hoist equipment would be found in a 9-ft. range air hoist. This may be used for handling all equipment parts, and the range is such as to permit repair parts to be elevated from the pit-floor level to the floor of a car. He also recommended grinding cast-steel wheels, stating that he was obtaining from 50,000 to 100,000 miles before scrapping. M. M. Lloyd, master mechanic Des Moines City Railway, raised the question of the most economical and safe method of oiling armature bearings. In reply, John Sutherland, master mechanic Tri-City Railway, stated that he used felt packed with waste. The felt was renovated from time to time as required, and the waste was repacked every ten days. This method of lubricating armature bearings was giving him 25,000 to 35,000 miles. He also said that he was obtaining 70,000 miles with plain caps allowing 3/64-in. clearance when bolted down tight to the motor frame. These boxes are made of steel, babbitt-lined.

Mr. Hewitt then raised the question of truing wheels without removing them from the trucks. He stated that he had been unable to obtain an absolutely true periphery without removing the wheels and placing them in a rigid bearing. In reply to his inquiry, O. S. Lamb, superintendent of the Waterloo, Cedar Falls & Northern Railway, stated that grinding in trucks had been accomplished successfully by the use of emery brakeshoes. As much as 100,000 miles had been obtained from chilled wheels which had had flat spots removed by the emery brakeshoe process. He also stated that the Lincoln Traction Company, Lincoln, Neb., had mounted on its wheel lathe an emery shoe attachment which was fed against the wheel by hand screws. It also was said that steel wheels were being ground in several shops with good results.

CONCLUDING BUSINESS

At this point the discussion closed, and President Cass advised the association of the status of legislative matters of peculiar interest to it. He then called for the report of the nominating committee, which unanimously recommended C. F. Hewitt, vice-president and general manager Des Moines City Railway Company, as director for the five-year term. This nomination was confirmed. After brief discussion the association unanimously voted to hold the 1914 convention at Cedar Rapids, Ia., which also is the convention city selected by the Iowa Electrical Association. At the close of the open sessions of this association the

board of directors held an executive meeting. C. D. Cass was re-elected president, C. F. Hewitt was elected vice-president, succeeding F. J. Hanlon, and H. E. Weeks was re-elected secretary and treasurer.

As has been the custom in years past, the Iowa Electrical Association held its meetings during the same week as the Iowa Street & Interurban Railway Association. In connection with the conventions held by these two associations a number of manufacturers exhibited on the first floor of the Citizens' Gas & Electric Company's building, the upper floors of which were used for the convention sessions.

INTERURBAN TERMINALS

BY J. F. HANLON, GENERAL MANAGER MASON CITY & CLEAR LAKE RAILROAD COMPANY

The subject of interurban terminals is as broad as the entire field of electric railroading and in this paper will be treated only as applicable to the interurbans of Iowa, which are all single-track lines doing a general freight business in about the same manner as steam lines. Many of the electric railways have worked into the freight business gradually, and their terminals represent the development of a department rather than what is now conceded to be a governing factor of the feasibility of the construction of country lines. The city line was originally the basis of the system, and the terminals and loops were provided to care properly for routing and loading of purely street car business. Later, when the interurban was projected, perhaps a blind siding was constructed with a small room cut off where baggage and express could be stored for a few hours until it could be loaded into the regular passenger cars. Then came the modern interurban terminal.

Ordinarily there is no interurban line built until a city has attained considerable growth and delivery tracks can be advantageously located only by buying expensive property, and it is here where the business must be accurately gaged to avoid investments which cannot be realized upon. On the other hand, freight and passenger stations easy of access will bring to the interurban line much business which they would otherwise lose. It is very easy for a shipping clerk loading a dray or a car for a steam line to include the comparatively few stations on the interurban line in his multitude of steam road deliveries, and in his hurry he is likely to follow the path of least resistance. In this case the more frequent deliveries and the closer personal service combined with fewer claims and the quicker return of his trucks are to be considered in connection with the well located and designed terminal.

With a fair amount of car-load freight, it is bad practice to attempt to handle it on the tracks used for passenger cars on account of the excessive delays to the passenger equipment, which are a distinct handicap to both passenger and freight business. Combination passenger and freight stations should be built with the main line to be used for loading passenger trains and the house track at the rear of the station. This will enable freight trains to work without loss of time and prevent any delay to passengers.

Yards which are filled with cinders present a good appearance and permit easy hauling of heavy loads in any kind of weather. It is surprising to find what little work it takes to keep them clean and how much assistance teamsters will give if they understand that the premises are always going to be neat.

Special attention should be given to securing ground such as will provide locations for coal sheds. These sites should be rented for such a sum as will return 5 per cent or 6 per cent on the amount invested in the property. No free sites are necessary as this is a relic of the days when land was donated to railroad companies in greater amounts than it was thought ever could be used. Special attention should also be given to the preparation of the lease so that responsibility of the company will be minimized in case of

destruction of the buildings or contents by fire or accident, and the lease should provide for a termination for various reasons, such as non-use, abuse of the premises, etc. Even items such as paint of a certain color and the maintenance of the building in good repair and well painted should be included.

Tracks to private industries, such as lumber yards, manufacturing plants, wholesale houses and the like, should be paid for by the beneficiary—that is, the owner of the plant. There is no reason for the railroad company paying the drayage for the manufacturer, which is what free trackage amounts to.

Interurban terminals should provide that high-speed cars should run as much as possible on private right-of-way, to the end that their time may compare favorably with that of the steam roads. Frequent service will get lots of business, but in this day of extra-fare trains, time is an essential feature of interurban operation. If you are handling freight, you need the traveling man on your cars, not alone for the money he pays you for his fare, but because he is practically forced to see your freight facilities and will be inclined to route his shipments over your line if he sees that you are in position to give him service. We have a small card which our interurban conductors hand each traveling man, when collecting his fare, explaining our freight arrangements and asking him to route his sales via the interurban line. The card shows the proper routing from all the jobbing centers, and, the traveling man being on a trip to solicit business himself, it makes a strong personal appeal to him.

Many a line spends as much time in getting in and out of the large towns through which it passes as it does on the many miles between them. I think there is good reason to invest in separate tracks and high-speed right-of-way in these instances, with a few stops at prominent points in the city. This question has reached the stage in Los Angeles where an elevated track is being advocated to avoid the surface delays to interurban trains.

No good is accomplished by attempting to reach all the prominent places in a city by interurban service. The steam road delivers passengers only at its station at a location nearly always requiring street car or bus transportation to the business section, and an interurban delivery to any good point in the business district should be amply sufficient.

No mention has been made of stock yards and elevators inasmuch as these have disappeared from cities of any size. Stock yards, of course, must be located where they will not become a nuisance unless all the revenue secured is spent in cleaning them. The site should be well away from dwellings and should have good natural drainage. It should be remembered that stock revenue is comparatively low per car as a special movement is frequently required and the car is hauled empty one way. With the interest charge on the investment, the cost of maintenance and the necessity for an adequate water supply, both in the yards and for wetting down shipments, the business brought by stock yards is of doubtful value at many stations.

No doubt, good, adequate and convenient terminals will secure interurban lines additional business, but an investment of this kind must be made only after a careful estimate of the cost of property necessary to be acquired and the improvements to be placed thereon. The profit on the additional business that can be secured by the traffic department then should be set against the interest, depreciation and maintenance on the proposed investment, and if the balance is on the right side the project may be undertaken. In many instances sentiment and pride determine whether terminals shall be built, and perhaps it is more to this than anything else that we owe some of our magnificent terminals in the United States.

Iowa has not as yet developed its interurban field sufficiently to present many serious problems in this line, al-

though the obstacles in the case of the Iowa & Illinois Railway at Davenport are well known and appreciated by those of us who have seen them. In that case it was necessary to riprap the bank of the Mississippi River for a long distance and use portions of two steam lines to gain entrance to yard room. By this means the business of one of the most highly developed manufacturing cities of the State became available to the interurban railway and will, in my judgment, amply repay the company for its foresight and confidence in undertaking a work of such magnitude.

A notable example of planning terminals for the future is in evidence in our convention city, Waterloo. No interurban official should leave here without a thorough inspection of the development of the yardage of the Waterloo, Cedar Falls & Northern Railway. Nearly all of its freight lines are ideally located on private rights-of-way and the belt lines offer especially advantageous locations for manufacturing purposes. In fact, nothing has made possible the marvelous growth of Waterloo so much as its interurban line and terminal facilities.

The first and last word in terminal planning is to secure adequate transfer tracks with every steam line entering the city. In addition to business to and from points on your own line, there is always a considerable amount of transfer business between the steam lines and the steam lines are usually glad to give this movement to the interurban lines on account of their ability to handle it promptly and smoothly.

SELECTION AND INSTRUCTION OF TRAINMEN

BY D. C. BELL, TRAINMASTER CEDAR RAPIDS & IOWA CITY RAILWAY COMPANY

The selection of trainmen is a matter that probably all companies handle in very much the same manner. We require a man to fill out a regular form of application blank, which calls for his name, place and date of his birth, etc., and he then refers to three persons for recommendations as to character and ability, giving name, address and nature of business of each of the three.

We follow up these references with a regular form of blank and it may be that experience has taught the street and interurban railway companies that this is a wise and necessary precaution to take before employing a trainman, but personally I do not give much consideration to the statements made in application or reference blanks if such statements conflict with my judgment of the man after interviewing him personally.

A personal interview with the applicant is certainly most desirable, and I invariably follow this rule in selecting men, as in my opinion the impressions received at this interview are of far more value than the information received from the reference blanks. I think you will agree with me that there are few men who could not refer to three or more persons who would state that the applicant was well qualified for the position for which he had applied, and unless persons referred to were personally known to me, I do not think much value should be placed upon the information received, except those references received from steam, street and interurban railway companies.

Some men who have come to our road with the best kind of recommendations have not made good workmen, while, on the other hand, we have hired some upon questionable recommendations who have proved to be exceptionally good men.

Before leaving this subject I wish to add that I believe that the official directly in charge of the men should be allowed to make his own selections; that his superiors should not employ men and send them to him, as he loses a good deal of control over them if they feel that they are not accountable to him but are responsible to some one higher up.

After applicant has been selected, we send him to our company surgeon and if he passes a satisfactory examination he receives a regular form of permit to receive instruction from a regularly assigned city car conductor. When the conductor to whom he has been assigned certifies in the permit that he is qualified and returns it to the trainmaster's office it is placed in a file envelope, which is kept for each employee in the train service, and which contains his application blank, references, his permits, receipt for equipment issued him and all other matters pertaining to his record. He then receives a second permit identical with the first, but to another city car conductor, which gives him the benefit of both day and night instruction.

He is then placed in service as a city car conductor and such work as he is entitled to by his seniority is given to him. After he is thus qualified, he immediately receives permits for instruction as city car motorman in the same manner as for conductor.

Employees qualifying for city car conductors and motormen do not receive instructions other than those necessary to operate cars before being allowed to begin work. They receive no pay while being instructed, but the average time required for instructing conductors does not exceed two days and that for motormen four days.

It may seem that we start our men to work with undue haste, but as a man can learn the rudiments in that length of time, and as he could not possibly become a proficient workman in less than three months, we feel that we may as well allow him to begin earning money as quickly as possible. The principles of the work, such as learning the names and locations of the streets, time of cars, making out trip reports and, in the motorman's case, learning to start and stop his car and feed it up properly, can be mastered in that length of time.

All of our men are required to qualify as conductors and motormen on city cars. This we do in order to keep our list of extra men reduced to a number that will insure them having reasonably regular work, either as conductors or motormen.

Our interurban conductors and motormen are promoted from the city car service but not until they have had freight train experience. Those who have not had such experience before being employed by our company are assigned as brakemen on our freight trains. This gives them an opportunity to become familiar with the line, the handling of trains by train orders, location of signals and switches, stations and local stops, also with the significance of the different rules as applied to actual working conditions.

We allow a man to qualify as either conductor or motorman in interurban service, but not for both. When we wish to add to the interurban lists of either conductors or motormen we call in the oldest man desiring to qualify for that branch and give him an examination upon the book of rules and time card. This proving satisfactory, we give him permits to be instructed by two regular interurban men, who sign his permits as soon as he is, in their opinion, properly qualified.

Our instructions for interurban conductors and motormen are given in actual service under the direction of regularly assigned trainmen.

Our motormen are not expected to have a very thorough mechanical knowledge of the equipment used, but as they are expected to replace trolley poles, lubricate the different bearings on trucks and motors and to be able to take care of controller and headlight troubles, they are instructed along these lines. However, before being assigned they are examined by the master mechanic.

These instructions cover a period of from one to four months, the employee choosing his time as is most convenient for him in connection with his other work. He receives no pay for time spent in receiving instructions.

A new feature recently added is a school of instructions

conducted by the company's attorney and physician. It is our intention to educate the trainmen to ascertain in case of an accident the exact information required by the attorney for his complete understanding of the case. In this connection the men are instructed to exercise such precautions as will avoid accidents.

Our surgeon's talks are intended to inform the men how best to handle accidents when medical aid is not present, what doctors to call in case he is not available and any other information of value to the employee. We have had but one meeting of this kind, so far, but expect to have them at stated intervals in the future.

We intend also to test the ability of our men to estimate speed, but have not as yet determined just how such tests will be made.

EFFECTIVE SHOP EQUIPMENT FOR REDUCING MAINTENANCE OF EQUIPMENT

BY G. A. MILLS, ELECTRICAL ENGINEER WATERLOO, CEDAR FALLS & NORTHERN RAILWAY COMPANY

No other part of a street railway or interurban property is so critically judged by the public as the rolling stock, although this part of the complete equipment of an electric railway system usually represents only a fraction of the total investment. The public is in such close daily contact with the cars that it is justly interested in their condition. New equipment cannot be supplied every few years, but cars in service can be kept in good condition and repair, thus presenting an outward sign of prosperity to the public.

This part of their equipment is directly in the hands of the shop department. No other department in a railway organization needs so efficient a force of employees. Labor alone constitutes from 40 to 60 per cent of the average repairs on a city railway property and from 30 to 50 per cent of the necessary repairs on an interurban property. The size of the force and number of sub-departments, of course, depends upon the number of cars operated. The general manager or superintendent can give only a limited portion of his time at the shop department; hence this very important work must be intrusted to a master mechanic or shop foreman, upon whom the efficiency and financial showing made by the department depend.

In attempting to compete with the car maintenance costs shown by very large shops the master mechanic of the small or medium-sized shop is working at a disadvantage. He has to develop men who can be changed efficiently from one class of work to something entirely different. Generally he lacks modern machinery and sometimes is even compelled to use machines which have been discarded by the larger shops as out of date. He has to modernize these machines as much as possible and to devise attachments to make them do work never contemplated by their original designer. Yet, despite these handicaps, it is possible for the wide-awake master mechanic to keep his costs down to those of the larger shops if the proper methods are followed.

The properties represented in this convention have from a dozen cars to a few hundred to maintain. They consist of street railways, interurban roads and a combination of both classes of service. No two shops, perhaps, have the same line of machinery or shop methods. These shops are the outcome of a very rapid growth experienced in the past few years which has not only changed the railway equipment, in general for the better, but has changed the methods of maintenance. For these reasons, in considering the subject assigned to this paper the writer has taken up cost-reducing and labor-saving devices which the medium-sized shop can use in connection with its present shop machinery at a small additional cost, also simple home-

made devices which any shop can make to increase the efficiency of the maintenance work.

While discussing effective shop machinery, electric railway men should not overlook the importance of proper inspection and its relation to maintenance, because we all know that "an ounce of prevention is worth a pound of cure." An efficient inspection system will locate the small faults before the equipment fails in service. This will greatly assist the small shop with a limited equipment as well as give more mileage per failure. It is not the purpose of this paper to discuss inspection, but it is indirectly a great assistance in reducing the work in the shop department. On our own system proper inspection is no doubt greatly responsible for the obtaining of 3700 miles per car per month for local service and 8300 miles per car per month for our interurban cars.

REMOVAL OF TRUCKS FROM CAR BODIES

One of the greatest problems of the medium-sized shop is the handling of car bodies for the removal of trucks, the dismantling of the trucks and motors and the transfer of these heavy parts to the shop machines where they are to be repaired. If an armature is to be repaired and box-frame motors are used, the truck must be taken from under the car body, the motor must be removed from the truck and the armature from the motor. With inadequate equipment this operation may cost, in labor alone, from \$8 to \$14. With modern machinery the expense should be between \$2 and \$4. Whenever there is much of this work to do, an overhead electrically operated traveling crane will prove most advantageous. An air hoist has a lower first cost and will effectively handle this work. These air hoists should be provided with trolleys running on overhead tracks so that the heavy parts may be transported from the pit tracks to the place of repair. Where this distance is great, shop hand-trucks can be used. The use of a chain hoist for this heavy work involves much time and labor, but such a hoist has its place where the amount of work to be done does not warrant the expense of the power hoist. In some shops the handling of car bodies is accomplished by four screw jacks, two on each side of the pit. The jacks are connected by bevel gearing which is driven by a motor. This device cuts the labor charge to a very small amount. The removal of trucks from interurban cars where the rear steps and pilot in front interfere is greatly assisted by the installation of a truck turntable on the pit track. The car body need be raised only a few inches, when the truck on the turntable can be turned 90 deg. and run out to the side of the car for stripping.

Our shop department has a portable crane of our own manufacture which is used in handling heavy material in and about the shops as well as out on the road. An old steam-coach truck was equipped with a 10-lb. boom and a 11-ft. mast. The mast is controlled by means of a $\frac{5}{8}$ -in. steel cable, operated by a winch. The crane is used in the shop in stripping and assembling motors and trucks. In the yard it is used to unload new motors, barrels of oil and other heavy material. The truck is equipped with drawbars and can be taken out on the road when heavy lifting may be required.

WHEEL HANDLING

Wheel removal is another place where labor-saving devices may be used. The wheel pit should be equipped with an air hoist of the plunger type. This hoist will reduce the cost of the labor 50 per cent and the time from a half day to a couple of hours. This same hoist, when equipped with a removal saddle, will reduce the time and labor for removing armatures in split-frame motors. However, armatures can be handled in the pit effectively with a quick-acting hand jack mounted upon a truck. This last method is used in our own shops with excellent results.

Steel wheels can be re-formed by being turned in a lathe or ground with a grinder, but a cast wheel can only be

ground. Where a road has only a few steel wheels in service and is short of lathe equipment, a two-in-one lathe will perhaps be the best investment, since this type of lathe can be used for regular lathe work when not used for wheel turning. A good wheel grinder can be installed for about one-half of the first cost of the lathe described, but it will not turn out such rapid work. The grinder, however, will true up either kind of wheel. From three to four hours are required to grind a cast wheel after it has run about 60,000 miles. It will then have about 20,000 more miles of service. This mileage varies greatly with the different properties. Some shops use motor-driven pit grinders which will true the wheel without requiring its removal from the car.

MISCELLANEOUS EQUIPMENT

A bolt cutter will be found useful to reduce the cost of rebuilding trucks and frames. Many times bolts are scrapped on account of a few damaged threads which can be corrected in the bolt cutter in less time than would be required to go to the stock room for a new bolt. This same machine can be provided with an attachment for cutting pipe threads.

A simple device for pressing bearings in and out of the housing, devised in our own shop, consists of a 12-in. x 12-in. air-brake cylinder, controlled with a straight air-brake valve and mounted with a table below the piston. Bearings are pressed in and out of the housing in a few seconds' time with no breakage. With hand methods a half hour or more was required for this work, and in many cases the sleeve was broken.

The trolley pole is not an expensive part of a car equipment, but it is often bent and dented, sometimes after only a few hundred miles of service. To keep the cost of repairs below the first cost of the pole, it must be a small part of a dollar. This is accomplished by the use of two simple machines. The first is a set of rollers similar to those used in a tin shop and properly shaped for the size of pole used. The bent pole is passed through these rollers which do the straightening. The second machine removes the dents. The machine consists of two dies, shaped to fit the pole. The dies are parted by a spring. The dented place in the pole is placed under the dies, which are brought together by means of a sledge applied by the operator. This device will renew several badly damaged poles before the cost of a new pole is reached. This is a small item, but a few pennies will make a dollar, and a dollar will pay the interest and depreciation on a ten-dollar investment, which would pay the first cost of this device.

The handling of babbitt metal for bearings in some shops will cost as high as 10 cents per lb. for labor only. Properly heated mandrels and special heating devices for the babbitt will obtain results. Where gas is not available gasoline tools of special design, which will be accepted by the Fire Underwriters, can be used.

The removal of underhung air compressors is accomplished economically by the use of a long hand-truck. This is placed under the car and over the track pit, which is covered with pit planks. This truck should be a little longer than the width of the car body and have a set of rings on each end for attachment to the overhead crane or air hoists. When a compressor is to be removed, the truck is hoisted up to the compressor, which is disconnected from the car and thus transferred to the truck. The truck with the compressor is then lowered and taken to the repair bench. When an extra compressor is available a compressor change can be made with this truck in about thirty minutes, the old compressor being removed and the new one connected with but one lifting of the truck.

The woodworking and blacksmith departments should receive as careful attention with respect to labor-saving tools as the machine shop. Special machinery for turn-

ing out special work will greatly reduce the maintenance cost. Wherever possible power-driven tools which will reduce the labor and time will increase the efficiency of these departments.

Car-cleaning maintenance may be held to a low figure by properly designed horses and well-drained pits, the latter where car washing is employed. The same care should be carried into the body erection and paint shops.

ELECTRICAL MAINTENANCE

The electrical maintenance is one of the largest items which the repair shop has to handle. Electrical faults are not so easily found as mechanical faults, and special testing sets are required to locate trouble effectively. The air hose is very useful for cleaning the motors and controllers from carbon dust and dirt, which are enemies to electrical insulation.

When a car is received in the shop for repairs the armature and fields should be first inspected and tested by an electrical inspector, who should determine whether these parts are to be rewound or only repaired. These tests should be made with alternating current. Most shops are not provided with alternating current, but it can easily be obtained in sufficient quantities for this testing work from a home-made inverted rotary converter. A small two-pole, 500-volt d. c. motor of about 1500 r.p.m. can be supplied with two slip-rings. This will supply 350 volts alternating current. A ten-to-one ratio transformer can be built from old transformer iron and wire on hand. Taps in the secondary should be brought out so as to give a wide range of test voltage. The transformer should be mounted on a truck so as to be portable. The converter a. c. voltage should be wired to different points around the shop and thus serve for all of the testing work. An armature test yoke and field-testing sets are as easily constructed. With a set of this kind all weak insulation in cables, controller stands and motors can be checked in the shop. After some experience with the tester it will be found possible to eliminate practically all electrical failures and send the equipment out from the shop with a knowledge of its exact condition.

Almost every shop in the country is now slotting commutators. There are many slotters on the market and many home-made ones. Our own shop force has equipped a small motor with a saw, and it is arranged so that it can be attached to the carriage of the lathe in which the armature has been placed for the returning of the commutator. With this device a GE-80 motor can be slotted in about twenty minutes. Maintenance work on armatures can be reduced still more by arranging one lathe so that banding, turning and slotting may be accomplished with one handling of the armature.

SWEDISH ELECTRIFICATION PLANS

It is announced that the Swedish government has worked out plans for the electrical operation of lines in addition to the Kiruna-Riksgränsen ore-carrying line described in the *ELECTRIC RAILWAY JOURNAL* for May 6, 1911, and Jan. 4, 1913. This line is north of the Polar Circle. The proposed electrifications cover the southern trunk lines between Stockholm and Gothenburg and Stockholm and Malmö. It is proposed to operate the Gothenburg line from the government's hydroelectric plant at Trollhättan and also from a plant under way at Motåla. The Malmö line is to be supplied from the latter station and also from a private station at Ligan. The third electrification would be that of the Gothenburg-Malmö line, for which energy would be transmitted from the Trollhättan and Ligan stations. The estimated cost of these electrifications is figured at approximately \$25,000,000, of which \$18,250,000 will be required for the overhead line, transformer stations and locomotives and the remainder for the completion of the hydroelectric plants.

COMMUNICATIONS

THE FORTHCOMING CENSUS REPORT

DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS
WASHINGTON, April 24, 1913.

To the Editors:

The schedules have been mailed to all establishments covered by the census of electrical industries. Of these industries electric railways are in some respects the most important, and the schedule for them is the most elaborate and technical.

The preparation of the lists of establishments and mailing of the schedules has required during the past two or three weeks the services of about twenty-seven clerks, and a number of clerks have been engaged on the inquiry since the first of the year.

We are in hope of collecting a much larger proportion of the returns by mail than were collected in this manner at the census of 1907. The census of electrical industries for 1907 required the services of a large field force, and the total expenses of the field were approximately \$61,000. The number of agents that can be employed in the collection of statistics of this character is limited, and it requires a number of months for them to cover the entire United States. Therefore, if the companies will make the reports to the Census Bureau promptly by mail, it will enable the office to compile and publish the statistics at a much earlier date than is possible by the employment of special agents to collect the returns.

The records of this office show that 2600 operating and 304 non-operating electric railway schedules were sent from which reports of some character must be secured. It is probable that some of these companies have gone out of existence, but a statement to that effect must be obtained before the canvass is closed.

In addition to the field force approximating sixty-five agents, there will be employed in the office from forty to fifty clerks during the greater part of the year 1913. These clerks and agents, of course, will collect the reports and tabulate the statistics not only for the railways but for central stations, telephone and telegraph systems. The office is already in receipt of 15,580 reports from telephone companies, and if the electric railway companies respond as promptly as the telephone companies have, it is hoped that the statistics for this important branch of electrical industries will be sufficiently complete to enable the office to publish a preliminary statement during the latter part of 1913, or in January, 1914.

W. M. STEUART,
Chief Statistician for Manufactures.

NEW YORK CENTRAL LOCOMOTIVE RATING

MINNEAPOLIS, MINN., April 26, 1913.

To the Editors:

Railroad motor ratings promulgated by the leading American electrical manufacturers seem to be on a peculiar basis, as shown by your recent articles on the Pennsylvania and the New York Central railroad locomotives.

The Pennsylvania locomotive is called a 4000-hp unit, yet the rating of the two motors on the one-hour A.I.E.E. basis, with natural ventilation, according to the manufacturer, with a voltage of 600, is nearer 2000 hp; and this corresponds to 2700 amp per locomotive, or to a tractive effort with full fields of 25,000 lb. at 31.5 m.p.h.; or, on normal field, to 15,000 lb. at 51 m.p.h. With 650 volts, according to a paper presented by George Gibbs before the International Railway Congress of 1910, the hourly rating of the locomotive is 2500 hp.

The New York Central locomotive of 1913 is now stated to have 50 per cent greater capacity than the 1906 unit, which is rated 3050 amp at 600 volts, or 2200 hp per unit.

The locomotive of 1913 is without doubt an improvement over the older type, in the following:

Weight is reduced from 115 to 100 tons.

Weight on drivers increased from 71 to 100 tons.

Total weight per driver axle decreased from 35,500 lb. to 25,000 lb.

Dead weight per driver axle decreased from 13,000 lb. to 6400 lb.

The New York Central locomotive of 1913 has eight motors, and the capacity of each is given as 325 amp with 600 volts, which at 93.6 per cent (estimated) efficiency gives a one-hour rating of 244 hp, or of 1944 hp for the locomotive. This agrees with the manufacturer's rating, with 36-in. drivers, of 13,500 lb. tractive effort at 54 m.p.h., which is only 1944 hp, and this is 16 per cent less than the published rating of the old locomotives. Either the new locomotives are much underrated or the old locomotives are much overrated.

The data presented in the *General Electric Review* of May, 1913, page 324, are that the continuous rating is 9500 lb. at 60 m.p.h., which is exactly 1520 hp. Other data in the same paragraph give the continuous rating as 250 amp with 600 volts, which at a high efficiency would make the continuous rating of eight motors, or the whole locomotive, about 1520.

Forced draft is used on the motors of the 1913 locomotive, the sides and bottom of the motors being of sheet iron as in the old locomotive, but forced draft, if used on the old units, would raise the continuous rating from about 53 per cent of the one-hour rating to about 80 per cent of the one-hour rating of 2200 hp, or to 1760 hp.

The data presented by the G. E. publication bureau, for this 1913 locomotive are that the new locomotive is designed to exert sufficient tractive effort to haul a 1000-ton train at 60 m.p.h. Railroads do not yet run passenger trains of this tonnage, or freight trains at 60 m.p.h., and the requirements are both interesting and peculiar. A 1000-ton train at 60 m.p.h. requiring a tractive effort, including the locomotive, of about 12 lb. per ton involves a horse-power of about 1944, or the one-hour rating. The New York Central run, from the Grand Central Terminal to Croton, is only 34 miles and with a few stops can be easily made in one hour.

EDWARD P. BURCH,
Consulting Engineer.

HEARINGS ON HEATING VESTIBULES AND AIR-BRAKE EQUIPMENT

At a recent hearing before the Massachusetts Railroad Commission upon a petition of street railway employees to require companies to equip their cars with vestibule heaters, air brakes and wind shields, Paul Winsor, chief engineer of motive power and rolling stock Boston Elevated Railway, presented testimony in opposition to the proposed changes and submitted data bearing upon the probable cost of installing such apparatus. Before Mr. Winsor took the stand Arthur A. Ballantine, of counsel for the company, said that in the Boston district few cars operate on runs of more than from forty-five minutes to an hour from the carhouses and touched upon the practice of freely interchanging open and closed cars according to the variation in weather conditions. He contended that it is undesirable to make over the older rolling stock and that it could be done only at excessive cost.

Mr. Winsor said that since 1901 the Boston Elevated has purchased no cars without air brakes and that no single-truck cars have been purchased for service since 1900. It now has 1387 double-truck open and box cars and 1479 single-truck cars without air brakes. The estimated cost of equipping these cars with air brakes is \$350 for air-brake apparatus and installation, with \$100 extra for

changes in the trucks and brake rigging. Most of the trucks will not stand the air-brake equipment. To provide all the company's cars with air brakes would cost \$1,288,700. All but 125 of these hand-brake cars were purchased prior to 1900.

Regarding the cost of heating vestibules, Mr. Winsor said that, taking as a basis a 300-watt heater with an estimated cost of \$3 each for installation and a price of \$7, the first cost per car with one in each vestibule would be \$20. The power requirements call for about 0.33 kw per heater at the generating plant, and as the cost of power stations, transmission lines, substations and feeders at Boston is \$175 per kw the first cost per heater would be about \$58 plus the heater investment, or \$68 in round numbers for one heater and about \$136 per car with two heaters in each case. The company's interest, taxes and depreciation charges amount to 11½ per cent to-day, and there would be a fixed charge of \$2.30 yearly on the investment in two heaters and a fixed charge of \$13.16 for the power station and distributing equipment, or a total charge for interest, taxes and depreciation of \$15.46 per car per year. The operating cost, taken at five months in the year and twelve hours per day, would be \$7.58 per year per car, making a total operating and fixed expense of \$23.04 per car. The total capital expense on the heaters would be \$290,783 and the total yearly cost without allowing for maintenance would be \$49,444. The estimated cost of putting glass wind shields on the cars not equipped with vestibules would be \$75 per car. It would be necessary to provide a drop window outside the dasher, and the total capital cost would be \$106,650. The total cost of complying with the petitioners' requests would be \$623,150 for air brakes for double-truck cars, \$665,550 for air brakes for single-truck cars, \$290,783 for heaters and \$106,650 for glass shields, or a total for the three items of \$1,686,133, giving a total annual cost on the Boston Elevated system alone of \$193,905 exclusive of maintenance. In response to a question of Chairman McLeod, Mr. Winsor stated that about 20 per cent of the capital investment in power plant and equipment represents the money required to provide for car-heating service.

For the Bay State Street Railway Company, its counsel, Bentley W. Warren, said that requirements of a capital nature bear heavily upon street railways in Massachusetts. Forty-one companies in the State, covering one-third the mileage, pay dividends of only 4 per cent or less per year, and of these about thirty companies pay no dividends at present. The practical result of any capital expenditures under such conditions is to impair the service. C. F. Bancroft, superintendent of motive power and machinery Bay State Street Railway, said the estimated cost of equipping cars now having only hand brakes with air brakes would be \$350 per car. The annual cost of maintenance of an air-brake car is about \$30 a year greater than for a hand-brake car. No single-truck cars have been bought for five years. The cost of wind shields would be about \$50 per end. Mr. Bancroft said that the expense would be increased on the Bay State lines because the regular cars are equipped with curved dashers with the headlight in the middle of the dasher. The change could not conveniently be made in the company shops. It would be necessary to drop down the wind shield on the outside of the dasher and box in the shield in some way by a kind of false dasher. The glass could not be dropped down inside the present dashboard on account of the hand brake, and changes in the fenders would also be necessary. The estimated cost of heaters for the vestibules is \$22 per car, and the power station capacity would also have to be increased. E. J. Dickson, manager of the Springfield (Mass.) Street Railway, and Howard F. Eaton, manager of the Brockton & Plymouth Street Railway, also spoke against the petition.

LONDON LETTER

(From Our Regular Correspondent)

The ten new cars which have been constructed for the Leicester Corporation by the International P-A-Y-E Tramcar Company, Ltd., have been put into service. The occasion was made one of some formality, the Mayor and his wife accompanied by various members of the Town Council, traveling in the first prepayment car which was run. There was a reception at the Grand Hotel, at which the system was eulogized by the Mayor and aldermen.

The Lancashire & Yorkshire Railway has opened its electric train service to Ormskirk, completing the through electrified system from Liverpool to Ormskirk. Only a limited number of trains are running, but when the new battery station at Ormskirk is erected a full service of express and limited electric trains will be introduced.

The tramway receipts of the London County Council for the year ended March 31, 1913, were £2,180,735, as compared with £2,292,301 for the previous year, a decline of £111,566. Recent records, however, show a great improvement as mentioned in this letter last month. Meanwhile the system continues to be extended. The opening of tramways in Bishopsgate, by which through running will be possible as far as Epping Forest, is announced. The reconstruction and electrification of the horse tramway from Dalston Junction to Mare Street, Hackney, has been completed. The Council suffered from two breakdowns recently at the Greenwich generating station, one some weeks ago, when the tramway service was held up for an hour, and another more recently, when the entire system was held up for two and a half hours, not a car over the whole area served by the Council being able to move during that time. The stoppage occurred just before 9 o'clock in the morning, one of the busiest times during the twenty-four hours. The official statement attributed the second suspension to a short-circuit which partially destroyed the switchboard.

The Birmingham tramways have had a most successful year, having carried about 132,000,000 passengers, an increase of more than 24,000,000 over the previous year. The receipts for the year were £573,072, as against £422,620 for the previous year, an increase of £150,452. It is not expected, however, that the amount applied for the relief of rates will be greater than last year, as concessions in the way of cheaper fares have been given to the public which approximate about £70,000 or £80,000. Meanwhile, many of the improvements sanctioned by Parliament are being carried out, which, when finished, will make the tramway system in Birmingham a much more efficient one than ever before. A sub-committee has been appointed to consider various projects for the extension of the tramways. The most important question which the committee has to decide, however, is the linking up of the various lines in the center of the city, as Birmingham is a city of "dead" ends.

The private bill committee of the House of Commons has been considering the bill of the Southport Corporation, which seeks power to establish a trackless trolley system on the esplanade and promenade, and also to run motor omnibuses. The committee has approved the part of the bill relating to the trackless trolley system, but has refused to pass the preamble of the clause relating to the buses.

The Manchester tramways committee is still deeply concerned with the problem of traffic congestion. Notwithstanding the recommendation made to it by various other committees that it should send the general manager of the tramways, the city surveyor, the chief constable and others to visit other large cities in Great Britain and abroad, and report the result so as to enable the committees which are concerned to make a complete joint report and recommendations on the subject to the City Council, the Council has recently sent the committee back to England for advice on the problem. This seems doubtful economy as many other European cities have had to face the same difficulties as exist in Manchester. The committee is gathering statistics as to the traffic density. The interim report issued recently shows that crowding decreased following the substitution of a through route scheme for the old method of bringing cars into the center of the city to "dead" ends. The question is a difficult one, and it is apparent that no remedy will be effective that does not deal with the whole of the congested

area, including the streets where the tramcars are not responsible for the congestion. Many of the most congested places are some distance from the busy tramcar routes but have a direct effect on them, showing that any remedial scheme must be of a general character and not apply only to tramways.

The Metropolitan Electric Tramways, Ltd., which operates in the northern portion of London, reports earnings of £518,025 for the year, but the directors state that the profit decreased £24,347. This is attributed to the motor-omnibus competition, which necessitated an increase in the car services. The receipts per car mile dropped from 10.59d. to 9.63d. It is anticipated that the alliance with the London General Omnibus Company will bring about the co-ordination of the omnibus and tramway services in the company's area and a consequent improvement in the company's revenue. The ordinary dividend for 1912 was only 5½ per cent for the year, against 6 per cent for 1911. The purchase by the London County Council of the company's tramway between Finsbury Park and Manor House was completed in August, 1912, at which time through-running arrangements went into effect. The satisfactory results obtained from the first through service worked jointly by the London County Council and the company have led to a further agreement, under the terms of which through running will be extended to all routes of the Council and the company converging at Manor House junction. The scheme for the consolidation of the company's interests with those of the London United Tramways, Ltd., particulars of which were issued to the shareholders, became binding in December, 1912, most of the holders of each class of shares having accepted the offer to exchange their holdings for shares and debenture stock in the London & Suburban Traction Company, Ltd. Under the terms of the scheme the company had sold to the London & Suburban Company its entire interest in the share capital of the Tramways (M. E. T.) Omnibus Company, Ltd. The directors anticipate that the consolidation of the two tramways will effect substantial economies in administration and a reduction of working expenses. The company is promoting a bill in the present session of Parliament to authorize the installation of the railless traction system over a route connecting the company's tramways in Wood Green and Tottenham with the light railways belonging to the Walthamstow Urban District Council. The new system will, if sanctioned by Parliament, take the place of the light railway authorized by the Tottenham-Walthamstow Light Railways order of 1906 and will open up a new area which is not served by the company's system.

A bill promoted by the City & South London Underground Railway to authorize important developments is pending before a select committee of the House of Lords. The main object of the measure is to secure authority to increase the size of the company's tunnel.

A select committee of the House of Lords is considering the Metropolitan Railway bill, a measure which has been promoted for the purpose of vesting in the Metropolitan Railway the undertaking of the Great Northern & City Railway, the underground tube which runs from Moorgate Street to Finsbury Park. The second object of the bill is to secure authority to construct two small underground railways, which might be described as an extension of the Great Northern & City Railway from Moorgate Street to Lothbury, so as to reach further into the heart of the city. It is also proposed to make a further extension, so as to connect with the City & Waterloo Railway at a point in Queen Victoria Street. The plan will afford connection between railways running north and those running south.

The Chesterfield Corporation railless traction bill is at present before a Parliamentary committee. The object of the bill is to give the corporation authority to run trolley cars and omnibuses over certain routes which radiate from the borough into the adjoining districts. The plan is to test the routes for the railless traction before putting up posts and overhead wires. After traffic has been developed in this way, the trolley system will be put into force and the motor buses taken off. Along certain routes no powers are being asked for trackless trolleys but only for motor omnibuses, as it has been discovered that along these particular routes the putting up of posts for the trackless trolleys would interfere with the trunk wires of the post office.

A. C. S.

News of Electric Railways

Hearing on Pennsylvania Utilities Bill

The joint general judicial committee of the Legislature of Pennsylvania held a hearing April 29 in the Senate caucus room on the public utilities commission bill as amended in committee. Representatives of the city of Pittsburgh and the steam, electric, telephone and milling interests spoke on the amended measure, which was defended by Attorney-General Bell and Dean Lewis of the University of Pennsylvania Law School, sponsors for the bill. Among those who appeared against the bill in its present shape were Mayor Magee of Pittsburgh, City Solicitor Bown of Pittsburgh and E. H. Davis, general manager of the Williamsport Passenger Railway, who was also spokesman for the Pennsylvania Street Railway Association.

City Solicitor Bown supported the amendments to the measure advocated by Mayor Magee. He maintained that these amendments were absolutely essential for the creation of a commission in the public interest. He contended that such public service corporations as subways, elevated railroads and inclined planes could not be properly regulated under the bill as it stood; that no attempt was made to regulate holding companies; that the terms of the commissioners (ten years) were too long; that the switching problem in Pittsburgh could not be handled under the present bill, and that the important question of regulating securities issued was not properly cared for in the bill. In the original bill drafted by the executive committee of the Republican state convention this regulation of security issues was entirely omitted for the reason that the subject was covered in a separate bill known as the "blue sky law." The present composite measure left it optional to the corporation issuing the securities whether or not it would apply to the commission for its approval. Then again, Mr. Bown claimed, the purposes for which the securities were issued were not limited by the act nor was the corporation required to apply the proceeds of securities issued as the commission may direct. Finally no limitation whatever was imposed on holding companies. Mr. Bown also opposed the provisions to enable public utilities to build their lines through municipalities without municipal consent and requiring the consent of the commission to any contract entered into between a public utility corporation and a municipality.

Mr. Davis spoke briefly on the features of the bill permitting municipally controlled corporations to compete with existing corporations, empowering the commission to compel street railway extensions and providing for the joint use of facilities by different corporations. He cited the new Lehigh River bridge of the Lehigh Valley Transit Company as an illustration of the hardship that would be inflicted upon that company under such provision. Mr. Davis held that the enforcement of such mandates by the commission would operate quite seriously against the earning power of small electric railway systems throughout the State.

Others who spoke included George Stuart Patterson, representing the Pennsylvania Railroad, and Ralph S. Morris, one of the men who drafted the Democratic state platform bill. Mr. Patterson recommended a provision for a certain distribution of the cost of eliminating grade crossings between a municipality, a railway and the State on a basis of 50 per cent for the railway and 25 per cent each for the State and municipality. He predicted that such a distribution would reduce the number of grade crossings in the State 50 per cent within the next twenty-five years.

Dean Lewis took issue with former Attorney General Hensel when the latter contended that a public utilities corporation franchise should possess a certain valuation in fixing the rates to be charged the public by such corporation. He held that while a corporation should have a proper return the franchise is given by the State solely that the corporation may be in a position to render public service; therefore there should be no value attached to the gift from the State. In this contention Attorney-General Bell agreed with Dean Lewis. Mr. Hensel also spoke against the provision in the bill permitting the opening of branch

offices of the commission in Pittsburgh and Philadelphia, holding that but one headquarters should be maintained, namely at Harrisburg. In a brief filed by Dean Lewis with the committee, he discussed in detail why these important amendments demanded by the corporations should not go into the bill.

Among the 126 amendments to the bill which will shortly be reported to the House are these: making corporations operating under municipal lease subject to the authority of the commission; likewise corporations operating street railways "above" or "below" any street or highway; requiring street railways to arrange schedules to provide quick and convenient transfer of passengers to other lines; requiring through connections to be established between lines doing an electric railway freight business; requiring "reasonable" fare zones and rates; requiring railroads to grant "milling in transit" privileges; giving shippers the right to designate routes; specifically requiring the transfer privilege on street railways; giving the commission distinct power over the system of accounting and service of the lessee of a municipally owned public utility, "subject to the terms of the contract or lease"; providing that the commission must institute action for violation of its orders within two years; prohibiting any commissioner from either holding another state or municipal office or from being a candidate for any public office during his term. Under the amended bill the present commission would go out of office on July 1, 1913, and the new commission would organize Oct. 1 and begin business Jan. 1, 1914.

Safety Measures Adopted by Public Service Commission

The Public Service Commission for the First District of New York adopted an order on April 25 requiring all public-service corporations within its jurisdiction using steam and electrical apparatus to employ certain safety appliances and take certain precautionary measures to protect their employees against injury by contact with live wires, etc. There were thirty-nine companies represented at the hearings on the measure, and while the importance of safeguarding employees was recognized by all, there was no unanimity in the practices of the various companies. Accordingly the appliances and measures recommended by the electrical engineer of the commission were prescribed. These are as follows:

1. All high-tension-switch compartments shall so far as their construction will permit be so inclosed as to make it impossible, except when necessarily opening the compartments, for employees to come in contact with electrically charged parts either from or above the floor level.
2. All exposed high-tension cables in generating stations or substations shall be inclosed by screens or otherwise protected.
3. There shall be posted in conspicuous places in all the generating stations and substations diagrams describing and showing the relative location of wires and cables (except light and signal wires) and the switches, etc., controlling them, and all such wires, cables and connections shall be so tagged and numbered that they may be readily identified.
4. All machines for the generation of electricity or connected with such generation shall be so protected by railings and gratings as to safeguard operators and others from coming in contact with moving or electrically charged parts.
5. There shall be at least two operators on duty in rotary converter stations delivering energy at 500 volts or higher when the same are in operation.
6. All water-level glasses or gage glasses on tanks, standpipes or other storage receivers under pressure shall be protected by screens to prevent injury from bursting glass.
7. Test cocks on water columns shall be fitted with extension rods or chains so as to be operative from the boiler-room floor level.
8. All stop valves on steam boilers shall be of the automatic self-closing type.

9. Outlets of all safety valves shall be vertical.

10. All furnace doors on hand-fired boilers shall be fitted with latches or catches to prevent them from being blown open.

11. All moving parts of stokers shall be so protected, wherever possible, as to prevent accidental contact with such moving parts.

12. All large main cut-out stop valves shall be provided with means whereby the same may be closed from the boiler-room or engine-room floor or other remote point.

13. All large steam units shall be fitted with automatic self-closing valves.

14. All high-speed engines shall be fitted with automatic safety stops.

15. Elevator wells shall be properly and substantially inclosed, secured or guarded and shall be provided with proper traps and automatic doors in or at all elevator ways, so as to furnish substantial covering when closed and to open and close by action of the elevator when descending or ascending.

16. All openings in floors shall be roped off or protected by railings when left unguarded, and in addition a red light shall be displayed in the immediate vicinity when the location is unlighted or poorly lighted.

17. All stairways shall be provided with safety treads, kept free from oil and water, and be properly protected with hand rails.

18. Shafting running along or passing through floors shall be housed or screened or otherwise properly guarded.

19. All belting shall be inclosed or otherwise protected wherever accidental contact is possible.

20. Gear-case covers completely inclosing the gears shall be fitted to all machine tools and be kept in place when such tools are being used.

21. Set screws and keys in exposed positions on moving machinery and shafting shall be countersunk or otherwise properly protected.

22. Buzz saws and band saws shall be protected so as to prevent accidental contact with saw blades.

23. Grinding and emery wheels shall be properly guarded and equipped with hoods and exhaust pipes to draw off finely powdered material.

24. Guard glasses shall be provided for employees and used by them when engaged upon any work causing chips or fragments to fly, and wire screens of a portable or permanent type shall be set up on workbenches or around employees engaged in chipping.

25. A sufficient number of pails of clean dry sand must be kept in all generating stations, substations, auxiliary and switching stations.

26. Generating stations, substations, auxiliary and switching stations shall be provided with a sufficient number of chemical fire extinguishers of such a type that the contents cannot act as an electrical conductor. No other extinguishers shall be kept for use unless conspicuously labeled that they are not to be used until circuit has been killed.

27. All generating stations, substations, auxiliary and switching stations and shops shall be provided with a first-aid or emergency kit.

28. Provisions shall be made whereby pulmotors will be available in case of accidents.

Cleveland Railway Preparing to Oppose Fare Reduction

At a meeting of the directors of the Cleveland (Ohio) Railway on April 26, 1913, it was decided to oppose the order of the city of Cleveland reducing the rate of fare to 3 cents cash or two tickets for 5 cents, with 1 cent for a transfer, which was to go into effect on May 1. The company will also insist upon its demand for an increase in the operating and maintenance allowances and will take issue with Mayor Baker's intimation of extravagance in the operation of the property. These matters will all be brought before the board of arbitration on which C. N. Duffy, Milwaukee, will represent the company.

At the regular meeting of the City Council of Cleveland on April 28, 1913, A. B. DuPont, former head of the Municipal Traction Company, Cleveland, was chosen to represent the city on the board of arbitration which is to take up the differences between the company and the city administration. C. N. Duffy, Milwaukee, the company's representative,

arranged to meet Mr. DuPont on April 30, 1913, to consider the selection of the third member of the board. The questions to come before the board follow:

The right of the company to exceed operating and maintenance allowances.

The right of the company to make arbitrary charges against the operating allowances for the accumulation of accident and insurance reserves.

Whether the interest fund is now more or less than \$700,000 and whether the fare shall be reduced to 3 cents cash, with two tickets for 5 cents and 1 cent for a transfer.

The disposition of \$189,300 of stock, once owned by the Municipal Traction Company and now held in trust by Horace E. Andrews.

The disposal of \$323,000 held by the company as surplus of underlying corporations.

Whether disused equipment shall be scrapped and paid off at once from the maintenance and renewal fund or whether the cost shall be distributed over ten years.

Whether allowances for operation and maintenance shall be increased.

Several of these questions have been injected into the controversy by the city since the fact became apparent that differences relating to the reduction of fare and allowances for operation and maintenance would have to be submitted to arbitration.

The report of operation for March shows an actual deficit of \$1,734, due to deficits of \$27,241 and \$25,865 in the operating and maintenance funds respectively. Notwithstanding this, \$51,372 was added to the interest fund, which is now \$614,000, according to the company's figures. The operating deficit amounts to \$285,000 and the maintenance deficit to \$349,000.

The directors have voted to accept a franchise for an extension from the St. Clair line into Gordon Park and have approved the expenditure of \$79,000 on improvements to the St. Clair Avenue carhouse and shop.

Resolution Introduced to Create Street Railway Commission in Detroit

According to the members of the Detroit charter commission the proposed commission form of government for that city will probably not be adopted. Most of the members of the commission, it is said, favor amendments to the present form in preference to an entirely new form of government.

On April 23 Lawrence Cameron Hull addressed the commission, on invitation. He explained the German form of government which the commission form would follow, but he said this cannot be adopted complete in this country because of partisan training.

Commissioner Burton has introduced the following plan for the creation of a street railway commission:

"The Common Council shall provide for a commission of not less than three and not more than five members, to be designated the Street Railway Commission.

"The commission, in the name of the city, may purchase, equip and maintain any or all of the present street railways, or may build and maintain new railways. Until an arrangement is made with the present system to vest the title in the city, the commission shall have power to fix the rates of fare and determine the running of lines and extensions.

"The commission shall make plans for subways or elevated roads for street cars as it may deem proper, and shall construct the same whenever proper funds for that purpose are provided.

"The commission shall have such other powers and perform such other duties as the Council shall from time to time prescribe.

"The members of the commission shall receive such salaries as the Council may, in advance of their appointment, prescribe.

"The members of the commission shall be appointed by the Mayor for the time being, and the term of office shall be coterminous with the office of the Mayor appointing them, but such commissioner shall retain office until his successor has been appointed and entered upon the duties of his office."

Corporation Counsel Lawson has expressed the opinion that the resolution adopted by the City Council on Dec. 3,

1912, providing for the creation of a charter commission may be amended by resolution and the amount to be used for expenses may be increased in that way from \$500 to \$5,000.

On April 23 the board of estimators engaged in making up the city budget voted to place an item of \$250,000 in the list for the purpose of building an electric railway on Junction Avenue, on which storage battery cars are to be operated. This was done at the request of Mayor Marx, who is anxious to have the city furnish cross-town service on that thoroughfare. Representatives of the Merkle Gas-Electric Company of Canada have asked the Mayor to allow them to demonstrate one of their cars on the tracks in Detroit.

Terms Proposed for Extensions in Akron

A. B. DuPont, Cleveland, is preparing two agreements between the city of Akron and the Northern Ohio Traction & Light Company relating to extensions of track which the city has demanded. Both will be presented to the City Council and a selection will be made of such parts of each as may be desirable. In both will be inserted a condition that if the extensions pay a profit above a certain rate of interest on the investment the surplus shall be turned over to the city, but the city must also guarantee a certain rate of return on the investment.

The platform men of the Northern Ohio Traction & Light Company have refused the offer of the company to increase their wages 1 cent and 2 cents an hour, making the minimum 22 cents and the maximum 27 cents. The men on the Cleveland-Akron division receive 27 cents an hour except for the time they are within the Cleveland limits, when they are really employees of the Cleveland Railway and receive the same wages as are paid on the local lines, 20 cents an hour. They argue that they should receive 29 cents an hour for their full time. The men demand 25 cents an hour for the first year and 30 cents thereafter. The company's scale increases 1 cent a year to the fourth year, when it increases 2 cents, making the maximum 27 cents. The company has since formulated a new schedule for its platform men which is said to be satisfactory.

The company recently closed a contract with the B. F. Goodrich Company, rubber manufacturer, to furnish power aggregating 4500 hp in addition to that generated by its own plant.

Subway Construction Payments in New York

The Public Service Commission for the First District of New York has entered into an agreement with the Interborough Rapid Transit Company upon the annual estimates of the amounts of money to be provided by the company under Contract No. 3 of the dual system agreement. The estimates agreed upon are as follows: For the period from the signing of the contracts, March 19, 1913, to Dec. 31, 1913, \$18,000,000; for the year 1914, \$20,000,000; for the year 1915, \$20,000,000; for the year 1916, \$19,260,000. Under the contract the company is to contribute \$58,000,000 toward the cost of construction of new city-owned subways and \$22,000,000 for equipment. This is on the assumption that the total cost of construction will be \$116,000,000, the underlying idea of the contract being that the city shall contribute one-half and the company one-half. Proper provisions are made for adjusting the difference if the cost of construction shall fall below \$116,000,000. Inasmuch as the city has already expended about \$30,000,000 on lines to be operated by the Interborough company, it is understood that the company will provide an amount out of its total contribution until its expenditures equal those of the city, when contributions will proceed half and half by both parties.

The Interborough Rapid Transit Company has deposited with the Comptroller of the city of New York \$1,000,000 in securities, as provided in the security chapter of the dual system contracts. The Public Service Commission gave its approval to the schedule of this security, which consists of two notes of the city of New York for \$500,000 each, dated Feb. 27, 1913, and payable on June 2, 1913. The notes were given by the city to the company for a loan of \$1,000,000 in anticipation of the issue of corporate stock for various municipal purposes. It is understood that the company

will purchase an equal amount of this corporate stock when it is offered for sale and will then substitute the stock for the notes as the deposit required under the subway contract.

Railroad Valuation Board Named by I. C. C.

The Interstate Commerce Commission on April 30, 1913, announced the members of the board of engineers, five in number, who will appraise the physical properties of the railroads of the United States under the law passed by Congress. They are:

R. A. Thompson, employed in railway valuation work by the California State Railroad Commission, and formerly engaged in similar work with the Texas Railway Commission.

Prof. W. D. Pence, chief engineer of the Wisconsin Railroad and Tax Commission and an expert in railroad valuation.

J. S. Worley, Kansas City, Mo., a consulting engineer with experience in railway valuation work.

Howard M. Jones, Nashville, Tenn., a consulting engineer in valuation work and a specialist in bridge engineering.

E. F. Wendt, Pittsburgh, Pa., president of the American Society of Civil Engineers, who is in charge of the engineering work of the Pittsburgh & Lake Erie Railroad.

The board of engineers will meet in a few days to determine the rules which shall govern the valuation.

Dedication of Buildings at the University of Illinois

On May 8 and 9, at Urbana, Ill., there will take place a formal dedication of the new Transportation Building and the locomotive and mining laboratories of the University of Illinois. This will mark a step in the extraordinary growth which has characterized the forty-five years' life of the university, during which time the original faculty of four professors has increased to more than 500 members and the student body from fifty to more than 5000.

As Illinois is the second among the states of the Union in its mileage of railway tracks, the trustees have considered it important that the activities of the university shall embrace such lines of instruction and research as will best prepare men for positions of responsibility in the railway service, and to this end the School of Railway Engineering and Administration was established in 1906. Its functions are to combine certain courses offered by different colleges of the university so as to provide training of a highly scientific character for those who wish to prepare themselves for the engineering, equipment, financial, traffic or operating departments of either steam or electric railways.

The Transportation Building, which has been recently completed, is designed primarily to be occupied by the department of railway engineering. It contains offices, classrooms, drafting rooms, various laboratories, a departmental library and a students' reading room. The upper floors are temporarily assigned to the department of mining engineering and the department of general engineering drawing. Adjacent to this building are the locomotive laboratory and the mining laboratory, the plan for the group of buildings of which these constitute a part providing also for a railway electrical laboratory and a railway museum.

As a part of the dedicatory exercises there will be a number of addresses by prominent speakers, among them being the following: Samuel Insull, president Commonwealth Edison Company, Chicago; J. G. Pangborn, special representative of the Baltimore & Ohio Railroad, Baltimore; John Hays Hammond, mining engineer, past-president American Institute of Mining Engineers, New York; W. B. McKinley, president Illinois Traction System, Champaign, Ill.; Charles B. Moore, vice-president Jacobs-Shupert United States Firebox Company, Chicago; G. R. Henderson, mechanical engineer Baldwin Locomotive Works, Philadelphia; D. F. Crawford, president American Railway Master Mechanics' Association, Pittsburgh, Pa.; Albert Reichmann, president Western Society of Engineers, Chicago, Ill.; T. H. Goodnow, president Western Railway Club, Chicago, Ill.; F. H. Clark, past-president Master Car Builders' Association, Baltimore, Md.; H. G. Hetzler, president Chicago

& Western Indiana Railway, Chicago, Ill.; W. L. Park, vice-president Illinois Central Railroad, Chicago, Ill.; Robert Quayle, general superintendent motive power Chicago & Northwestern Railroad, Chicago, Ill.; Samuel O. Dunn, editor *Railway Age Gazette*, Chicago, Ill.; H. E. Chubbuck, vice-president executive Illinois Traction System, Peoria, Ill.; C. B. Young, mechanical engineer Chicago, Burlington & Quincy Railroad, Chicago, Ill.; Isham Randolph, consulting engineer, Chicago, Ill.

The formal dedicatory exercises will be held on the afternoon of May 9, 1913, at which addresses will be made by Edward F. Dunne, Governor of the State of Illinois, and C. H. Markham, president Illinois Central Railroad.

Award in Toronto Expropriation Case

The following is the award of the Ontario Railway & Municipal Board in connection with the expropriation of the portion of the Toronto & York Radial Railway, Toronto, Ont., lying between Sunnyside and the Humber River, the whole containing 54,720 ft. of land, an old structure and the roadbed and equipment of the railway in that area:

For the carhouse site and Humber property.....	\$38,254
For the railway within the city, construction, etc.....	40,991
Total amount of award	\$79,245
Estimated value by Toronto & York Radial Railway for the carhouse property.....	\$137,031
Estimated value of the Humber property.....	11,812
Total value for the property alone	\$148,843
Value estimated by the city for the whole of the carhouse and Humber property	\$32,000

The value of the lands could not be agreed upon by the city and the railway, and appeal was made to the Ontario Railway & Municipal Board. Experts were called by the railway and the city, but they were \$116,000 apart. The board appointed its own engineer to decide the value of the roadbed and the equipment. Upon this estimate the finding is made and the award given after much consideration and personal inquiry by Chairman McIntyre of the board and his colleagues. The company under the award gets \$47,245 more than the city's estimated value but \$68,598 less than it expected for the property alone. An appeal is probable.

Progress Program in Twin Cities

Horace Lowry, vice-president of the Twin City Rapid Transit Company, Minneapolis, Minn., in a letter to H. L. Moore, chairman of the street railway extension committee of the City Council, proposes important extensions of the company's lines for 1914 which will affect all parts of the city. Mr. Lowry said in part in his communication to the committee:

"We wish to submit to you the following proposition and trust that after due consideration by your committee you will recommend its acceptance by the City Council of Minneapolis. On account of the large volume of permanent improvements undertaken by our company for 1913, we respectfully request that no more lines (except those now ordered and accepted by our company) be ordered for construction during this year, and in consideration of this we submit the following offer for construction during the year 1914:

"Construct a line on Eleventh Street from Hawthorn Avenue to Fourth Avenue South, on Fourth Avenue South to Franklin Avenue, on Franklin Avenue to Minnehaha Avenue, on Minnehaha Avenue to Twenty-fifth Street, on Twenty-fifth Street to Thirty-sixth Avenue South and on Thirty-sixth Avenue South to Lake Street. The portion of this line now being operated as a single-track stub to be double-tracked and made a part of the proposed line on which cars will be operated from terminus to terminus.

"Extend the Twenty-eighth Avenue South line from Twenty-eighth Avenue on Fiftieth Street to Thirty-fourth Avenue South.

"Extend the Xerxes Avenue line from Xerxes Avenue and Fiftieth Street on Fiftieth Street to Penn Avenue South.

"Bring the Bobbinsdale line through to the city of Minneapolis from its present intersection with Crystal Lake Avenue, at the city limits, on Crystal Lake Avenue to Penn Avenue and Crystal Lake Avenue, thence into the city via the Twentieth Avenue North line.

"Extend the Oak Street Southeast line from its present terminus at Dartmouth and Superior Streets on Dartmouth Street to Lennox Street, thence on Lennox Street to Hamline Avenue.

"Referring to grade crossings our past experience shows that such busy crossings as those mentioned are not only extremely dangerous, but, furthermore, the traveling public is inconvenienced a great deal by poor service, which we are unable to control. Present conditions frequently show that poor service exists on account of railroad crossings causing irregular car spacing, when as a matter of fact there are sufficient cars on the line to give good service were it possible for us to keep them in place.

"It is our intention to work with the city to the very best of our ability and at all times to attempt to keep up with the growth and advancement of the city. We believe that the above proposition solves the situation at this time and sincerely trust that the city can see its way clear to accept it."

Large Increase in Assessment in New Orleans

The assessment committee of the Council Commission of New Orleans, La., has voted to assess the property of the New Orleans Railway & Light Company for 1913 at \$23,576,944. The assessment against the company for 1912 was \$17,170,261, making the increase for the year more than \$6,400,000. In protesting against the proposed assessment the company said:

"For 1912 the assessment of the New Orleans Railway & Light Company was \$17,170,261, equivalent to 7.29 per cent of the total assessment of the city. The board of assessors has placed the 1913 assessment of the company at \$23,576,944. If this is 7.29 of the total city assessment, as was the case in 1912, it indicates that the total assessment amounts to \$323,409,382 (nearly equal to the wealth of the city), as compared with \$235,482,566 for 1912. It is not conceivable that the total city assessment for 1913 would be increased by \$87,926,816, or 37.3 per cent over that of 1912, consequently the New Orleans Railway & Light Company has been discriminated against. The total assessments of the city of New Orleans and the assessments of the New Orleans Railway & Light Company from 1902 to 1912 were as follows:

	City Assessment	Railway Assessment
1902	\$147,852,113	\$9,216,934
1903	155,149,019	11,511,118
1904	158,584,194	12,073,742
1905	170,583,374	13,166,590
1906	204,585,967	14,448,557
1907	217,366,255	15,922,700
1908	223,549,246	15,091,197
1909	221,373,512	15,332,154
1910	230,846,187	15,510,902
1911	233,377,637	16,452,409
1912	235,564,586	17,170,261
1913 .....	.....	23,576,944
Per cent increase for period 1902 to 1912.....	59.5	86.0

"Based upon the increases above indicated, the assessment of the New Orleans Railway & Light Company for 1913 should not exceed \$17,842,000. In addition to this, the company spent \$552,000 in extensions of its property in 1912, 60 per cent of which would add only \$319,200 to the assessment for 1912, if based upon property increase only.

"The citizens of New Orleans own approximately 52.89 per cent, par value, of the total securities of the American Cities Company and its subsidiary companies which are outstanding. The remaining 47.11 per cent, however, is not owned by people foreign to the interests of New Orleans, but is largely held in Louisiana and in the South. Regarding such stockholders as may be considered foreign, they are among the best friends the city of New Orleans has and have invested large amounts in industries other than public utilities here and in the South. This city and this section need foreign capital and cannot expect to compete with progressive communities if policies of this kind prevail. In fact, the wealth per capita of New Orleans is only about \$1,000, as compared with approximately \$1,500 for the remainder of the country. New Orleans has been at a disadvantage in comparison with other cities in rate of growth, but has had in offset a reputation for conservatism. We submit, that establishing this increase in assessment of \$6,406,683, or 37.31 per cent, initiates a policy that will deter the investment of foreign capital which the city desperately needs."

Decision Affecting Creditors Not Parties to Reorganization

In a decision which it rendered on April 28, 1913, the United States Supreme Court laid down the general principle that a creditor of a corporation not a party to its reorganization may hold its successor for his debt. The court held the Northern Pacific Railway responsible for a judgment for \$125,000 against the Northern Pacific Railroad, which it succeeded, despite the fact that the court expressly stated that no moral wrongdoing was to be found in the reorganization. The principle as laid down by Justice Lamar was stated as follows:

"Corporations insolvent or financially embarrassed often find it necessary to scale their debts and readjust their stock issues with an agreement to conduct the same business with the same property under a reorganization. This may be done in pursuance of a private contract between bondholders and stockholders, and though the corporation property is thereby transferred to a new company having the same shareholders, the transaction would be binding between the parties.

"But, of course, such a transfer by stockholders from themselves to themselves cannot defeat the claims of a non-assenting creditor. As against him, the sale is void in equity, regardless of the motive with which it was made. For if such contract reorganization was consummated in good faith and ignorance of the existence of the creditor, yet, when he appeared and established his debt, the subordinate interest of the old stockholders would still be subject to his claim in the hands of the reorganized company. There is no difference in principle if the reorganization, instead of being effectuated by private sale, is consummated by a master's deed under a consent decree."

Electrification of Canadian Northern Railway in Vancouver.—The Canadian Northern Railway proposes to build a tunnel $4\frac{1}{2}$ miles long between Lytton Square and Main Street, Vancouver. The line will be electrified. It is expected that work will commence as soon as the False Creek operations are well under way and that it will be completed in two years.

More Storage Battery Cars in New York.—The New York (N. Y.) Railway has applied to the Public Service Commission for the First District of New York for permission to substitute storage battery cars for horse cars on the Metropolitan crosstown line running from Delancey Street and the Bowery through Spring Street, West Broadway and other streets to the Desbrosses Street ferry on the Hudson River.

Conference in Buffalo in Regard to Employees' Demands.—The committee representing the employees of the International Railway, Buffalo, N. Y., and the officers of the company met on April 28, 1913, to consider the demands of the men in accordance with the provisions of the agreement under which the men returned to work following the recent strike. After a brief session the meeting was adjourned until April 29. It was agreed at the meeting on April 28 that no statement would be given out in regard to the progress of the arbitration negotiations until after the meeting on April 29.

Franchise Negotiations in Saginaw.—A committee has been named by the Board of Trade of Saginaw, Mich., to frame a new ordinance in favor of the Saginaw-Bay City Railway which will be submitted to the directors of the board of trade, after which it will be recommended to the Common Council for adoption and submission to a vote of the people. Some 12 miles of new line are desired in the city, and the company in consideration of the construction of the extensions is said to desire a blanket franchise for thirty years. The franchises under which it now operates were granted for from sixteen to thirty years.

Plans of the Pittsburgh, Steubenville & Wheeling Railway.—W. E. Hildebrand, president of the Pittsburgh, Steubenville & Wheeling Railway, 1510 Arrott Building, Pittsburgh, Pa., has arranged for the construction of the proposed line between Pittsburgh and Wheeling. The line will be 52 miles long. It is proposed to charge a fare of 95 cents from Wheeling to the connection which the line will make with the Pittsburgh Railway, and it is hoped to make the run between the cities in two hours and twenty

minutes. The survey for the line has been completed between Pittsburgh and Patterson Mills, which is 22 miles from Wheeling. The estimated cost of the road is \$3,000,000.

Strike in Jamestown.—The employees of the Jamestown Street Railway and the Chautauqua Traction Company, Jamestown, N. Y., went on strike on May 1, 1913, following the refusal of the officers of the companies to reinstate two trainmen who were discharged recently for infractions of the rules, to grant an increase in wages and to recognize the union which has recently been organized among the men. A. N. Broadhead, president of the companies, is reported to have said that the increase in wages which has been demanded would amount to more than twice the present net earnings of the companies.

Progress on Providence Tunnel.—It is expected that the north arch of the East Side Tunnel through the hill from North Main Street to Thayer Street, Providence, R. I., for cars of the Rhode Island Company, will be completed by Aug. 15, 1913. This means that about 60 per cent of the work will have been done by that time. Heaton R. Robertson, who is in charge of the work for the Rhode Island Company, is reported to have expressed the opinion that the tunnel will be ready to be put in operation as a part of the street railway system by July, 1914. The work was begun on the tunnel on Nov. 13, 1912. Under the provision of the contract between the city and the Rhode Island Company all single-truck cars will be retired when the tunnel is finished.

New Franchise in Springfield, Ohio.—The American Railways, Philadelphia, Pa., which own the Springfield (Ohio) Railway, has accepted a franchise from the City Council of Springfield, to run for twenty-five years. By the terms of the grant the road is to be operated under the supervision of the city, which is to have the right to purchase the property any time after five years. Ten miles of extensions and the expenditure of \$500,000 on improvements within three years are required. The fare is to remain at six tickets for 25 cents until the gross earnings reach \$800,000 a year, when the fare is to be reduced to seven tickets for 25 cents. Differences respecting service, double-tracking and other matters are to be submitted to a board of arbitration of local men, whose decision is to be final.

Suburban Line at Seattle Offered to City.—A. K. Wyld, E. J. Sherman, George Gunther and H. C. Glenn, present owners of the Highland Park & Lake Burien Railway, in a communication to the Council of Seattle, Wash., have offered to transfer that portion of the railway within the city limits to the city free of all encumbrances on condition that the city maintain service so that property owners along the road who subscribed to the fund for the road's construction may have access to Seattle. The stipulation is that in case service is not maintained the line will revert to the original owners. They point out that approximately half the line, which originally cost \$112,000, lies within the corporate limits. The offer has been referred to the city utilities committee, of which Councilman Oliver T. Erickson is chairman.

New Municipal Ownership Bill in Toronto.—Practically a new bill has been drafted to enable the city of Toronto to purchase the property of the Toronto Railway and Toronto Electric Light Company. Among the amendments proposed to the bill, it is provided that voting on the question of purchase shall only be by the electors entitled to vote on money by-laws under the municipal act. An important sub-section has been introduced to meet the objections of the Hydro-Electric Power Commission. It provides that any proposition submitted to the people must first be approved by the Lieutenant-Governor-in-Council and the Hydro-Electric Commission. The by-law to be submitted shall contain a synopsis of the proposal with the price to be paid to the company and the terms of payment. In case the property of the Toronto Electric Light Company is purchased by the city the control and management of the enterprise shall be intrusted to the Toronto electric commissioners having the control of the municipal electric light, heat and power works. Another clause prohibits the merger of the Toronto Electric Light finances and those of the civic hydroelectric system. Any debenture debt acquired under the act shall not be considered part of the general debenture debt of the city.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

CONNECTICUT

The judiciary committee of the Legislature met recently to consider several bills relating to the Public Utilities Commission. The bill providing for the approval of the Public Utilities Commission of the securities of public service corporations was referred to the committee on incorporations. No action was taken on the bill giving the Public Utilities Commission power to fix rates.

IDAHO

Governor Haines has signed the bill creating a public utility and tax commission in Idaho. A measure modeled after the Kansas "blue sky" law has been passed and signed. The most important measure which failed of enactment was a workmen's compensation act. The two houses of the Legislature were unable to agree upon the form of law which should be passed. As a temporary solution of the question and by way of providing a permanent solution, the Governor was authorized to appoint a commission for the purpose of studying this question and of reporting a suitable bill to the next Legislature. It was provided that the commission be composed of one member of each house of the present Legislature, two representatives of labor and two of capital.

ILLINOIS

The Denver bill, providing that street railway employees can be employed only ten hours a day and that in twelve consecutive hours, has been passed by the Senate. The Beall bill, stipulating that seats shall be provided for all passengers on common carriers except street surface cars, has been advanced to third reading in the Senate. Free individual drinking cups in sufficient numbers to supply all railroad passengers will be required if the Burns bill introduced in the House passes. Representative Frank Gillespie, Bloomington, has introduced a new corporation bill which provides for the organization of corporations with shares without par value and permits the ownership by Illinois corporations of shares of stock in other corporations with restrictions similar to those recommended by President Wilson for the bills recently enacted in New Jersey.

MINNESOTA.

The opinion prevails among the leaders in the House and Senate that there will be an extra session of the Legislature for the purpose of passing a public utilities bill. This session, however, may not be held until September or early in October. The trend of affairs since the Governor vetoed the Nolan bill and threatened an extra session indicates that no public utilities bill will be passed at the present session.

A resolution was offered in the House on April 23 for a committee of seven members independent of the Senate special committee to draft a public utilities bill and report to the next session.

NEW YORK

The Senate on April 30, 1913, passed the workmen's compensation bill which was favored by the State insurance department. Two bills were pending. One was introduced by Senator Foley and the other by Senator Murtaugh. The Foley bill was indorsed by the State insurance department. The Murtaugh bill had the support of the State Federation of Labor. The Foley bill allows employers to insure with casualty companies. The rates of compensation are a little higher in the Murtaugh bill than in the Foley measure. The Blauvelt bill, a companion to the Foley measure, providing for the formation of mutual insurance companies to provide security for the payment of compensation awards, has been passed by the Senate.

A bill has been passed by the Assembly which would compel the railways in New York City which operate horse cars to discontinue the operation of their lines with horses after Jan. 1, 1914. The bill contains the following provision to permit the companies to capitalize the expenditure involved in the change of power: "Any such corporation is hereby authorized to issue stock, bonds, notes or other evidence of indebtedness sufficient to cover the complete cost of the new cars and other changes in plant and equipment made necessary by the provisions of this act."

The Yard bill permitting the construction of an electric

railway on the Albany Post Road from Hastings to Ossining has been passed by the Senate.

It is said that Governor Sulzer will veto the "blue sky" bill introduced by Assemblyman Goldberg, which creates a commission composed of the Governor, the Lieutenant-Governor and the Comptroller to pass on securities before they are placed on the market.

Governor Sulzer is said to have emergency messages ready urging the passage of the bill for the repeal of the Long Sault charter, under which a syndicate holds water concessions on the St. Lawrence River.

The Senate finance committee on April 30, 1913, reported favorably a resolution providing for the final adjournment of the Legislature on May 3. It was expected that the adjournment resolution would be sent to the Assembly on May 1, 1913, for concurrence.

OHIO

At a meeting of the conference committee of the Ohio Legislature on April 25 the Snyder bill, authorizing the creation of indeterminate permits for public utility corporations and their exchange for term franchises, was modified and will be reported to both houses for action at the final session. The measure was opposed by J. C. Martin and D. L. Gaskill, representing the Ohio Electric Light Association, and Joseph G. Heintzman, representing the Union Gas & Electric Company, Cincinnati. They asked that it be made to apply only to street railways, union terminal companies and interurban railways, on the ground that other forms of utility companies are not ready to accept the conditions. Those who favor the measure declared that the bill was permissive and that no company need subject itself to the requirements unless it so desired. The present law, it was asserted, had not been disturbed in any way. Opponents insisted, however, that the bill is so arranged that it will really compel the acceptance of indeterminate permits, and it was requested that it be made to apply only to Cincinnati and Cleveland. This is the last measure necessary to enable Mayor Hunt of Cincinnati to carry out his plan of settlement with the Cincinnati Traction Company.

The redrafted Snyder bill, providing for the exchange of franchises for a fixed term for indeterminate grants, did not meet the approval of the House. A new conference committee was named and instructed to make the bill apply only to those utility companies which took advantage of the Rogers law, allowing the granting of fifty-year franchises. The committee reported a bill that applies only to conditions in Cincinnati and this was adopted by both House and Senate just before final adjournment. The measure is before Governor Cox.

RHODE ISLAND

The failure of the Legislature to act upon the request of the Boston & Providence Interurban Electric Railroad for a charter to do business in Rhode Island has raised the question of the future of the proposed road. The promoters had received an extension of time until Dec. 31, 1913, by the State of Massachusetts in which to file their certificate of incorporation, but when this grant was made it was generally believed that little difficulty would be encountered in obtaining the charter on the Rhode Island end of the line. Several hearings were held by the corporation committee of the Rhode Island House, but the bill was allowed to die in committee. As the Rhode Island Legislature has adjourned sine die the company cannot obtain a charter in Rhode Island this year. The Massachusetts Legislature is still in session and counsel for the road are considering another appeal to that body for a further extension of time so as to make it possible to take up the matter with the Rhode Island Assembly of 1914. Many of the privileges which were at first asked by the company in its application in Rhode Island were waived in the final hearings on the bill. In its final form the charter authorized the company to do little more than construct and operate an electric railway between Boston and Providence.

WISCONSIN

The Jennings bill to prevent the overcrowding of street cars has been killed by the refusal of the Senate committee on corporations to concur in the measure after it had

passed the House. The measure would have authorized the Railroad Commission to order companies to put on extra cars and would have allowed unseated passengers to ride free of charge.

PROGRAMS OF ASSOCIATION MEETINGS

New York Electric Railway Association

At a meeting of the executive committee of the New York Electric Railway Association held at the office of the American Electric Railway Association, New York, on May 2 it was decided to hold the annual meeting of the New York association at Brighton Beach, Brooklyn, on June 24 and 25. The members of the executive committee who were present at the meeting in New York were: President, W. H. Collins; vice-presidents, Frank Hedley and Stuart Wilder; also Charles H. Smith, Albany; James F. Hamilton, Schenectady, and J. P. Barnes, Syracuse. Others present at the meeting were Charles C. Dietz, secretary New York Electric Railway Association; H. C. Donecker, secretary American Electric Railway Association, and W. O. Wood, president New York & Queens County Traction Company.

President Collins appointed two committees as follows: Committee on arrangements for the annual outing: J. H. Pardee, (chairman), Frank Hedley, J. K. Choate, C. C. Castle, Stuart Wilder, Samuel Trawick and Charles R. Ellicott; entertainment committee: J. P. Barnes (chairman), C. R. Ellicott, R. M. Colt, H. N. Ransom and C. E. Barry. The program for the annual meeting will be announced later.

Southwestern Electrical & Gas Association

The following tentative program has been announced for the meeting of the Southwestern Electrical & Gas Association which is to be held at Galveston, Tex., on May 21, 22, 23 and 24, 1913:

MAY 21

10 a. m.—Meeting of the executive committee.
11 a. m.—Street railway session. Papers: "Concrete Track Construction" and "The Use of Traffic Charts for Rush Service."

2 p. m.—Street railway session. Papers: "Old and New Ideas in Car Design" and "Street Railway Planning in Growing Cities."

11 a. m.—Parallel sessions for gas members. Papers: "The Use of the Electric Pyrometer in Gas Making" and "The Trimming of Gas Appliance Show Windows." The gas question box.

2 p. m.—Parallel sessions for gas members. Papers: "The Commercial Department in the Gas Business" and "High-Pressure Gas Distributors." The gas question box.

MAY 22

9.30 a. m.—Light and power session. Papers: "Erection and Protection of High-Tension Lines and Apparatus" and "Oil Engines for Light and Power Plants in Small Towns and Cities."

2 p. m.—Light and power and gas and water sessions. Papers: "Economical Operating of Light and Power Plants in the Small Town" and "The Proper Basing of Rates by Light, Power, Gas and Water Public Utilities in Texas."

MAY 23

9.30 a. m.—General session. Papers: "Fire Prevention" as Fire Protection" and "The Purification of Feed Water for Steam Boilers." Report of secretary on the work accomplished and the future value of the secretary's office.

2.30 p. m.—Supply men's session and entertainment.

9.30 a. m.—Parallel session for accountants. Paper: "The Necessity of a Standard System of Accounting for the Small and Medium-Sized Public Utilities of Texas." This subject will be discussed by speakers to be announced later. Exhibition, comparison and discussion of forms brought by members.

MAY 24

9.30 a. m.—Association session, unfinished business, reports of standing committees, reports of temporary committees, nomination and election of officers and standing committees for 1913-14. Meeting of new officers and new executive committees.

Financial and Corporate

Stock and Money Markets

April 30, 1913.

There was little in the way of advance as the result of to-day's trading on the New York Stock Exchange. Many of the issues which were without international support showed weakness. New York, New Haven & Hartford Railroad declined four points. The other railroad issues, except Canadian Pacific, were also weak. Interborough-Metropolitan preferred opened at 51, but sold off despite the dividend announcement. Rates in the money market to-day were: Call, 2½@3 per cent; sixty days, 3@3½ per cent; ninety days, 3¾@4 per cent; four months, 4@4½ per cent; five months, 4¼@4¾ per cent.

Trading in the Philadelphia market to-day was dull. Philadelphia Rapid Transit trust certificates and Tonopah Belmont were the weakest features.

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

The feature of the Boston market to-day was Boston Elevated Railway. This issue sold off 3¾ points. The sales in Boston Elevated Railway totaled 396 shares.

The Baltimore market to-day was narrow and dull.

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

	April 23	April 30
American Brake Shoe & Foundry (common).....	92	95
American Brake Shoe & Foundry (preferred).....	130½	132
American Cities Company (common).....	37¾	37¾
American Cities Company (preferred).....	70½	70½
American Light & Traction Company (common).....	365	355
American Light & Traction Company (preferred).....	105	105
American Railways Company.....	38	38
Aurora, Elgin & Chicago Railroad (common).....	42	42
Aurora, Elgin & Chicago Railroad (preferred).....	85	84½
Boston Elevated Railway.....	96¾	93
Boston Suburban Electric Companies (common).....	7½	7½
Boston Suburban Electric Companies (preferred).....	a66	a66
Boston & Worcester Electric Companies (common)....	8	a8
Boston & Worcester Electric Companies (preferred)....	a43	43
Brooklyn Rapid Transit Company.....	90¾	87¾
Capital Traction Company, Washington.....	122¾	122¾
Chicago City Railways.....	150	*150
Chicago Elevated Railways (common).....	25	*25
Chicago Elevated Railways (preferred).....	85	*85
Chicago Railways, pteptg., ctf. 1.....	91	*91
Chicago Railways, pteptg., ctf. 2.....	21¾	*21¾
Chicago Railways, pteptg., ctf. 3.....	7½	*7½
Chicago Railways, pteptg., ctf. 4.....	3½	*3½
Cincinnati Street Railway.....	112	112½
Cleveland Railway.....	103	103
Cleveland, Southwestern & Columbus Ry. (common)....	*5½	*5½
Cleveland, Southwestern & Columbus Ry. (preferred)....	*30	*30
Columbus Railway & Light Company.....	18	18
Columbus Railway (common).....	69½	69½
Columbus Railway (preferred).....	82½	82½
Denver & Northwestern Railway.....	*108	*108
Detroit United Railway.....	72½	a76
General Electric Company.....	140¾	137½
Georgia Railway & Electric Company (common).....	*120	119½
Georgia Railway & Electric Company (preferred).....	83¾	83
Interborough Metropolitan Company (common).....	16¾	14½
Interborough Metropolitan Company (preferred).....	57¾	48¾
International Traction Company (common).....	*35	*35
International Traction Company (preferred).....	*95	*95
Kansas City Railway & Light Company (common).....	15	*15
Kansas City Railway & Light Company (preferred)....	*30	*30
Lake Shore Electric Railway (common).....	*6½	*6½
Lake Shore Electric Railway (1st preferred).....	*91	*91
Lake Shore Electric Railway (2d preferred).....	*25½	*25½
Manhattan Railway.....	128¾	127
Massachusetts Electric Companies (common).....	a17¾	16½
Massachusetts Electric Companies (preferred).....	75½	74½
Milwaukee Electric Railway & Light Co. (preferred)....	*100	*100
Norfolk Railway & Light Company.....	*25¾	*25¾
North American Company.....	76	75
Northern Ohio Light & Traction Company (common)....	80	80
Northern Ohio Light & Traction Company (preferred)....	105	105
Philadelphia Company, Pittsburgh (common).....	44	43½
Philadelphia Company, Pittsburgh (preferred).....	39¾	39
Philadelphia Rapid Transit Company.....	25¼	24
Portland Railway, Light & Power Company.....	*67	*67
Public Service Corporation.....	113	114
Third Avenue Railway, New York.....	35	33½
Toledo Railways & Light Company.....	a12	a12
Twin City Rapid Transit Co., Minneapolis (common)....	105	103
Union Traction Company of Indiana (common).....	*4½	*4½
Union Traction Company of Indiana (1st preferred)....	*81	*81
Union Traction Company of Indiana (2d preferred)....	*34	*34
United Rys. & Electric Company (Baltimore).....	26½	26¼
United Rys. Inv. Company (common).....	26½	24
United Rys. Inv. Company (preferred).....	48	44
Virginia Railway & Power Company (common).....	51¾	50
Virginia Railway & Power Company (preferred).....	93	90
Washington Ry. & Electric Company (common).....	93	91
Washington Ry. & Electric Company (preferred).....	92½	91
West End Street Railway, Boston (common).....	75½	75
West End Street Railway, Boston (preferred).....	a95	95
Westinghouse Elec. & Mfg. Company.....	64½	61
Westinghouse Elec. & Mfg. Company (1st preferred)....	117½	117½

*Last sale. aAsked.

ANNUAL REPORTS

Washington, Baltimore & Annapolis Electric Railroad

The report of the operations of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., for the year ended Dec. 31, 1912, follows:

SUMMARY OF OPERATIONS

Gross operating revenue	\$778,287
Operating expenses.....	388,956
Net operating revenue	\$389,331
Miscellaneous income	6,306
Gross income.....	\$395,637
Deductions from income (taxes and interest).....	271,536
Net income	\$124,101

George T. Bishop, the president, says in part:

"The net total expenditure for additions and betterments for the year was \$73,030. The track, roadway, ditches, culverts and bridges are in first-class condition and during the year there was a total of 9700 tie renewals made. The overhead system, including the transmission line and the trolley, which is of the catenary type, has been well maintained and is in good condition.

"During the year an automatic block signal system of the track-circuit type was installed on the Eastern division between Naval Academy Junction and Annapolis, a distance of 13.8 miles. This signal system was installed by the Union Switch & Signal Company, New York. All of the switches are connected in with the signal system and are equipped with circuit controllers so arranged as to hold to 'stop' all signals governing the block in which the switch is located when the points are not correctly set for the main line. These signals govern all trains operated in either direction over this division.

"Substations have been well maintained; the equipment generally has received careful attention and is in excellent condition. There are substations at Baltimore, Naval Academy Junction, Annapolis, Ardmore and Benning. Power is purchased from the Potomac Electric Power Company, Washington, D. C., and the Benning substation, which is a transformer station, is located alongside the Potomac power station. The equipment consists of two banks of transformers—each bank containing three 800-kw transformers. There is also one spare 800-kw transformer. Your directors have recently authorized an expenditure of \$6,000 for two additional transformers to insure against possible interruption in service due to breakdown or other causes. Arrangements were made to have this additional equipment installed prior to inauguration day, March 4, 1913.

"The Naval Academy Junction substation has a battery of two boilers which are used to heat the substation and carhouse, also to operate a 1500-gal.-per-minute fire pump. Your board recently authorized an expenditure of \$3,893 for the installation of an electrically driven fire pump, which has been installed and is now in operation. This installation will permit of the boilers being shut down for about seven months during the summer season, thereby economizing in the consumption of fuel during that period.

"On account of the growth in the freight and express business four new express cars were purchased. Three of these have been equipped with control without motors, for trailer service, and the fourth is being equipped with GE-205 75-hp motors. This car will be used by the American Express Company for handling express matter over your line. All cars and equipment have been well maintained and are in good condition.

"The total miles operated on power purchased from the Potomac Electric Power Company was 1,861,348, not including operation on the tracks of the Washington Railway & Electric Company or the joint tracks of the United Railway & Electric Company, Baltimore. The total consumption from this source was 6,896,950 kw-hr. Power consumed per car mile was 3.70 kw-hr.

"In June, 1912, a contract was entered into with the American Express Company for a period of ten years giving that company the right to operate an express service between Washington, Baltimore, Annapolis and all points on our line. The company now reaches Baltimore over the New York Central lines and the Western Maryland Railroad. The new arrangement enables the company to reach

the capital of the United States and the capital of Maryland, also to make Southern connections. The American Express Company operates in all upon 58,000 miles of lines in the United States and Canada with offices and agents in all principal cities.

"The company's property is well insured under a liberal policy at the rate of 40 cents for three years per \$100, being the equivalent of 13½ cents per year.

"Three per cent of the gross operating revenue has been credited to 'reserve for injuries and damages.' The balance in the reserve account as of Dec. 31, 1912, namely, \$36,242, is invested in your company's bonds to the extent of \$35,711, the balance, \$530, being covered by cash in the treasury. The disbursements in payment of accident claims, suits and judgments amounted to 0.28 per cent of the gross operating revenue.

"On account of the increasing growth of the package freight business and the business handled in connection with the American Express Company, the terminal facilities at Lombard Street freight station, Baltimore, were inadequate, and the directors authorized the expenditure of \$38,030 for the purchase of property immediately in the rear of the present Lombard Street terminal, fronting on West Pratt Street. This property was recently acquired and may well be considered the best freight terminal location in Baltimore, as it is right in the heart of the wholesale district with entrances from two of the most prominent streets. Plans are now under way for the construction of a freight house and this work will be completed the coming summer.

"Since the company started to operate direct to the Treasury building, Washington, it has had a waiting room and ticket office at 1424 New York Avenue. This is a small narrow room in the Evans Building, midway in the block between Fourteenth and Fifteenth Streets, Northwest. It could not be considered a desirable location, but was the only vacant space then available. The directors recently authorized the lease of three storerooms in the Bond Building, located at the corner of Fourteenth Street, Northwest, and New York Avenue, one of the most prominent corners in Washington. These rooms have been remodeled and made into one large waiting room, with an entrance into the basement where toilet and package rooms are located. The advantage of this new terminal from an advertising standpoint is very important.

"In May of this year a new steamboat line known as the Eastern Shore Development Steamship Company inaugurated a service between Annapolis and points on the eastern shore of Maryland. This service now enables Washingtonians to reach the eastern shore by the most direct route via 'the Electric Line' to Annapolis and thence across Chesapeake Bay, thereby saving five hours, as it was formerly necessary to come to Baltimore and there take a steamer for the eastern shore." It also enables residents of Baltimore to take an electric train in the heart of the business and shopping district of Baltimore and make direct connection with the steamer. We are now operating under a traffic arrangement and sell through tickets from Washington and Baltimore in connection with this new line. At Claiborne boats connect with the Baltimore, Chesapeake & Atlantic Railway, which operates to Ocean City, Md., on the Atlantic coast."

General Electric Company

The report of the General Electric Company for the year ended Dec. 31, 1912, has just been made public. The profit and loss statement and balance sheet are presented herewith.

The report says that the competition referred to in last year's report has continued to increase in severity, with the result that the percentage of profit realized from the sales of apparatus has diminished materially. The total number of employees is more than 60,000. The orders received during the year are in excess of those of last year. There has been an expenditure of \$539,956 for patents and patent expenses, but, as has been the custom in previous years, this expense has been charged to profit and loss. The additions to real estate, buildings and patterns, furnishings and fixtures during the year amounted to \$6,968,975, of which two-thirds was written off. The report does not contain any statement of technical improvements made during the

year as has been customary in the past. The condensed profit and loss statement follows:

Sales billed	\$89,182,185	
Less cost of sales.....	81,074,192	
		\$8,107,993
Interest and discount, royalties and sundry profits	\$1,292,224	
Income from securities owned.....	1,241,256	
From increase in value of securities of companies owned, due to the increase in the surplus of those companies for the year; and profit on securities sold	2,469,348	
	\$5,002,829	
Interest and discount on debenture bonds.....	532,087	4,470,742
		\$12,578,736
Dividends paid		6,213,173
Net surplus for the year	\$6,365,562	
Surplus at Jan. 1, 1912.....	29,019,892	
	\$35,385,454	
Less stock dividend	23,354,310	
Surplus at Dec. 31, 1912.....		\$12,031,144

The condensed balance sheet as of Dec. 31, 1912, follows:

ASSETS		
Patents, franchises and good-will.....		\$1
Cash		13,507,225
Stocks and bonds	\$23,325,070	
Notes and accounts receivable.....	26,950,244	
Due from affiliated companies.....	4,099,062	
Installation work in progress.....	686,480	
	\$55,060,858	
Merchandise inventories:		
At factories	\$31,851,689	
At district offices, in transit, etc....	4,090,622	
Consignments	1,300,506	
	37,242,818	92,303,677
Factory plants (including all lands, buildings and machinery)	\$24,556,110	
Real estate, buildings, warehouses, etc. (other than factory plants).....	1,575,447	
Furniture and fixtures (other than in factories)	3	
	26,131,560	
	\$131,942,464	
LIABILITIES		
Debenture bonds:		
5 per cent series of 1892.....	\$35,000	
3½ per cent series of 1902.....	2,047,000	
5 per cent series of 1907.....	211,000	
5 per cent series of 1912.....	10,000,000	
	\$12,293,000	
Accounts payable	\$4,140,699	
Accrued taxes	265,444	
Advance payments on contracts.....	257,336	
Accrued interest on debentures.....	197,543	
Dividend payable Jan. 15, 1913.....	1,555,294	
	6,416,319	
Capital stock issued	101,202,000	
Surplus:		
At Jan. 1, 1912.....	\$29,019,892	
Added during year.....	6,365,562	
	\$35,385,454	
Less stock dividend	23,354,310	
	12,031,144	
	\$131,942,464	

Statement on Accounts of Chicago Railways

A report made to the board of directors of the Chicago Railways Company by Henry A. Blair, chairman of the board, on April 23 has been sent by direction of the board to each holder of participation certificates. The report was sent together with the financial statement showing the results of operation for the fiscal year ended Jan. 31, 1913. Mr. Blair's letter enters into various questions affecting the company which are now matters of controversy in Chicago and says in part:

"The company's profit on the sale of first mortgage bonds in the amount of \$41,550,000 and the 15 per cent allowed on construction expenditures was \$5,496,734. In marketing the bonds it had to allow a discount of \$3,486,850. Therefore the profit of the company to date has been \$5,496,734 less \$3,486,850, or \$2,009,884. As relating to the profits of the company, the 15 per cent allowed, \$5,496,734, has been disposed of as follows: credited to interest and discount, \$3,676,781. The balance has been used to write down the excess value of the property carried on the books over the city valuation.

"While the funded debt of the company on Feb. 1, 1908, was \$38,199,347, the price at which the city under the ordinance was entitled to purchase the property as of the same date was only \$32,589,047. In other words, the excess of the net funded debt over the amount at which the city was

then entitled to purchase was \$5,610,300. In acquiring the property of the Chicago Consolidated Traction Company, it was necessary, in order to obtain complete title, to issue and deliver mortgage bonds in the amount of \$6,843,000, which was an addition to the original excess of \$5,610,300. These two sums, together with other items, have been reduced by payments and by application of the sinking fund provision, so that the total excess of funded debt over the amount at which the city could have purchased on Feb. 1, 1913, is \$9,955,003.

"As shown by the report, the total net income of the company for the last fiscal year, after deducting operating expenses and taxes, funds contributed to renewals and 5 per cent upon the valuation at which the city is entitled to purchase the property, was \$2,569,825, but under the terms of the ordinance the city was entitled to receive 55 per cent of this net income, or \$1,413,404, while the company had to be content with 45 per cent thereof, or \$1,156,421.

"It will be readily perceived that the 5 per cent on the valuation retained by the company is insufficient to pay all the interest on its funded debt by the interest upon the above-mentioned excess of \$9,955,003, to say nothing of (1) \$250,000 necessary every year to be applied to the sinking fund in redemption of consolidated mortgage bonds, or (2) various non-partnership expenses—that is to say, expenses not recognized by the city in the settlement of accounts with it. All of these expenses are necessarily paid out of the company's 45 per cent of the divisible net receipts.

"In this connection some criticism has been made upon the item in the non-partnership account of \$126,573, corporate expenses and adjustments. This item embraces in substance \$33,639, representing the expenditures to trust companies for commissions, paying interest on bonds, trustee's fees, certifying bonds, expenses for engraving bonds, traveling expenses and similar corporate expenses; the remainder, viz., \$86,934, is the interest accruing to the joint account with the city on daily cash balances as prescribed by the ordinance.

"The inference has been made that cash items in the balance sheet indicated possession by the company of large amounts of funds which might be devoted to dividends. These critics forget that these cash items include the city's share of undivided net receipts, amounts attributable to reserve funds, accrued sinking fund, accrued interest and accrued taxes.

"Some criticism has been made upon the fact that the amount declared as dividends by the company has not been received in full by the certificate holders entitled to dividends.

"In accordance with the agreement entered into as of August, 1907, however, the depositaries, upon the receipt of the dividends from the company, deducted (1) their own compensation, (2) the fees of the registrars and transfer agents and (3) the fee of the Chicago Title & Trust Company as trustee of the stock, and the remainder was made the subject of distribution to the participation certificate holders according to the terms of the agreement."

A committee of holders of certificates has been formed as a protective committee and has propounded a series of questions to Mr. Blair, and the foregoing statement is intended as an answer to some of the queries of this committee.

The movement of the committee representing the holders of participating certificates has led to a similar attack in the City Council. That body passed resolutions on April 28, by a vote of forty-two to fifteen, ordering the suspension of negotiations for a merger of the elevated and surface lines until an investigation shall have been made of the relations between the surface companies and the city.

The action of the City Council was based in part on charges made in a suit filed in the Circuit Court on April 28 by James B. Hogarth, who was formerly superintendent of the Chicago Railways Company. The bill filed by Mr. Hogarth asks for an accounting from various interests which are concerned in the negotiations now under way for a merger of the properties.

At the same session of the Council at which it was decided to discontinue negotiations for a merger until an investigation of the charges presented could be made a message was read from Mayor Harrison urging a settlement of the traction situation.

Merger of Michigan and Ohio Properties Proposed

Plans have been formulated for the acquisition of the property of the Union Railway, Gas & Electric Company, Rockford, Ill., the Michigan Railways Company and the Springfield (Ohio) Light Company by the Commonwealth Power, Railway & Light Company, Saginaw, Mich. It is proposed to increase the capital stock of the Commonwealth Power, Railway & Light Company to \$31,500,000, of which \$16,000,000 is to be preferred stock, and to issue \$7,500,000 of additional bonds to provide the funds for extensions and improvements. A special meeting of the stockholders of the Commonwealth Power, Railway & Light Company will be held in Portland, Maine, on May 15, to authorize the increase in the capital stock of the company and to ratify the proposed exchange of securities.

W. A. Foote, Jackson, Mich., who, with representatives of E. W. Clark & Company, Philadelphia, and Hodenpyl, Hardy & Company, New York, arranged the details of the plan, says that a majority of the stockholders of the Commonwealth Power, Railway & Light Company also had large holdings in the three other companies, and that the merger of interests was planned to centralize control, reduce expenditures and provide funds for the extension of interurban electric railways owned by the companies.

The Union Railway, Gas & Electric Company controls and operates various gas, electric and railway companies in Indiana, Illinois and Wisconsin. The Michigan Railways Company controls water power privileges in Michigan on the Manistee River and is constructing interurban railways between Grand Rapids and Kalamazoo, Battle Creek and Allegan, and Kalamazoo and South Haven. The Springfield Light Company controls the electric light, power and heating business in Springfield, Ohio.

Consolidation of Columbus Subsidiaries Approved

The Ohio Public Service Commission on April 22 approved the plan to consolidate all the companies operated under lease by the Columbus Railway & Light Company, Columbus, Ohio, into one corporation. The matter will now be submitted to the stockholders for their approval. The Columbus Railway, Light & Power Company, hereafter to be the owning company, is to issue \$9,226,000 of stock in addition to its present outstanding capital of \$957,400, which it issued as the Columbus Traction Company, for the purpose of buying the stocks of the Columbus Edison Company, the Columbus Railway and the Columbus Light, Heat & Power Company. There will be preferred stock series A, paying 6 per cent; series B, paying 5 per cent, and common. The Columbus Railway will receive \$3,500,000 of the new 5 per cent preferred stock for its outstanding \$3,500,000 of 5 per cent preferred and \$3,500,000 common for its outstanding junior stock in a like sum. The Columbus Edison Company will receive \$750,000 of 6 per cent preferred and a like amount of 5 per cent preferred for its common stock to the same amount. The Columbus Light, Heat & Power Company will receive \$413,040 of 6 per cent preferred for 80 per cent of its present outstanding preferred, \$103,250 of 5 per cent preferred for the remainder of its preferred and \$210,000 for its outstanding common stock.

It is understood that an application will be filed with the commission shortly to purchase the leases, rights and other assets of the Columbus Railway & Light Company, capitalized at \$5,000,000. A considerable part of the assets of this company consists of stock of the underlying companies which has been turned over in consideration of improvements and extensions to the properties. If the purchase of the Columbus Railway & Light Company is not approved, it is said that the company will continue to operate the properties under lease. The only difference is that there will be one underlying company instead of four, as in the past.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—Ninety per cent of the preferred stock of the Cleveland, Southwestern & Columbus Railway has assented in writing to the new financial plan, according to announcement made after the special meeting of the stockholders, which was adjourned until April 28.

Ocean Shore Railroad, San Francisco, Cal.—The Railroad Commission of California has decided to suspend for the present action on the application of the Ocean Shore Railroad to issue \$700,000 of 6 per cent bonds and pledge them as collateral to secure a loan of \$250,000 to be negotiated with the Union Trust Company, San Francisco, Cal., to provide funds for improvements. The commission will withhold action until matters now before the courts affecting the company have been decided. It is reported that an assessment of \$2.50 per share has been levied on the capital stock of the company.

Toledo Railways & Light Company, Toledo, Ohio.—On application of Barton Smith subpoenas were issued for Frank R. Coates, president of the Toledo Railways & Light Company, and the twenty-one directors recently chosen by the Doherty interests, at the hearing of the injunction case in the United States District Court at Toledo, April 22. The court instructed these men to bring with them all the correspondence relating to the company's business and their certificates of stock as evidence. Attorney Charles A. Frueauff, Frank Hafer, M. R. Bump, Mr. Coates and Barton Smith all appeared before the court. Albion E. Lang and W. E. Hutton have also been summoned as witnesses. H. L. Doherty & Company assumed control of the subsidiary companies of the Toledo Railways & Light Company on April 24. At special meetings of the stockholders officers to serve all the companies were chosen as follows: F. R. Coates, president; W. J. Marshall, vice-president; C. A. Murray, secretary and treasurer. These officers with A. Schwartz, engineer of the company, and F. J. Derge, in charge of the contract department, compose the board of directors. C. A. Murray is the new auditor of the Toledo Railways & Light Company. The companies over which these officers will preside are the Toledo & Western Railroad, Maumee Valley Railways & Light Company, Toledo, Ottawa Beach & Northern Railway, Adrian (Mich.) Street Railway, Interurban Station Company, Toledo Beach Company and Toledo Casino Company.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—The Annapolis Public Utilities Company has applied to the Public Service Commission of Maryland for permission to sell to the Washington, Baltimore & Annapolis Railroad \$85,000 of its stock, in addition to the amount to be sold to the same interests named in its original application.

ELECTRIC RAILWAY MONTHLY EARNINGS

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.							
Period			Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1 mo.	Feb.	'13	\$530,071	*\$247,357	\$282,714	\$152,509	\$130,205
1 "	"	'12	518,927	*269,039	249,888	138,787	111,101
12 "	"	'13	6,675,837	*3,304,478	3,371,359	1,791,038	1,580,321
12 "	"	'12	6,396,956	*3,099,841	3,297,115	1,537,538	1,759,577
PORTLAND (MAINE) RAILROAD							
1 mo.	Feb.	'13	\$64,487	*\$55,664	\$8,823	\$10,274	†1,451
1 "	"	'12	62,100	*56,710	5,390	10,238	†4,848
12 "	"	'13	991,339	*696,854	294,485	123,249	171,236
12 "	"	'12	961,039	*720,706	240,333	113,210	127,123
ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.							
1 mo.	Feb.	'13	\$95,736	*\$54,665	\$41,071	\$20,053	\$21,018
1 "	"	'12	91,701	*51,845	39,856	19,710	20,146
12 "	"	'13	1,188,656	*674,684	513,972	236,960	277,012
12 "	"	'12	1,119,413	*689,291	430,122	232,374	197,748
SAVANNAH (GA.) ELECTRIC COMPANY							
1 mo.	Feb.	'13	\$62,404	*\$45,006	\$17,398	\$17,392	\$6
1 "	"	'12	56,440	*40,572	15,868	15,865	3
12 "	"	'13	762,456	*563,164	199,292	198,075	1,217
12 "	"	'12	706,363	*519,758	186,605	185,457	1,148
TAMPA (FLA.) ELECTRIC COMPANY							
1 mo.	Feb.	'13	\$62,356	*\$32,855	\$29,501	\$4,759	\$24,742
1 "	"	'12	59,659	*30,703	29,057	4,675	24,382
12 "	"	'13	763,938	*399,173	364,765	54,084	310,681
12 "	"	'12	701,175	*380,811	320,365	59,102	261,263
UNION RAILWAY, GAS & ELECTRIC COMPANY, ROCKFORD, ILL.							
1 mo.	Feb.	'13	\$383,132	*\$214,835	\$168,297	\$97,081	\$71,216
1 "	"	'12	293,554	*177,554	116,000	65,564	50,436
12 "	"	'13	4,187,750	*2,417,586	1,770,164	1,023,370	746,794
12 "	"	'12	3,269,218	*1,881,043	1,388,275	756,496	611,799
VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.							
1 mo.	Feb.	'13	\$384,408	\$193,467	\$190,942	\$124,057	\$66,885
1 "	"	'12	357,350	188,346	169,003	118,558	50,446
8 "	"	'13	3,289,708	1,614,497	1,675,212	990,707	684,505
8 "	"	'12	3,100,070	1,621,094	1,478,976	945,237	533,739

*Includes taxes. †Deficit.

Traffic and Transportation

From Kalamazoo to Indianapolis and Return

Officials of the Michigan United Traction Company recently completed a trip over the principal electric railways of Michigan, Indiana and Ohio in the private car "Michigan," of the Michigan company, covering a total of 1002 miles. In addition to the trip in their own car the officials journeyed from Indianapolis by steam railway to Springfield, Ill., and thence to Keokuk, Ia., where they viewed the water-power installation across the Mississippi River at that point. They were the guests of Vice-president Executive H. E. Chubbuck and officials of the Illinois Traction System on an inspection trip over that system to St. Louis. The party included J. F. Collins, vice-president and general manager; Frank Silliman, Jr., vice-president; W. A. Foote, director, and R. C. Taylor, superintendent of equipment. The car left Kalamazoo, Mich., over its own lines on April 16 and arrived in Indianapolis on April 18. The return trip from Indianapolis consumed two days. The itinerary and mileage follow:

Going Trip:	Miles
Kalamazoo to Jackson, Michigan United Traction Company.....	68
Jackson to Detroit, Detroit, Jackson & Chicago Railway.....	76
Detroit to Toledo, Detroit, Monroe & Toledo Short Line.....	57
Toledo to Findlay, Toledo, Bowling Green & Southern.....	51
Findlay to Lima, Western Ohio Railway.....	32
Lima to Fort Wayne, Ohio Electric Railway.....	65
Fort Wayne to Bluffton, Fort Wayne & Northern Indiana Traction Company.....	25
Bluffton to Anderson, Union Traction Company.....	61
Anderson to Indianapolis, Union Traction Company.....	38
Indianapolis to Brazil, T. H., I. & E. Railway.....	57
	<hr/> 530
Return Trip:	
Indianapolis to Richmond, T. H., I. & E. Railway.....	69
Richmond to Dayton, Ohio Electric Railway.....	40
Dayton to Piqua, Dayton & Troy Electric Railway.....	31
Piqua to Findlay, Western Ohio Electric Railway.....	80
Findlay to Toledo, Toledo, Bowling Green & Southern.....	51
Toledo to Detroit, Detroit, Monroe & Toledo Short Line.....	57
Detroit to Jackson, Detroit, Jackson & Chicago Railway.....	76
Jackson to Kalamazoo, Michigan United Traction Company.....	68
	<hr/> 472
Total mileage, round trip.....	1002

New Regulations to Eliminate Trouble with Passengers

The New York, New Haven & Hartford Railroad has issued revised rules and regulations for the government, guidance and information of the employees of the electric railways owned and operated by it, in which the safety first rule is repeatedly emphasized. Several pages of the book of rules are devoted to this subject, and the various regulations are devised to prevent accidents of all kinds. The importance of exercising constant care to prevent injuries, and in all cases of doubt to take the safe course, is impressed upon the employees above all other considerations. Two other rules and regulations upon which great stress is laid are politeness and the personal habits and appearance of the employees. Conductors and motormen are ordered to treat all passengers with politeness, to avoid difficulty and to exercise patience, forbearance and self-control under all conditions. They must not make threatening gestures, or use loud, uncivil or profane language, even under the greatest provocation. Their uniforms must be kept clean and neat in appearance. They are prohibited from drinking intoxicating liquors while on duty or to excess at any time. There are several other minor rules regarding personal habits, and ignorance of these rules is not accepted as an excuse for non-compliance with them. In fact, each employee is required to sign a statement to the effect that he has read the rules and regulations and that he agrees to abide by the same and to submit to the penalties prescribed for their violation. Employees are considered for promotion according to their faithful discharge of duties and any violation of rules is deemed sufficient for suspension or dismissal.

Company Publication in San Antonio.—The San Antonio (Tex.) Traction Company has begun the publication of the *Traction Magazine* for distribution among its patrons.

Near-Side Stops in Spokane.—The City Council of Spokane, Wash., has passed an ordinance requiring the electric railways which operate in Spokane to stop their cars on the near side of the street.

No Smoking Recommendation in New Jersey.—The Board of Public Utility Commissioners of New Jersey has recommended that the Public Service Railway, Newark, N. J., post notices in its carhouses addressed to its conductors to the effect that no smoking or carrying of lighted cigars, pipes or cigarettes will be permitted in the future on any car except those that have a special compartment for smokers.

Increase in Wages in Richmond, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has increased the wages of trainmen on its lines in Richmond, Ind., formerly operated by the Richmond Street & Interurban Railway. Hereafter 1 cent more an hour will be paid men during their first year, and for each succeeding year after the first year for a period of five years the wages of trainmen will be advanced 2 cents an hour.

Hearing Continued in Wisconsin Fare Case.—The hearing before the Railroad Commission of Wisconsin in regard to the application of the Eastern Wisconsin Railway & Electric Company to amend its schedule of rates on its interurban line between Oshkosh and Omro has been continued until May 15. The first hearing was held April 25. The company desires to establish a straight rate of 2 cents a mile in place of its present 5-cent fare zone system.

Electric Railway Progress in Oklahoma City.—The *Oklahoman* in its issue of April 20, 1913, contained a short non-illustrated article dealing with the history and progress of the Oklahoma Railway, which was originally organized in February, 1902, as the Metropolitan Street Railway. The population of Oklahoma City at that time was about 14,000. The present population of the city is 68,000, an increase in the eleven years since 1902 of 54,000. The system was opened on Feb. 7, 1903, with 6½ miles of track serving the downtown district and running northwest to University station and east to Stiles Park. At present the company is operating about 103 miles of track, 62 miles of which are within the limits of Oklahoma City. The remainder is divided between city lines operating outside the city limits and the interurban lines.

New York Railway's Contribution to Flood Fund.—On March 27 Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York, N. Y., sent a letter to Mayor Gaynor of New York informing him that the company would devote 5 per cent of its receipts from ticket sales on both the subway and elevated lines on Monday, March 31, as a contribution to the flood sufferers in the West. Monday was selected because normally it is the day of heaviest travel, and also because it is the day when many people buy tickets for the remainder of the week. The company made its contribution in this way so that all of its patrons could feel that part of their fares which they paid on that day would go to the flood sufferers. The result was that all records for ticket sales for a single day on the subway were broken—1,343,515 tickets being sold. On the elevated lines 1,087,715 tickets were purchased. In keeping with its offer a check for \$6,073 was sent by the company to Mayor Gaynor to be added to the relief fund.

City Car Inspector for Providence.—The City Council of Providence, R. I., at its meeting on May 5, will probably be called on to pass an ordinance creating the office of car inspector for the city. The ordinance bears the recommendation of the committee on railroads. According to the provisions of the bill, the car inspector is to have general supervision over all electric, steam and other railroads with authority over time schedules and is directed to observe the failure of operating companies to conform to such schedules. The resolution asking for the creation of the position was presented in the Common Council on Jan. 6, 1913, by Councilman E. Merle Bixby and was referred to the railroad committee for investigation. Under the proposed plan the office will be under the jurisdiction of the city gas and electrical engineer, who is authorized to appoint the inspector and will have general supervision over his activities. It will also be the duty of the car inspector to observe the number of passengers carried on cars and to examine and note conditions pertaining to the cars or lines which he may consider to be unsafe or unsanitary. He will be required to see that the railroads observe the rules and regulations fixed for the use of city streets and that they comply with all the terms of their franchises.

Personal Mention

Mr. F. M. Millson has been appointed general purchasing agent of the Lincoln (Neb.) Traction Company.

Mr. O. P. Gothlin has been nominated by Governor Cox of Ohio to succeed himself as member of the Public Service Commission of Ohio and the appointment has been approved by the Ohio Senate.

Mr. F. D. Brown has resigned as manager of the Aberdeen (S. D.) Railway to become manager of the Huron Light & Power Company, which furnishes both gas and electricity to the city of Huron, S. D.

Mr. W. O. Vickery, who has been in the employ of the Trinidad Electric Transmission, Railway & Gas Company, Trinidad, Col., which is controlled by the Federal Light & Traction Company, has been appointed superintendent of the southwest division of the Federal Light & Traction Company.

Mr. W. F. Aid has resigned as engineer of maintenance of way of the Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio, to become connected with the engineering department of the Cleveland (Ohio) Railway. Mr. Aid's successor with the Cleveland, Painesville & Eastern Railroad has not yet been chosen.

Mr. P. C. Reinking, whose appointment as auditor of the Fort Wayne & Springfield Railway, Decatur, Ind., was noted in the *ELECTRIC RAILWAY JOURNAL* of April 26, 1913, has heretofore been employed by manufacturing concerns in different lines and in these positions he always made a specialty of bookkeeping and general systematizing.

Mr. E. Hengst, foreman of the Willoughby shop of the Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio, has been appointed master mechanic of the company to succeed Mr. P. J. Wood, who as previously noted in the *ELECTRIC RAILWAY JOURNAL* has become connected with the Northern Ohio Traction & Light Company, Akron, Ohio.

Mr. Frederick L. Ray, superintendent of the power plant of the Louisville (Ky.) Railway, won the first prize of \$75 offered by the educational committee of the National Association of Stationary Engineers in its recent prize competition. Mr. Ray was successful in the advanced classification of the committee, in which thirteen papers were submitted, all of exceptional merit. Mr. Ray is chairman of the education committee of the Kentucky branch, No. 1, of the National Association of Stationary Engineers.

Mr. Robert W. Perkins has been elected president of the Shore Line Electric Railway with headquarters at Norwich, Conn. Mr. Perkins has been treasurer and general manager of the Norwich & Westerly Traction Company since the reorganization of the company in July, 1911. The Pawcatuck Valley Street Railway, which operates in Westerly, R. I., and vicinity, and the Groton & Stonington Street Railway, which operates between Groton and Westerly along Long Island Sound, have been merged with the Norwich & Westerly Traction Company.

Mr. W. J. Wood, chairman of the Railroad Commission of Indiana, whose term of office expired on May 1, 1913, the date on which the utility act went into effect in that State, was formerly vice-president and counsel of the Louisville & Nashville Railroad. He was appointed a member of the Railroad Commission by Governor Hanley on the creation of the commission in 1905. Mr. Wood was made chairman of the commission to succeed Mr. Union B. Hunt and was reappointed to the commission by Governor Marshall in 1909. He championed the safety first movement on the railroads in Indiana and was instrumental in having the law changed so as to give the Railroad Commission of Indiana power to require the railroads to install block signals. Practically every railroad in Indiana organized a safety committee at the instance of the Railroad Commission.

Mr. Kinichi Iwai, of the municipal tramway department of the city of Osaka, Japan, is on a visit to the United States to study electric railway operation. Mr. Iwai was born and educated in Japan, but spent four years with the General Electric Company at its works in Schenectady, N. Y. Before coming to the United States on the present trip he visited Germany, Switzerland and England. He

has lately been over the electric railways at Boston and expects to visit New York, Chicago, Philadelphia, Washington and possibly San Francisco and Seattle. The electric railway system in Osaka with which Mr. Iwai is connected operates 22 miles of double track. Part of the capital expended on the line was spent in the United States for material and equipment.

Mr. Edwin Fledderjohann, who resigned recently as auditor and general passenger and freight agent of the Fort Wayne & Springfield Railway, Decatur, Ind., has entered the employ of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., to take the student course of that company, after which he expects to return to electric railway work. As previously noted in the *ELECTRIC RAILWAY JOURNAL*, Mr. Fledderjohann has been succeeded with the Fort Wayne & Springfield Railway by Mr. Paul Reinking as auditor and by Mr. Albert Scheumann as general passenger and freight agent. Mr. Fledderjohann also had jurisdiction over the telephone and overhead work of the Fort Wayne & Springfield Railway. This work is now in charge of Mr. A. M. Henry.

Mr. L. B. Wickersham, who has been appointed chief electrical engineer of the Oregon Electric Railway and the United Railways, Portland, Ore., and the Spokane & Inland Empire Railroad, Spokane, Wash., as previously noted in the *ELECTRIC RAILWAY JOURNAL*, was graduated from Stanford University as an engineer. He served as electrical engineer for the Washburn-Moen Company at San Francisco and later became electrician for the Portland (Ore.) General Electric Company. He was appointed chief engineer of the so-called New York and Oregon syndicate, formed for the purpose of reporting on and developing water powers in the West. During his connection with this company Mr. Wickersham analyzed and reported on many of the principal water-power sites and projects on the Pacific Coast. He also served as superintendent and electrical engineer of the American Goldfields Company. Subsequently he was appointed chief engineer of the United Railways, Portland, Ore., and in addition thereto he was appointed chief engineer of the Oregon Electric Railway in 1910. On April 1, 1913, he was appointed chief electrical engineer of the Oregon Electric Railway, the United Railways of Portland and the Spokane & Inland Empire Railroad.

OBITUARY

Horatio A. Foster, who had charge of the appraisal work of J. G. White & Company, died of heart failure on April 27. Mr. Foster was born at Bustleton, Pa., on Jan. 12, 1858. In the fall of 1884 he entered the employ of the Daft Electrical Company and the following spring he was sent to Baltimore to electrify a short branch of the Baltimore Union Passenger Railway. Later he became connected with the Thomson-Houston Electric Company at Lynn, Mass., and in the fall of 1888 he was appointed superintendent of the East River Electric Light Company, New York. In July, 1891, he was appointed an expert for the United States Census office, and in 1893 he became associated with Prof. George Forbes, then electrical engineer of the Niagara Falls Power Company. Early in 1895 he joined the staff of the Cataract Construction Company, Niagara Falls. After some years of general practice as consulting engineer Mr. Foster was engaged by L. B. Stillwell in 1906 to rehabilitate the generating and distribution system of the United Railways & Electric Company, Baltimore. In 1898 he was retained by Bion J. Arnold and assisted in the appraisals of the property of the Metropolitan Street Railway, New York; the Detroit (Mich.) United Railway and the Southern California Edison Company, Los Angeles. Mr. Foster has since worked on the valuation of public utilities and studied traffic conditions and other matters pertaining to public service, being engaged in this work with J. G. White & Company at the time of his death. Mr. Foster was the author of the "Electrical Engineer's Pocket-Book" and "Valuation of Public Utilities," and he had contributed to the technical press. He was a member of the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, the Engineers' Club of New York and the Philadelphia Arts Club. He is survived by his widow, a son, his mother and two sisters.

Construction News

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

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

RECENT INCORPORATIONS

***Vinita (Okla.) Interurban Railway.**—Incorporated in Oklahoma to build an electric railway in Vinita. Capital stock, \$10,000. Incorporators: J. T. Ratcliff, M. T. Knight, Seymour Riddle, John A. Wise and Paul F. Mackey, all of Vinita.

***Willapa Bay & Eastern Railroad, Centralia, Wash.**—Incorporated in Washington to build a 51-mile electric railway from Centralia to Willapa Harbor. Capital stock, \$2,000,000. Incorporators: W. H. Bogle, F. Merritt and C. P. Bissett.

***Charleston, Parkersburg & Northern Railroad, Parkersburg, W. Va.**—Incorporated in West Virginia to build an interurban railway from Charleston to Parkersburg. Capital stock, \$100,000. Incorporators: K. B. Stephenson, Parkersburg; H. M. Fowler, E. R. Reidl, J. E. Fowler and A. H. Geiger, Washington, D. C.

Milwaukee (Wis.) Traction Company.—Application for a charter has been made in Wisconsin by this company to build an electric railway in Milwaukee. It is understood one of the first projects in view is the construction of a line connecting with the line now operated by The Milwaukee Electric Railway & Light Company on Third Street and Green Bay Avenue. Capital stock, \$10,000. Incorporators: L. F. Wagner, N. C. Schulz and H. A. Schmidt.

***Pigeon Valley Railway, Pigeon Falls, Wis.**—Incorporated in Wisconsin to build an interurban railway from Pigeon Falls to Hay Creek, a distance of 20 miles. The incorporators include H. A. M. Steem, T. R. Kittleson, Niels Hagen, Ole A. Olson, B. M. Sletland and G. H. Neprud.

FRANCHISES

Pine Bluff, Ark.—The Little Rock, Pine Bluff & Eastern Traction Company has asked the Council for a franchise in Pine Bluff.

South San Francisco, Cal.—The South San Francisco Railroad & Power Company has received a franchise from the Council for a line along Walker, Swift and Grand Avenues in San Francisco.

Jacksonville, Fla.—The Jacksonville Electric Company has received an extension of time on its franchise in which to build the extensions on Market Street and Hogan Street in Jacksonville.

Freeport, Ill.—The Freeport Railway & Light Company will ask the Supervisors for franchises through Freeport, Florence and Harlem.

Hillsboro, Ill.—The Springfield & Central Illinois Traction Company has asked the Council for a franchise in Hillsboro.

Cedar Rapids, Ia.—The Cedar Rapids & Marion City Railway has asked the Council for a franchise on Second Street in Cedar Rapids.

Dubuque, Ia.—The Union Electric Company has received a twenty-five year franchise from the Council for the extension of a line on West Locust Street in Dubuque.

Muscatine, Ia.—The Davenport-Muscatine Railway, Davenport, has asked the Council for a franchise to extend its line to Roscoe Avenue in Muscatine.

Springfield, Mass.—The Springfield Street Railway has received a franchise from the Council for an extension of the double track in North Main Street through to the Chicopee line and for a turnout in Sumner Avenue near White Street in Springfield.

Saginaw, Mich.—The Saginaw-Bay City Railway is negotiating for a new franchise in Saginaw, as noted on page 825 of this issue of the ELECTRIC RAILWAY JOURNAL.

Niagara Falls, N. Y.—The International Railway will ask the Council for a franchise along Willow Avenue to its proposed new carhouse in Niagara Falls.

Cleveland, Ohio.—The Cleveland Railway has accepted a franchise from the Council for an extension from the St. Clair line into Gordon Park in Cleveland.

Springfield, Ohio.—The Springfield Railway has accepted a twenty-five year franchise from the Council in Springfield.

Dunnville, Ont.—The Niagara Falls, Welland & Dunnville Electric Railway has received a year's extension of time on its franchise in Dunnville in which to earn the bonus voted by the ratepayers some years ago. The company expects to complete its line to St. Anns before fall and will connect with the Toronto, Hamilton & Buffalo Railway at St. Anns. [E. R. J., Dec. 21, '12.]

Allentown, Pa.—A franchise has been granted the Lehigh Valley Transit Company by the Borough of Hatfield for its main street. This gives the company almost the entire right of way for its new double-track line from Lansdale to Souderton. Bids for this 14-mile line have been invited and construction work will commence this summer. The new double-track line will be 1 mile shorter than the old line, but more substantially built for fast service, thus permitting the cutting of fifteen minutes from the present schedule of two hours and fifteen minutes between Allentown and Philadelphia. The new bridge at this point will also permit of a further reduction in schedule time, which it is planned to reduce to one hour and forty minutes as against the steam railway's one hour and forty-eight minutes.

Chattanooga, Tenn.—J. W. Adams, representing the East Tennessee Traction Company, has received a franchise from the Bradley County Court for a line from Chattanooga to enter Cleveland over any route which the company may decide upon. This 30-mile railway will connect Cleveland and Chattanooga. [E. R. J., March 23, '13.]

Tacoma, Wash.—The City Council has been asked to grant a franchise for an electric railway over certain streets in Tacoma.

TRACK AND ROADWAY

Birmingham & Chattanooga Railroad, Birmingham, Ala.—Preliminary arrangements have been completed and construction will be begun by this company during the summer on its line between Chattanooga, Tenn., and Birmingham, Ala., via Oneonta and Boaz. W. W. Shortridge, secretary. [E. R. J., Dec. 28, '12.]

***Eureka, Cal.**—Richard H. Tingley, Rufus R. Wilson and associates are considering plans to build an electric railway from the vicinity of Korbel to the Eel River Valley towns.

Los Angeles (Cal.) Railway.—Surveys have been completed by this company for its Fifty-fourth Street extension to connect with the new carhouse in the southwest section of Los Angeles.

Pacific Electric Railway, Los Angeles, Cal.—Work will be begun at once by this company on its line from Long Beach to Bay City.

Modesto & Empire Traction Company, Modesto, Cal.—This company, which now operates a 5-mile line between Modesto and Empire, is prepared to begin the construction on an extension from Empire to Waterford, a distance of 8 miles.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—This company will soon build a 5½-mile branch line. Material for the extension has been purchased.

Mexico & San Diego Railway, San Diego, Cal.—This company will place in operation on May 10 its 3¾-mile railway between South San Diego and Imperial Beach. Its repair shops are located in Imperial Beach. The company will operate two Beach-Edison storage battery cars. Capital stock authorized, \$216,000; issued, \$35,000. Officers: E. S. Babcock, president; R. B. Talbot, vice-president, purchasing agent and engineer; L. M. Brown, secretary, and A. L. Goodrich, treasurer, all of San Diego. [E. R. J., March 29, '13.]

Geary Street Municipal Railway, San Francisco, Cal.—The contract for the construction of the roadway of this municipal line from Geary Street and Thirty-third Avenue in San Francisco to the beach has been awarded by the Board of Public Works to the Healy-Tibbitts Company. The route has been graded.

Santa Barbara & Suburban Railway, Santa Barbara, Cal.—This company is asked to consider plans to extend its Haley Street line to Miramar.

***Fort Myers, Fla.**—A company has been organized with a capital stock of \$350,000 to construct a 13-mile railway to extend from the Deep Lake orange groves to a point in Allens River, 1 mile above Everglade. Gasoline motor cars will be operated. W. G. Langford, Fort Myers, is interested.

Carolina & Georgia Railway, Augusta, Ga.—This company has awarded the contract to Michael P. McGrath, Worcester, Mass., for the construction of this 75-mile line between Augusta and Columbia. The railway will be so constructed that either electric or steam trains will operate over it. The capital stock of the company will be increased from \$100,000 to \$2,500,000, of which \$500,000 will be preferred stock. A bond issue of \$2,000,000 has been authorized. James P. Jackson, Augusta, president. [E. R. J., Dec. 7, '12.]

Rome Railway & Light Company, Rome, Ga.—During the summer this company expects to build an extension on the east side in Rome.

Lewiston-Clarkston Valley Railway, Lewiston, Idaho.—This company will begin work about July 1 on its 18-mile line to connect Lewiston, Idaho, with Clarkston and Asotin, Wash. The power station will be located at Clarkston and power will be purchased from the Lewiston-Clarkston Improvement Company. The company will operate eighteen cars. Officers: F. L. Sturm, Lewiston, president and general manager; J. B. Morris, vice-president; R. L. Sheppard, Lewiston, secretary and treasurer, and P. P. Oehler, Clarkston, chief engineer. [E. R. J., April 12, '13.]

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—This company has been asked to extend its line on Claim Street in Aurora.

Peoria, Canton & Galesburg Interurban Railway, Peoria, Ill.—Final surveys have been completed by this company and construction work will be begun in about a month. C. B. Coffeen, Peoria, chief engineer.

Springfield (Ill.) Consolidated Railway.—During the next four weeks this company expects to build a double track on Monroe Street from Eighth Street to Tenth Street in Springfield and will also relay a considerable amount of track.

Kankakee & Urbana Traction Company, Urbana, Ill.—It is reported that this company will begin work about June 1 on a line between Paxton and Rantoul.

Gary & Interurban Railway, Gary, Ind.—Announcement has been made by this company that within the next few days it will file notice of a bond issue of \$2,000,000 to pay for the proposed extensions to Elkhart, Goshen and South Bend and for an extension of the main division to Fort Wayne.

Waterloo, Cedar Falls & Northern Railroad, Waterloo, Ia.—This company has placed an order for 30 miles of catenary line material with the Ohio Brass Company.

Kentucky Southwestern Electric Railway, Light & Power Company, Paducah, Ky.—Contracts for the construction of the first 55 miles of the Paducah-Murray division of this company's line are now being awarded. Surveys have been made and right-of-way has been obtained through Lone Oak, Melber, Lowes, Fancy Farm, Mayfield, Sedalia and Lynn Grove.

Hagerstown (Md.) Electric Railway.—It is reported that this company is considering plans for an extension to Mont Alto, Pa., and eventually to Gettysburg.

***Trackless Transportation Company, Boston, Mass.**—This company has been organized in Massachusetts as a holding company and subsidiaries are to be formed to build and operate trackless trolleys in Massachusetts. The Boston and New York Stock Exchange house of I. M. Taylor & Company is interested.

Detroit (Mich.) United Railway.—This company has made an offer to extend its line from Romeo to Almont if it receives a private right-of-way.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—It is reported that

this company plans to build a 17-mile extension from Brookside.

Kansas City, Lawrence & Topeka Electric Railroad, Kansas City, Mo.—Work will be begun within the next few weeks by this company on an extension to Lawrence, Kan. The company plans to secure the necessary power for this line from the municipal lighting plant of Kansas City.

***Kingston & Excelsior Springs Electric Railroad, Kingston, Mo.**—Surveys are being made by this company to build a 25-mile electric railway between Kingston, Lawson and Excelsior Springs. B. Boner, Kingston, president, and S. C. Rogers, Kingston, chief engineer.

St. John (N. B.) Suburban Railway.—Surveys have been begun by this company on its line in the suburbs of St. John. J. A. Jones, engineer. [E. R. J., April 5, '13.]

Atlantic Coast Electric Railway, Asbury Park, N. J.—During the next two weeks this company will award contracts to build 2010 ft. of double track through the camp ground at Sea Girt.

Trenton & Mercer County Traction Company, Trenton, N. J.—This company will rebuild about 4 miles of track. In Trenton it will weld electrically over 1000 joints and rebuild 2 miles of track with all new material, using treated ties laid on 4 in. of crushed-stone ballast on top of this and up to base of rail a concrete mixture paving of granite block. The company will lay Lorain 7-in. 103-426 rail. It will also rebuild, except rail, about 3 miles of suburban roadbed.

Hornell (N. Y.) Traction Company.—The work of replacing old ties and the laying of new track will soon be begun by this company on its lines in Hornell. The material for most of the work has been obtained.

Piedmont & Northern Railway, Charlotte, N. C.—The Catawba Springs township has voted \$45,000 of bonds to induce this company to build a line from Mount Holly via Lucia, Lowesville and Triangle to Denver, N. C., a distance of about 18 miles.

Newbern-Ghent Railway, Newbern, N. C.—Work will soon be begun by this company on its extension to Trenton and Pollacksville.

Grand Forks (N. D.) Street Railway.—This company has awarded the contract to the Dinnie Brothers for the construction of its extension in Grand Forks.

Poland Street Railway, Youngstown, Ohio.—It is reported that this company has secured the necessary capital for the construction of its 4½-mile line and that grading will be begun within the next few weeks between Poland and Youngstown. George E. Rose is interested. [E. R. J., Feb. 1, '13.]

Norman Interurban Railway, Oklahoma City, Okla.—This company, which will be operated as a subsidiary of the Oklahoma Railway, has begun the construction of its 9-mile line between Oklahoma City, Moore, Norman, El Reno, Edmond and Britton. Contracts for rails and wire have been made and contracts will be let for the rest of the material. The company's repair shops will be located at Oklahoma City and power will be furnished by the Oklahoma Railway. Capital stock authorized, \$200,000; capital stock issued, \$150,000. Officers: George W. Knox, president; J. J. Johnson, vice-president; Charles Hoopes, secretary, and Henry Brauer, treasurer, all of Oklahoma City. [E. R. J., April 19, '13.]

***Tulsa, Okla.**—Plans are being made to build an electric railway between Tulsa and Kansas City. Among those interested are Herbert H. Clark, Kansas City, and R. S. Morely, Tulsa.

Lehigh Valley Transit Company, Allentown, Pa.—The entire right-of-way has been secured by this company for a double-track line from Lansdale to Souderton, a distance of 14 miles.

Easton (Pa.) Transit Company.—During the next few weeks this company expects to rebuild about 3000 ft. of track in Freemansburg and about 2000 ft. of new track in Easton.

Philadelphia & Garrettford Street Railway, Philadelphia, Pa.—It is reported that this company is considering plans to build a line from Collingdale to Folcroft and the Darby Creek.

Phoenixville, Valley Forge & Strafford Street Railway, Phoenixville, Pa.—Surveys have been begun by this company for the extension from Valley Forge to Bridgeport. An order has been placed with the Phoenix Bridge Company for the bridge over the Valley Creek and a contract has been awarded to Daniel E. O'Connell & Sons, Avondale, to build the concrete piers and abutments and erect the ironwork. An order for 15,000 cross ties has been placed with Bush & Company, Wilmington, Del.

Pottstown & Reading Street Railway, Pottstown, Pa.—This company has awarded the contract for the grading and masonry work for its extension from the township line below Sanatoga to the site of the new bridge over the Schuylkill River at Linfield to Steir, March & Company, Philadelphia.

Scranton & Binghamton Traction Company, Scranton, Pa.—During the next few weeks this company will award contracts to build 17 miles of new track from Nicholson to Montrose.

South Fork-Portage Railway, South Fork, Pa.—This company's line will be extended via Cassandra, Lilly and Cresson to Gallitzin as soon as the line between South Fork is completed. The company has secured the extension of its charter rights.

Regina (Sask.) Municipal Railway.—Construction work has been begun by this company on its line in Regina.

East Tennessee Traction Company, Nashville, Tenn.—The Bradley County Court has authorized the issuance of \$15,000 in bonds for this company insuring the immediate construction of an electric line between Chattanooga and Cleveland, Tenn. Lewis M. Coleman is interested. [E. R. J., March 23, '13.]

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.—This company plans to build 2 miles of new track during the year.

Eastern Texas Traction Company, Dallas, Tex.—More than 50 per cent of grading and bridge work has been completed by this company between Dallas and Rockwall.

***Houston, Tex.**—Work on the projected interurban railway from Houston through South Houston to La Porte will be begun during the summer, according to the statement of F. E. Ebersole, who recently purchased from A. F. Irwin the franchise and right-of-way for this 27-mile line.

***Seguin, Tex.**—F. C. Weinert and associates are considering plans to build an 18-mile electric railway between Seguin and Staples.

Southwestern Traction Company, Temple, Tex.—Surveys are being made by this company for its line between Temple, Belton, Georgetown, Austin, San Antonio and other points.

***Webb, Tex.**—Nathan Love, R. S. Payne, J. E. Bloomer and C. W. Duke are considering plans to build an electric railway between Webb, Dallas, Glen Rose and Mansfield.

Charlottesville & Albemarle Railway, Charlottesville, Va.—During the next sixty days this company will award contracts to build 2 miles of new track and two passing tracks in Charlottesville.

Wellsburg, Bethany & Washington Traction Company, Wellsburg, W. Va.—This company plans to repair its road-bed during the summer.

West Virginia Traction & Electric Company, Wheeling, W. Va.—During the next few weeks this company plans to do general repair work along its lines and at its carhouse in Wheeling.

SHOPS AND BUILDINGS

British Columbia Electric Railway, Vancouver, B. C.—Plans are being made by this company to build a new carhouse on the Kitsilano Indian reserve. The cost is estimated to be about \$50,000.

Bakersfield & Kern Electric Railway, Bakersfield, Cal.—During the year this company plans to build a new carhouse in Bakersfield.

Springfield (Ill.) Consolidated Railway.—During the next four weeks this company expects to build a carhouse in Springfield. The structure will be 210 ft. x 60 ft. and of concrete and steel construction.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—This company is considering plans to build new freight terminals and a new passenger station in Cedar Falls.

Union Street Railway, New Bedford, Mass.—This company has sold its Durfee Street carhouse in New Bedford. The structure will be demolished.

United Traction Company, Albany, N. Y.—Among the improvements planned by this company in the near future will be the enlarging of its North Albany carhouses to house some new equipment.

Binghamton (N. Y.) Railway.—Plans are being prepared by this company to build a three-story brick freight station on its State Street property in Binghamton. The basement will be occupied as a storage room. On the first floor will be located the freight offices and rooms for handling the incoming and outgoing freight. The second floor will be used for crew rooms and lockers for the men, and the third floor will be fitted out as a clubroom for the employees.

Cleveland (Ohio) Railway.—The directors of this company have approved the expenditure of \$79,000 on improvements to the St. Clair Avenue carhouse and repair shops in Cleveland.

Ottawa & Morrisburg Electric Railway, Ottawa, Ont.—Plans are being considered by this company to build a new terminal in Brockville.

POWER HOUSES AND SUBSTATIONS

Birmingham-Tuscaloosa Utilities Company, Birmingham, Ala.—This company has awarded a contract to the General Electric Company for the construction of its power plant at Tuscaloosa. The company is a subsidiary of the Birmingham, Ensley & Bessemer Railroad, which operates electric lines in and around Birmingham, and was organized to build an electric railway between Birmingham and Tuscaloosa.

Alabama Traction, Light & Power Company, Montgomery, Ala.—This company has awarded contracts aggregating \$200,000 for electrical supplies, gates for locks and other equipment for the hydroelectric development it is making at Lock 12 on the Coosa River near Birmingham. This is the final series of contracts and the material will be delivered during the summer, the contracts being divided between the General Electric Company, the Westinghouse Electric & Manufacturing Company and the Pennsylvania Steel Company.

Pensacola (Fla.) Electric Railway.—Plans are being made by this company to build a concrete addition to its power house in the city of Pensacola, which will double the capacity of the plant.

Springfield (Ill.) Railway.—During the next four weeks this company will award contracts to build an addition to its power house in Springfield to be used for the superintendent and drafting office, machine shop and storage room. The structure will be about 30 ft. x 60 ft.

Berkshire Street Railway, Pittsfield, Mass.—Plans are being considered by this company to build a new substation 1 mile east of Worden's Corners in Pittsfield.

West Penn Traction & Water Power Company, Pittsburgh, Pa.—This company has awarded a contract to the John F. Gallagher Company to build an addition to its power plant at Forty-second Street, Wheeling, W. Va. The structure will be 63 ft. x 100 ft. and of brick and concrete construction. The cost is estimated to be \$25,000.

Scranton & Binghamton Traction Company, Scranton, Pa.—During the next few weeks this company will award contracts to build an addition to the boiler room at its power plant in Dalton. It expects to purchase three new water-tube boilers for installation at the Dalton plant and one 150-kw turbo-generator for lighting purposes.

Charlottesville & Albemarle Railway, Charlottesville, Va.—During the next sixty days this company expects to build a new power plant with a capacity of 2000 hp. It expects to purchase three 400-hp high-pressure boilers, condensers, brick stack and pumps.

West Virginia Traction & Electric Company, Wheeling, W. Va.—During the next few weeks this company will do general repair work at its power house in Wheeling and plans are being considered to add new equipment in the near future.

Manufactures and Supplies

ROLLING STOCK

Montreal (Que.) Tramway, it is reported, will ask for bids for 100 double-deck cars.

Tri-State Railway & Electric Company, East Liverpool, Ohio, it is stated, will rebuild twenty-seven interurban cars.

East St. Louis & Suburban Railway, East St. Louis, Ill., is in the market for ten interurban cars and five city cars.

South Bethlehem & Saucon Street Railway, University Heights, Pa., expects to purchase ten railway motors, trucks and fenders.

Chicago, Peoria & St. Louis Railway, Chicago, Ill., has purchased four 70-ft. gasoline motor cars from the General Electric Company.

Wilmington-Southern Traction Company, Wilmington, Del., expects to purchase several additional Beach-Edison storage battery cars.

Manhattan City & Interurban Railway, Manhattan, Kan., will purchase several second-hand trail cars, also probably a few single-truck motor cars.

Los Angeles & San Diego Beach Railway, San Diego, Cal., has ordered three 41-ft. 10-in. Beach-Edison storage battery cars from the Federal Storage Battery Car Company.

Detroit (Mich.) United Railway, noted in the *ELECTRIC RAILWAY JOURNAL* of April 12, 1913, as contemplating the purchase of fifty trail cars, has made no plans for the immediate purchase of this equipment, though it intends to arrange for some of a design yet to be determined.

Seattle (Wash.) Municipal Street Railway has specified the following details for the twelve semi-convertible pay-within cars which are being built by the Cincinnati Car Company:

Seating capacity.....	48	Air brakes.....	Allis-Chalmers
Weight (car body only),		Car trimmings.....	Dayton
	1650 lb.	Control	West. HL
Bolster centers, length,		Couplers	Cincinnati
	23 ft. 1 in.	Curtain fixtures	Forsyth
Length of body..	31 ft. 1 in.	Curtain material...Pantasote	
Length over ves-		Destination signs,	
tibule	43 ft. 1 in.		Elec. Serv. S. Co.
Width over sills. 8 ft.	1½ in.	Gongs	Dayton
Width over all.. 8 ft.	7 in.	Hand brakes.....	Cincinnati
Height, rail to		Headlights	Crouse-Hinds
sills	32¾ in.	Sanders	Cincinnati
Sill to trolley		Sash fixtures.....	Dayton
base	8 ft. ¾ in.	Seats.....	Hale & Kilburn
Body	wood	Step treads.....	Mason
Headlining..	3/16-in. Agasote	Trolley retrievers.....	Earl
Roof	turtle-back	Trucks.....	Standard 0-45
Underframe	composite	Ventilators..	Railway Util. Co.

TRADE NOTES

Wallace Supply Company, Chicago, Ill., has removed its New York office to the Woolworth Building, 233 Broadway, New York.

Seaboard Construction Company, Brooklyn, N. Y., has removed its main office to the Temple Bar Building, 44 Court Street, Brooklyn.

Westinghouse, Church, Kerr & Company, New York, N. Y., engineers, have removed their offices from 10 Bridge Street to 37 Wall Street, New York.

Indiana Car & Equipment Company, East Chicago, Ind., has been incorporated with a capital stock of \$12,000 to handle railroad repair supplies. The incorporators are Lloyd J. Smith, P. H. Joyce and T. C. McCella.

Union Electric Company, Pittsburgh, Pa., has been appointed distributing agent in the Pittsburgh territory for the Sherwin-Williams insulating paints and varnishes and is now carrying a complete stock of this material in Pittsburgh.

Canadian Allis-Chalmers Company, Ltd., Toronto, Ont., has been incorporated in Ottawa with a capital stock of \$500,000. It will take over the Allis-Chalmers-Bullock Company, of Montreal, Que., and will have headquarters at Toronto.

William B. Dickson has resigned as president of the International Steam Pump Company, New York, N. Y. William Guggenheim, chairman of the board of directors, will direct the affairs of the company until a successor to Mr. Dickson can be chosen.

C. Wadsworth, Detroit, Mich., has established an office at 961-3 Woodward Avenue, Detroit, with the intention of representing manufacturers of contractors' machinery and materials of construction, making more or less of a specialty of municipal equipment and supplies.

U. S. Metal & Manufacturing Company, New York, N. Y., has appointed E. R. Schoenberger, formerly connected with the Griffin Wheel Company, manager of its Western railroad department. Mr. Schoenberger will be located in the Western offices of the company in the McCormick Building, Chicago, Ill.

Western Electric Company, New York, N. Y., has appointed O. D. Street its assistant general sales manager and supervisor of the distributing houses. Mr. Street has been connected with the company since 1901, during which time he has served in various capacities. The Western Electric Company also announces the appointment of E. W. Rockefeller as assistant general sales manager and E. A. Hawkins as telephone sales manager.

Taylor-Wharton Iron & Steel Company, Philadelphia, Pa., has acquired the Tioga Steel & Iron Company, Philadelphia. The Tioga plant, in addition to its product of steel and iron forgings, will handle part of the foreign work of the Taylor-Wharton company. An important addition to the product will be forged manganese steel. Knox Taylor was elected president of the company, A. E. Borie, W. L. Wright and L. W. Jones were elected vice-presidents, and W. A. Ingram was elected secretary and treasurer.

Universal Trolley Wheel Company, Northampton, Mass., has elected Walter H. Hadley treasurer and general manager. The company has recently completed a new concrete factory in Northampton for the manufacture of the Universal trolley wheel and harp. This equipment is self-contained and is said to need no attention so far as lubrication is concerned until the center of the wheel is worn out. The special feature of the trolley head is the spring. It is not riveted to the harp, and can easily be removed from the trolley head and replaced if necessary. An illustrated article upon these devices appeared previously in the *ELECTRIC RAILWAY JOURNAL*. The factory will be equipped with new drill presses, lathes and automatic machinery.

Nachod Signal Company, Philadelphia, Pa., opened its new factory on May 1, 1913. This is an important step in the policy of the company, as the acquisition of this shop will greatly facilitate development and experimental work in order to utilize the latest advances in engineering. The plant is equipped with modern machine tools, as well as jigs and fixtures for manufacturing the signals interchangeably. The electrical testing equipment is very complete, and a separate section of the shop will be devoted exclusively to experimental work. The Nachod Signal Company will manufacture at the new factory its complete line of automatic signals controlled by trolley contactors for single and double track electric railways, highway crossing signals, car headway recorders and allied devices.

ADVERTISING LITERATURE

Joseph Dixon Crucible Company, Jersey City, N. J., has lately printed a pocket pamphlet entitled "Graphite for the Boiler." This publication enumerates the advantages of graphite for fighting scale, shows several methods of applying it and presents the commendations of those who have had experience with the graphite manufactured by this company for boiler maintenance.

Charles N. Wood Company, Boston, Mass., sales agent, has issued a sixteen-page catalog which fully describes and illustrates Chapman automatic signals for electric railways, manufactured by the Electric Railway Signal Company. This apparatus is designed especially for signaling single-track urban, suburban and interurban railways where speed does not exceed 30 miles per hour. Two types of the signal are made—the single-car or absolute block signal and the multiple or car-counting signal.