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"SAFETY FIRST" NEWSPAPER PUBLICITY "Safety first" campaigns are pretty numerous these days among progressive electric railways. In every case the object is the same, but usually there is something characteristic about each movement. In this instance an example is offered by the Montreal Tramways which may well be envied by other railways for the splendid publicity it is receiving from both the French and English newspapers of Montreal. Long before the railway had inserted a single "safety" advertisement, all of the newspapers had published many columns of favorable news and editorial comment on the campaign to be undertaken by the company. In fact, one paper has already devoted the complete front page of its Sunday magazine supplement to "safety first" pictures, even going voluntarily to the expense of posing its own subjects. This evidence of good-will from the press clearly is the result of safe operation in the past, for during the year 1913 the accident account of the Montreal Tramways was only 1.74 per cent of the gross earnings. The present campaign is therefore simply a proof of the company's desire to bring accidents to the irreducible minimum by inculcating the public with the same degree of caution which has already been shown by the railway employees. The educational methods used or in contemplation by the Montreal Tramways are detailed elsewhere in this issue. While they embody such recognized features as moving pictures, the practices which will be taken to interest the public in the accident campaign are unusual enough to warrant the thoughtful study of other railways.

CENTRALIZED POWER FOR LONDON? A timely reinforcement of Samuel Insull's recent plea for the centralization of power supply, as noted in the *ELECTRIC RAILWAY JOURNAL* for April 25, is afforded by the report rendered on April 16 by Messrs. Merz and McLellan to the London County Council on "London Electricity Supply." According to their investigations, the replacement of all of the existing stations in a territory of 100 square miles by eight or ten plants farther down the Thames River would save 18 per cent, or approximately \$850,000, a year in operating expenses. This saving means that after allowing all capital and sinking fund charges on the new equipment the entire cost of the old plants would be written off by 1931. It may seem odd that a scheme of centralizing power supply should call for eight to ten stations. The consulting engineers believe, however, that if each station is large enough to use the biggest economical unit it would be unwise to put all of them

in one plant, especially when such separate plants would have more favorable fuel and water conditions. These new plants with three-phase, high-tension, fifty-cycle transmission and a 500-volt, three-wire system for the d.c. distribution would replace the forty-nine different installations of to-day. A striking feature of the report is the reference to the fact that several railways (presumably the London & South Western and the London & North Western Railways) are building their own stations for electrified suburban lines because of the present inadequate energy supply. Certainly the load factor of such lines is not one which should encourage the building of separate plants if a whole battery of centralized interconnected plants is available. While the consulting engineers suggest several ways to carry out the scheme of centralization they appear to favor partial or complete municipal ownership with private operation on a profit-sharing basis.

RUSH-HOUR AND NORMAL RUNNING TIME At first sight many operating men would take issue with the statement that the time taken to make a round trip during rush hours need not exceed that during normal hours of traffic. Yet this is the paradox offered in a recent article in this paper describing the make-up of a time-table. Naturally, cars do make more stops during the rush hours than at other times, but partial compensation is afforded by the fact that the time of passenger interchange tends to be less than it is during normal hours when the greater proportion of the passengers are children, elderly persons and shoppers who are carrying bundles. A broader explanation of the paradox is the fact that while the car may lose time outbound it can make up for the loss on its trip inbound. In other words, comparisons of rush-hour and normal-hour running times should be made on the basis of round trips instead of half trips, because the same car that stops at every corner on its outbound trip when loaded may not have to stop more than three or four times on its return when empty. The total number of stops per round trip, therefore, may actually be less than the total number of stops made by a car during the normal hours when a fairly good load is carried in each direction. The possibility of maintaining normal running time during the rush hour is affected, of course, by the type of cars in use. The possible saving in the return run may be, and too often is, offset by the longer interval which outward-bound passengers necessarily require for alighting when they are obliged to work their way through a heavily loaded car with narrow aisles.

THE OPPORTUNITY OF THE SMALL COMPANY

A recent glance over the list of members of the American Electric Railway Association discloses the somewhat anomalous fact that the proportion of companies which are members of the association among the smaller roads is nowhere near as large as the proportion of the larger roads. This seems strange because the schedule of dues is arranged so as to be particularly favorable to the smaller companies; they secure all of the privileges of the larger properties and have equal opportunity of representation at the convention and of calling upon the secretary's office for special information of any kind. The latter advantage is one whose importance those companies which are not members of the association do not always realize. Under Secretary Burritt this department of the activities of the association has been greatly developed. While more could undoubtedly be done with the greater facilities which a larger membership would warrant, the facilities possessed for gathering information of all kinds are even now so great that if a company made but one inquiry a year it would be repaid far more than its membership fees. As an instance, the association recently received a request for data in regard to the conditions under which city railway companies were required to make fire stops. The member company making the inquiry considered the number of fire stops which it was required to make was excessive. In reply a 35-page compilation was sent on the subject, showing the practices in a large number of cities, quotations from many municipal ordinances and the number of voluntary stops made by certain companies. From Feb. 1 to Nov. 15 of last year more than fifty such special original reports and compilations were prepared by the association, independent of all work of this kind done by committees, and the information thus secured is kept up to date so that it can be available for any company which desires it. Since Nov. 15 about twenty such compilations have been prepared on such subjects as the decisions of commissions on the height of car steps and the character of waiting rooms to be furnished, typical organization charts, and even on such comparatively minor matters as the use and cost of different types of vending machines. In fact, nearly every mail brings an inquiry which can generally be answered by the data at hand but occasionally requires a special report, which is available for other companies later.

We have touched somewhat at length upon this phase of association work partly because it has not been as thoroughly understood or has not been so conspicuous as other phases and partly because it is one which seems particularly to appeal to the smaller companies and is provided without charge to the members. To assist in this work the association can and does call upon the transportation, legal and engineering experts of the larger companies, whose services are thus made available for the good of the industry to companies which otherwise could not afford to seek their advice.

A single inquiry of this kind from a small company may cost the association more in clerical work than the

company's annual dues, so that on its face it would look as if the undertaking is a losing proposition. This, however, is not the case, partly because every additional member secured by this service means added strength to the association and partly because the data obtained from any special inquiry is retained for use in case the inquiry is repeated by another member. The association is now endeavoring to include practically every company in the country, and there is logically no reason why it should not be successful in so doing in view of the benefits which it offers to member companies.

PUBLIC RELATIONS OF PUBLIC UTILITIES

The important questions under this general subject pressing for solution are many. Are these enterprises to be conducted in the future under government or municipal ownership, or are they still to be under private control closely regulated by representatives of the public? Will public utility franchises be perpetual or indeterminate, or shall they be for definite periods of time? If the latter, what is to be done when these franchises expire? If private ownership is to be the rule, what rate of return shall be allowed on the investment? What returns shall be allowed on the capital now represented by the properties? What allowances shall be made because of the effect of obsolescence on apparatus otherwise good? What participation will labor have in the management of these properties or in their earnings from operation? If the railway companies expect a satisfactory answer to these questions they must at least agree upon what they consider a proper solution. They will make no progress if they vainly hope for a return of the old conditions under which the public had no voice in the control of the public service corporations. Whether for better or for worse, that time has passed never to return, and the sooner this fact is recognized the better.

A very helpful contribution toward a better understanding of this subject by electric railway companies, written by the secretary of the Pacific Coast Electric Railway Association, appears in this issue. In some respects the railway corporations in the Far West have had a better opportunity to judge the sentiment of the times than those in the East. More has been actually done there, for instance, in municipal ownership and operation of electric railways than in the older parts of the country. Other problems, which have appeared in only vague form in the East, have become acute in the states on the Pacific Coast. Mr. Hazzard's plea is, first, for a recognition by all the companies of the necessity for some action; second, a definite policy and, third, co-operation in this policy by all. He compares the company which has not felt the need for relief to the highlander who sees his neighbors on lower ground inundated by a flood but thinks that it will not rise to him, and he represents the feelings of the great majority of the railway companies who appreciate the situation and look to the American Electric Railway Association and its committee on public relations for some definite statement of policy.

We share his belief that the work of this committee will be of great assistance to the industry. To be of the greatest assistance, however, it must recognize the conditions as they exist, not as they have been or might have been. The position to take is that the true interests of the public and the public utility are the same, that the claim of the public utility for fair treatment is based solely on the equally good treatment in the way of service which it gives the public, and that this service is better and cheaper when provided by a private company than would be possible under municipal ownership. It will be impossible to carry conviction under any other standard.

MUNICIPAL OWNERSHIP FOR THE CAPITAL CITY ?

Glib is the only word that properly characterizes the communication of the commissioners of the District of Columbia to the chairman of the House District committee, advocating the immediate passage of a bill providing for the "acquisition, ownership and operation" of all the Washington street railroads. Reference was made to this communication in our news columns last week.

In less than four typewritten pages the commissioners dispose once and for all of the whole subject of municipal ownership and operation of electric railways. It is really a very simple proposition—the commissioners say so themselves. As they put the case it reminds one of the simple syllogisms that are given to beginners in logic. Urban transportation is vital to the life of a city. "The furnishing of such transportation is as essentially the performance of a public function as is the supplying of water or lights." To "leave to private individuals . . . the performance of such a public function . . . is to insure the maintenance of a struggle between public duty and public needs on the one hand and private interest and profit on the other," while "if this public service is performed by public authorities they can have no other motive than to do those things that the traveling public demands. They have but to maintain a proper relation between efficient service and the cost thereof."

See how easy it is. After reading the last two sentences just quoted one wonders why there has been all the argument about municipal ownership and operation, when it is so plain that this policy solves the whole problem of giving the public what it wants while maintaining the proper relation between efficient service and its cost! To clinch their argument the commissioners refer to the "notable success" of municipal electric railways in New Orleans, where no such things exist. The commissioners could not have meant San Francisco, for it is stated that this "notable success" has been going on for a number of years.

Anticipating the argument that regulation under the commission law that went into effect in February, 1913, should be tried before resort is had to municipal ownership and operation, the commissioners (who form the Public Service Commission of the District of Columbia) say that there are two railways in Washington

and that this would make regulation "perplexing." Here is another new idea, namely, that where there is more than one utility to be regulated the work is really too complicated for a public service commission to attempt, especially in view of the greater simplicity and promise of public ownership, as exemplified in New Orleans!

Throughout the commissioners' recommendation there is the implication that the Washington railways have been derelict in the performance of their duty in supplying good transportation and that their scramble to make "private profits" has resulted in failure to provide facilities to which the public is entitled. This is not true, nor is it true that excessive profits have been earned or paid to stockholders. The Washington railways have not only given good and satisfactory service but have extended their lines to such points as Chevy Chase and Takoma Park, Montgomery County, Maryland, where the prospect for profit was remote, so far as the railway was concerned, but immediately effective in enlarging the residential area and increasing real estate values.

Of the two Washington systems, one reports a cost of property of \$17,706,393 and capital stock and funded debt of \$17,639,500. This, the Capital Traction system, pays a 6 per cent dividend on \$12,000,000 capital stock. The Washington Railway & Electric Company reports its cost of road equipment and real estate at \$28,182,972, and has outstanding capital stock and funded debt of almost exactly the same amount. It pays 5 per cent on \$8,500,000 of preferred stock, and in the past five years has paid from 1 per cent to 3 per cent on \$6,500,000 of common.

The idea that the commissioners of the District of Columbia, changed as they are every four years and sometimes after shorter terms, could take over the transportation problem of the District of Columbia and handle it more efficiently than the existing companies are handling it at the present time, is of course an assumption entirely unjustified by general experience or the facts of this particular case. Although the conduct of the present House committee of the District of Columbia has been somewhat erratic, it is very much to be doubted whether serious attention will be paid to the commissioners' recommendations. These, however, were no doubt sought by several members of the District committee who are known to be advocates of municipal ownership and operation. The proposition is, however, sure to receive critical examination from the House as a whole, and if the recommendations of the commissioners of the District are the best that can be said for the bill to provide for municipal ownership and operation of the Washington electric railways, it is fairly safe to say that this measure will have rough sledding in Congress.

When the public service commission law went into effect in the District of Columbia a year ago last February, it could not be executed because there was a squabble over the appointment of the commissioners, and for several weeks there was no one to put the law

into operation. This in itself is suggestive as to how Washington railroads would be operated by the District government. The commissioners have found the regulation of electric railways "perplexing" and "complex," but this does not seem to have suggested to them that ownership and operation would be at least as perplexing and complex as mere regulation. Moreover there is nothing in the management of government or municipal enterprises which shows evidence of notable efficiency or absence of politics or gives ground for belief that any different plan would be followed if the operation of the public utilities was under the same direction. Until it has been shown that post-office affairs, or the police departments of our cities, or the building operations in which municipalities are engaged, are conducted with greater regard for economy and efficiency than is now shown, it would be the height of recklessness to confide other large enterprises to the same control.

PROGRESS IN ELIMINATING INDUCTIVE INTERFERENCE

When the New Haven Railroad was electrified from Woodlawn to Stamford seven years ago there was much apprehension as to the effects upon neighboring telegraph and telephone lines of the alternating magnetic field which would surround the track in the electrified zone. Preliminary calculations showed that voltages of considerable magnitude would be induced in the lines with the system of railway distribution as planned and that the telegraph and telephone circuits could not be operated without some compensating scheme. A plan for using transformers or compensators which would introduce into the disturbed lines emfs proportional to the disturbance was adopted and has been in use ever since. This method of attack on the problem was one involving cure rather than prevention. That it has not been altogether successful is indicated by the recent expenditure of large sums of money on preventive rather than curative measures. The details of the plan have been mentioned from time to time by those competent to explain them but the whole story of the development has not been available. The *ELECTRIC RAILWAY JOURNAL* has, therefore, gathered the facts from various sources and has arranged them in convenient form for reference. The result is seen in the article appearing in this issue.

The method finally adopted by the railroad was worked out by the three companies most vitally concerned, the American Telephone & Telegraph Company, the Western Union Telegraph Company and the railroad company. By this co-operation the interests of all are conserved, while each party is brought to realize the standpoint of the others. While the auto-transformer plan thus developed may not be the best for all cases it has effected a very great reduction in this disturbing magnetic field.

Meanwhile some very important experiments are being made on the New Canaan branch of the New Haven

line. In this the railroad, long distance telephone, local telephone, and manufacturing interests are co-operating. Data are being collected on a large and systematic scale and a theory of preventing interference which is apparently cheaper than the auto-transformer plan is being tried out. At present the results are still incomplete and not altogether classified, but it is evident that the whole subject will be placed on a much more scientific basis, for experimental data will be available to serve as a check on the theory.

The old adage "Prevention is better than cure" is illustrated in the present instance. Telephone and telegraph currents are small, and the apparatus used on such lines is sensitive and complicated. Telephone currents in particular are liable to interference on account of the minute fluctuations upon which successful speech transmission depends. Telephone circuits are fortunately of the metallic variety so that they can be transposed without difficulty, but even if the disturbing emfs between wires are practically neutralized there is still the difference of potential between lines and ground to contend with. Even if the emfs between wires are balanced out under normal conditions there still remain the effects of overloads and short-circuits which are particularly difficult to neutralize. Telegraph lines with grounded circuits and superimposed telegraph and telephone lines with ground return are much more liable to be affected by stray fields than lines used for telephone purposes only and cannot, of course, be transposed. The introduction of compensating devices into the weak-current circuits adds new sources of disturbance while removing others. The compensators must carry the direct current of the telegraph circuits while performing their function as transformers. The direct current may affect the permeability of the cores and so reduce the degree of compensation. The transformers further increase the power consumption in the line and thus reduce the efficiency of transmission. All of this indicates the importance of stopping the disturbing cause at its source if possible.

The cost of the auto-transformer installation has often been considered excessive. That the cost is high is true but it must be remembered that the work was done upon an operating road which had to be kept in operation. The track mileage in the electrified zone also is very large. The cost of the Stamford-New Haven section is very much less per mile, as the transformers are being installed with the transmission system; in fact, the cost per mile of route is said to be much less than that of the original section which had fewer switches and no transformers. The doubling of the transmission voltage, in addition to the application of the experience gained on the older section of the road, have combined to bring about this very satisfactory result. In the new division the inductive interference will be kept down at very reasonable cost. In all of this work the railroad management deserves great credit for going to such expense to eliminate a trouble inherent in an important advance in the art. Each new development in an art is liable to involve

temporary trespass upon the rights of others, but a spirit of fairness with arbitration of conflicting interests will always bring ultimate harmony.

The meagerness of the data on inductive interference makes each contribution doubly welcome. Reference has been made in these columns to the investigations which have been going on for more than a year under the auspices of the California Railroad Commission. As was to be expected, the California test committee soon discovered that the subject under investigation is a complicated one. This fact was clearly shown in the paper presented by John B. Taylor before the American Institute of Electrical Engineers in October, 1909, which, with the accompanying discussion, still forms one of the best reference texts on the subject. The experimental data being compiled by co-operative committees such as the two mentioned will greatly augment our present small store of information on a vital subject.

IS MANGANESE STEEL A FAILURE IN CHICAGO?

The article on Chicago's manganese steel experience in another part of this issue may lead many engineers to believe that manganese steel is an absolute failure in track special work. This conclusion is unfounded despite the number of failures, and the good service given by a considerable percentage of the installations seems to warrant the statement that manganese steel properly manufactured offers the best solution of track special-work difficulties at the present time. The article describes many of the types of failures observed, and it is hoped that both engineers and manufacturers will contribute their experience to these columns so that a more uniform manganese steel may be had in future.

The reasons for describing the experience with special work in Chicago are: first, because of the great number of pieces of various types installed four years ago, as well as the fact that the dense traffic has brought about results before they could be obtained elsewhere; second, because it is believed the percentage as well as the character of failures are representative; and third, because many engineers have looked to Chicago for service results before making extensive purchases of solid manganese steel special work. Chicago, in a way, was a pioneer in the extensive use of manganese steel special work in its various forms, and the extensive rehabilitation of the surface tracks there between 1907 and 1911 necessitated the purchase of more than 1000 special-work installations. These included first, solid manganese and, later, three types of manganese insert work. All special-work installations were laid on approximately the same type of foundation, and, in but a very few instances, may the failure be attributed to faulty foundations rather than the inherent characteristics of the manganese steel furnished or the manner of setting and fastening inserts.

As shown in the article, manganese steel failed in three ways, namely, by chipping at the intersecting flangeways, by cupping at the joints or intersecting flangeways, and by cold rolling. The causes of these failures are discussed in the article. On the other

hand, those installations that have stood up under the Chicago service, some of which now have been in for more than five years, began early to take on a glassy polish, which they have maintained to date, and they show little or no evidence of wear or any of the forms of failure. It is interesting in this connection to note that cupping and cold rolling did not appear in the manganese inserts, which, when they did fail, were either broken in several pieces or chipped at the intersecting flangeways or failed because of faulty setting and fastening. This varied record indicates faulty foundry practice or tempering of the pieces which failed, but from a discussion of the problem with engineers and manufacturers we believe that a uniform manganese steel can be produced at a reasonable price for the service it can render. The fact that the insert pieces supplied were more uniformly good in quality may be accounted for by the ease with which smaller castings may be treated properly as well as by the fact that a greater number of such pieces may be rejected without an undue increase in the manufacturing cost.

As the problem presents itself at this time, it resolves into one of changing the design, refining the foundry practice and the tempering process to a point where a more uniform product can be produced. Our investigations lead us to believe that this can be done without an undue increase in the cost of manufacture. The chemical analysis of the switch points showed a considerable variation in the percentage of manganese used in the different castings tested, and certainly there can be no question about the practicability of refining the process of manufacture to a point where the variation would be much smaller than 15 per cent. It is probable also that the metal in the wearing surface of each casting might be made more dense, either by increasing the thickness of the supporting web so that the molten metal will flow more freely to the wearing surface or bottom of the mold, or by providing more and larger gates and risers. With this improvement might be combined a careful inspection of all the heats to insure a uniform chemical analysis and extra care in the annealing and quenching process to insure a uniform toughness and hardness.

If the tempering of large manganese castings as well as the foundry practice cannot be refined, Chicago's experience points to the insert types of special work for maximum economy except for switches and mates. The principal objection to the insert construction at the present seems to be the difficulty of fastening the insert permanently in the casting. It has been suggested that solid manganese crossings with renewable inserts might be a good solution for chipping. But this does not appear advisable, because such excellent results have been obtained from the cast-steel arm and the iron-bound insert frogs that nothing would be gained by such a change. In any event the solution of the problem is largely in the hands of the manufacturers. They must be able to furnish a more uniform quality of manganese steel special work than that in Chicago before confidence in the general use of solid manganese steel frogs and crossings will be established.

Reduction of Inductive Interference from the Power Lines of the New Haven Railroad

On Jan. 25, 1914, the New Haven Railroad Put Into Operation the Auto-Transformer Plan for Minimizing Inductive Interference in Telegraph and Telephone Wires and at the Same Time Improving Transmission Economy. Details of the Plan and of the Circumstances Leading to Its Adoption Are Given

One of the chief objections alleged against the single-phase railway system has been the serious interference with the operation of telephone and telegraph lines within a considerable zone surrounding the electrified railway. That such disturbances have, in the past, been very serious cannot be denied and there is still much to be done before all problems connected with the elimination of inductive interference are solved. Ever since the electrified division of the New Haven road commenced operations, the matter of interference has been under consideration by the electrical engineers of the company, and on Jan. 25 of this year a new system of power transmission was put in service by which the company expects that these troubles will be very much reduced. Short accounts of the general principles upon which this system is based have been published in this paper, but it is believed that a fuller statement of the methods employed and of the circumstances leading up to their adoption will be of interest. The extent of the interference can be judged from the fact that telegraph lines paralleling the New Haven railroad at a distance of 4 to 6 miles could not be operated without compensating transformers before the railroad put the new plan into operation. P. J. Howe of the Western Union Telegraph Company at a meeting a year ago said that if the troubles continued that company would have to move its pole line, formerly on the right-of-way, entirely out of the zone of distribution, partly on account of interference with transmission and partly on account of the hazards to operators introduced by the nearness of the high-voltage lines.

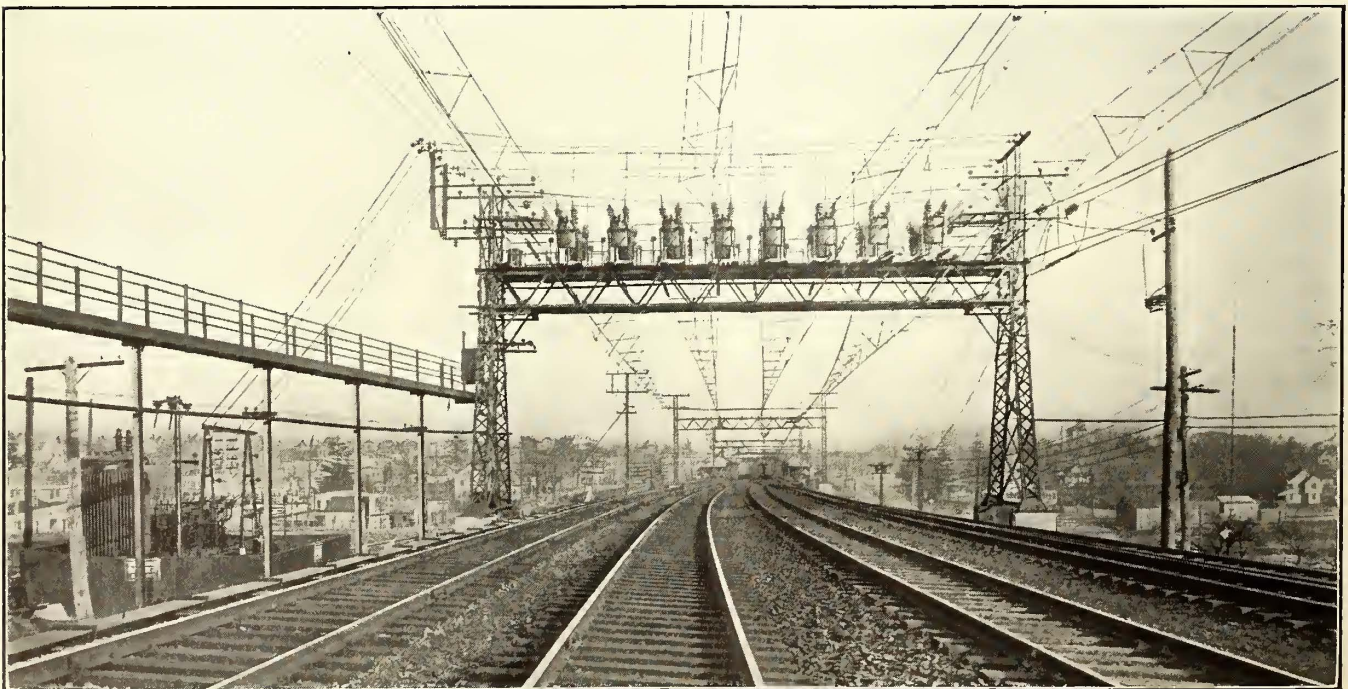
Before taking up the general discussion of the New

Haven Railroad problem, it may be well to review briefly the causes of inductive interference from power transmission lines and the general methods available for preventing and overcoming it. Induction is of two kinds—magnetic and electric; the former is produced by the magnetomotive force of a conductor carrying a current and the latter by the electromotive force between two conductors separated by dielectric.

MAGNETIC INDUCTION

For the purpose of illustration it is convenient to compare the action of, say, an alternating-current railway having overhead conductor with ground-return, inducing electromotive forces in neighboring conductors, with the a.c. transformer. The railway circuit sets up a magnetic field which links with the loop formed by the trolley wire and the return, corresponding to the primary winding of the transformer. The density of the magnetic flux is greatest within the loop and falls off rapidly in all directions. If the return current were confined entirely to the rails, the density of the magnetic field at various points corresponding to assumed values of current could be calculated with a fair degree of approximation. As a matter of fact, however, the return current spreads out over a large area, and its magnetic effect is somewhat uncertain. This magnetic flux produces disturbing electromotive forces in all loops with which it links.

As the total quantity of magnetic flux produced by the primary circuit depends upon the area of the loop producing it, its quantity can be reduced by having the two sides of the loop as near together as possible. Thus



New Haven Electrification—Fig. 1—View of Typical Sectionalizing Bridge, Auto-Transformer Installation and Cable Runway

a conductor doubled back on itself would produce practically no magnetic flux. What is true in the primary circuit also applies in the secondary, for the total quantity of magnetic flux linking with a loop depends upon the loop area. As the secondary electromotive force produced, at the same frequency, is proportional to the linking flux, keeping the two sides of the secondary circuit close together will also minimize the disturbance, as far as the loop is concerned. The flux which passes between the ground and the conductors, however, will induce electromotive forces in a loop of which the overhead conductors and the ground form parts.

ELECTRIC INDUCTION

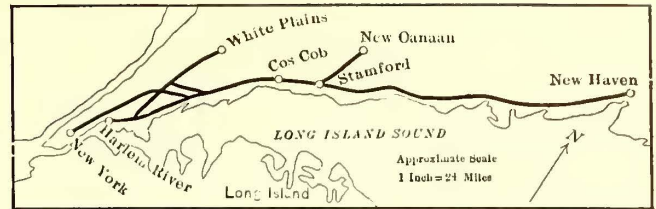
Electrostatic disturbances are due to differences of potential between conductors, for when such difference of potential exists, one conductor tends to charge the other by induction. The quantity of this induction depends upon the difference of potential, or electromotive force, between the conductors and upon their capacities. When this induced charge is produced by an alternating difference of potential, a charging current flows in the circuit in which the induction takes place.

Conductors having potentials negative with respect to the disturbed circuit induce positive charges thereon and vice versa; so that two similar conductors equidistant from a third would induce no charge in the last-named if the differences of potential between it and the others respectively were equal and opposite in sign. In the a.c. railway the rails are at ground potential and the charging currents in telegraph and telephone lines are induced from the trolley wires and feeders. It is theoretically possible to balance out the induction as explained above.

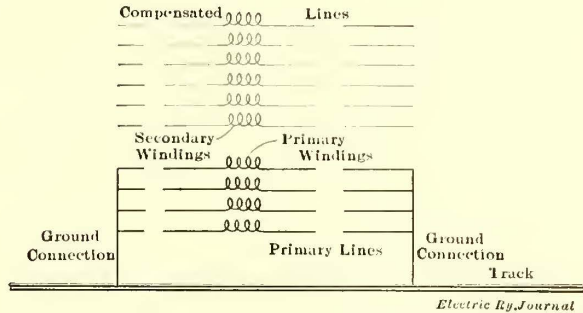
In the case of the New Haven Railroad there is practically no trouble from electrostatic induction because the lead sheaths of the underground cables act as shields for them, as do also the overhead steel structures and all grounded telegraph and telephone circuits.

COMPENSATION IN TELEGRAPH AND TELEPHONE LINES

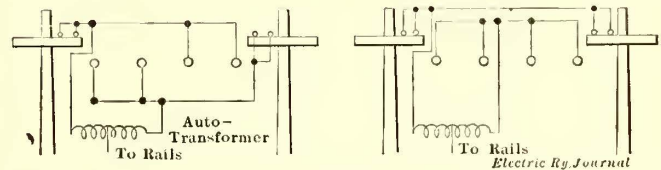
In telegraph and telephone circuits which run inside the zone of possible interference from a.c. power lines it is necessary to take precautions to compensate for interference. As the disturbance takes either the form



New Haven Electrification—Fig. 2—Map of Electrified Line



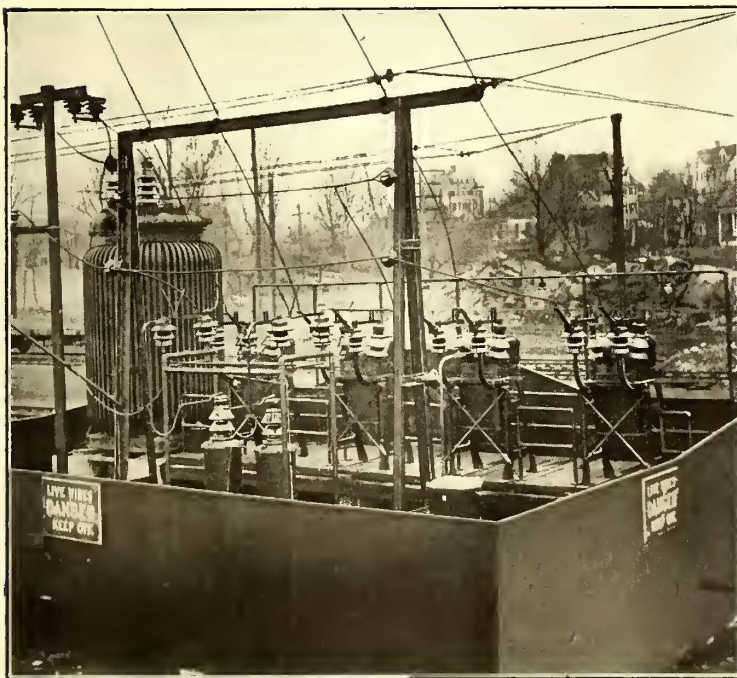
New Haven Electrification—Fig. 3—Diagram of Line Compensator Connections



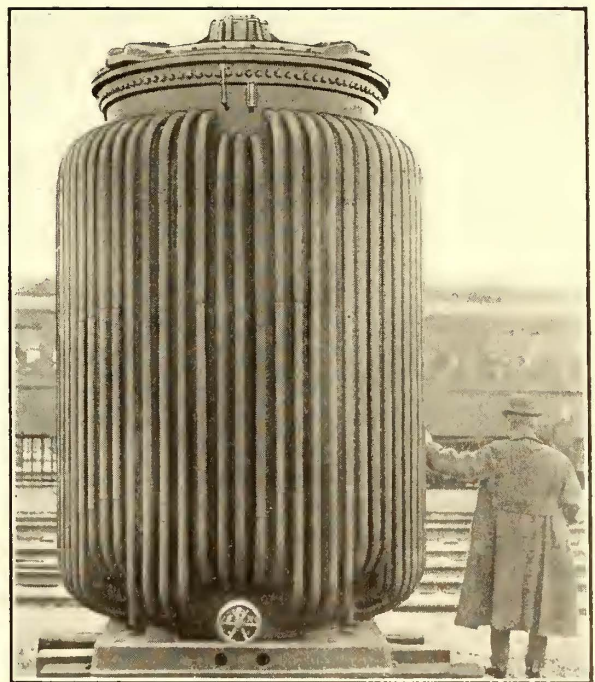
New Haven Electrification—Figs. 4 and 5—Diagram of balanced and Auto-Transformer Schemes

of an induced emf or a charging current, or both, the curative methods must be designed to compensate for the induced emfs or to "drain" away the extra current.

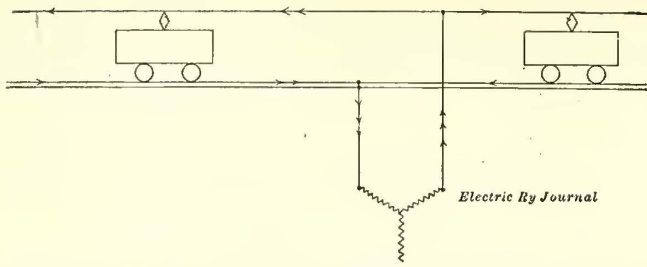
In two-wire lines, such as telephone and some telegraph lines, the neutralization of emfs in the circuit can be accomplished by means of transposition of the wires. By this means emfs in different parts of the circuit have different directions. Transposition does not prevent the development of emfs between conductors and ground.



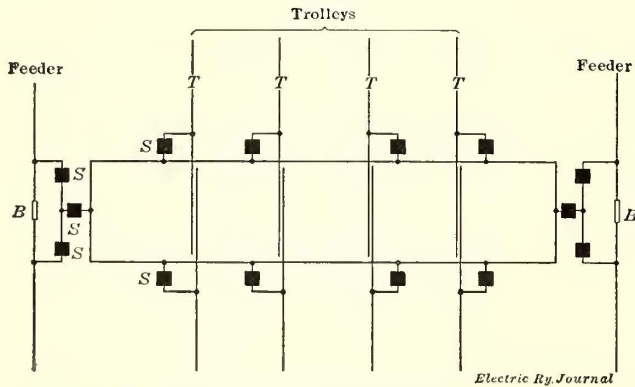
New Haven Electrification—Fig. 6—Typical Line Auto-Transformer Installation



New Haven Electrification—Fig. 7—Self-Cooling Line Auto-Transformer



New Haven Electrification—Fig. 8—Diagram of Former Distribution



New Haven Electrification—Fig. 9—Diagram of Former Sectionalizing Bridge Wiring

Drainage of two-wire lines is accomplished by shunting the lines with choke coils grounded in the middle. These present high impedance from wire to wire but little from both wires to ground. This plan is used principally on private lines.

The most satisfactory means of neutralizing disturbing emfs is by means of transformers which introduce into the affected lines compensating emfs proportional to the disturbance. These transformers, or compensators, have primary windings connected in one or more lines paralleling the disturbing circuit and grounded at both ends. The secondary windings are connected in series with the affected lines, the values of the compensating emfs being adjusted by selecting the proper ratio of turns in the transformer windings. The arrangement of such a compensating transformer is shown in Fig. 3. This is the method employed by the American Telephone & Telegraph Company on its New York-Boston lines paralleling the New Haven. This company has an underground conduit along the line of the New Haven at an average distance of about 2000 ft. from the track.

The compensator arrangement is obviously expensive, requiring, as it does, not only the addition of the transformers to the equipment but the setting aside of certain wires for the primary circuits and a reduction in the efficiency of all circuits due to transmission losses in the transformers. The primaries are not lost entirely for transmission purposes as they can be used telephonically as parts of other circuits, although not for superposed telegraph.

In a grounded circuit some such compensation as described is absolutely essential. It is valuable also in metallic circuits, in preventing a difference of potential between lines and ground, which is disagreeable for operators and may become dangerous.

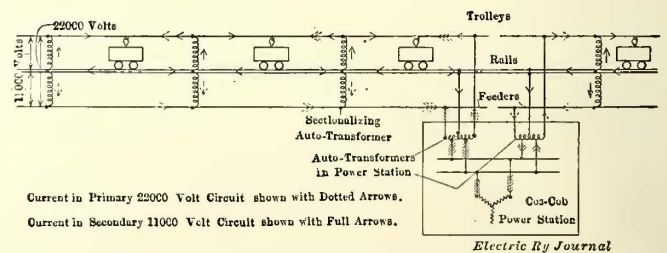
In the telegraph lines operated by the New Haven Railroad itself for signal and other purposes, it was found necessary to do away with the grounded circuit on one of the most important lines between New York and Boston, as it was impossible to overcome the induced voltages at all times. In a discussion on the subject at the last meeting of the Association of Railway

Telegraph Superintendents, N. E. Smith, superintendent of telegraphs of the New Haven Company, stated that considerable improvement was secured by using voltages much higher than those induced in the line by interference. In this way the interference could be made negligible in many cases as compared with the working current. The railroad company operates telephone wires on a pole line located near the track, and by keeping up the insulation and by frequent transpositions, at every fifth pole, it is able to get satisfactory speech transmission. In order to protect users of the telephone from high voltage induced in the line, transformers were installed for each telephone, thus electrically insulating the instruments from the line. Drainage coils were found unsatisfactory in this case.

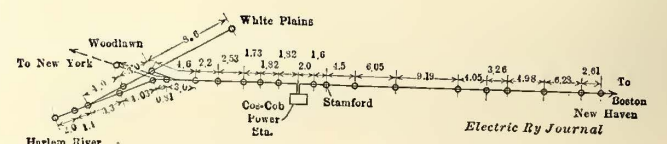
EVOLUTION OF THE PLAN USED AT PRESENT BY THE NEW HAVEN RAILROAD

The adoption of the auto-transformer plan, which will be described in detail later, was the outcome of a number of conferences held by representatives of the conflicting interests in the early part of the year 1912. At the suggestion of the engineers of the New Haven Railroad, representatives of the American Telephone & Telegraph Company and the Western Union Telegraph Company were appointed to confer with the railroad company's engineers with a view to preparing a plan for correcting the evils which existed in the zone between Stamford and New York. W. S. Murray was appointed to represent the railroad company, H. S. Warren, the American Telephone & Telegraph Company, and G. M. Yorke, the Western Union Telegraph Company. This committee held eight or more conferences, to which were also invited experts from manufacturing companies and others able to give the committee first-hand information on the subject under discussion. Prof. Charles F. Scott, of Yale University, was employed as consulting engineer for the railroad company, and in this capacity he made studies of the existing interference and outlined several plans for reducing it. Three plans were given careful study by the committee, not only from the standpoint of the reduction of interference but also of the cost involved. These may be called, for convenience, the balanced plan, the semi-balanced plan and the island plan. The general principles of these are as follows:

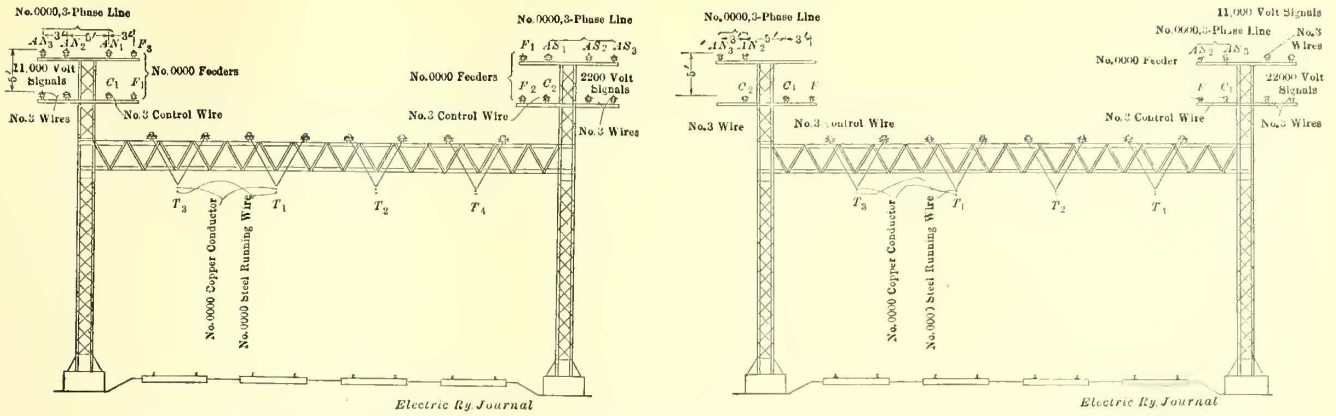
The balanced plan comprised a three-wire transmission with auto-transformers distributed along the line. These transformers were to be connected across two pairs of feeder wires with 22,000 volts between the two. The mid-points of the transformer windings were to be connected to the track. Two feeders were to be placed on each side of the track and for convenience may be



New Haven Electrification—Fig. 10—Diagram of Present Distribution



New Haven Electrification—Fig. 11—Diagram of Sectionalizing Bridge and Transformer Spacing



New Haven Electrification—Fig. 12—Cross-Sections of Present and Former Line at Bridge

referred to as the north and south feeders respectively. The generator voltage of 11,000 was to be raised to 22,000 for the line by means of auto-transformers, with their mid-points grounded, located in the power station.

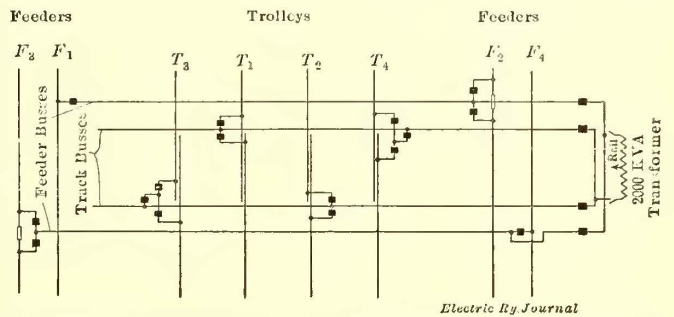
For the purpose of producing electromagnetic and electrostatic neutralization the north feeder wires were to feed the south trolley wires and vice versa, as shown in Fig. 4. This plan was ideal from the standpoint of transmission economy and of non-interference with foreign lines, but it was felt to be impracticable on account of the difference of potential between the trolley wires, which obviously would be 22,000 volts. This feature would have made the overhead construction difficult, particularly at track switches.

The second plan considered, the one finally adopted, may be called a semi-balanced system. In this plan the trolley wires are all at the same potential, 11,000 volts above the rails. The transmission system and auto-transformer arrangement are as in the first plan except that the trolley wires are all connected together and to one terminal of the transformers, while the feeders, in parallel, are connected to the other. This plan will be taken up more in detail later in this article. Fig. 5 shows by way of contrast with Fig. 4 the general features of the auto-transformer plan.

The third plan considered was one in which the line was divided into a number of sections, insulated from each other, each fed from one or two transformers. By this means the current drawn by a train in any one section could be confined to that section, and the inductive disturbance would be largely balanced out. This plan was not adopted, because in the opinion of the railroad company's engineers, the large expense involved for first cost and annual charges was not warranted by the result to be secured.

DETAILS OF THE AUTO-TRANSFORMER PLAN

In Fig. 8 are represented diagrammatically the elements of the electric circuit under the arrangement used previous to Jan. 25. The current for each car flowed from the power house through the overhead feeders and conductor wires and back through the rails and ground. The loop thus formed had considerable area, and at times of short-circuit, in particular, the magnetomotive forces produced were very great. The line was capable of being sectionalized by means of circuit breakers at the bridges, but this was merely for convenience in disconnecting defective line sections and not for the reduction of inductive interference. Fig. 9 shows the old switching arrangements at a typical four-track bridge. Here the trolley wires were interrupted and overlapped to prevent the breaking of a circuit under ordinary conditions. Provision was made for connecting and disconnecting feeders by means of circuit breakers, marked S in the diagram. These were

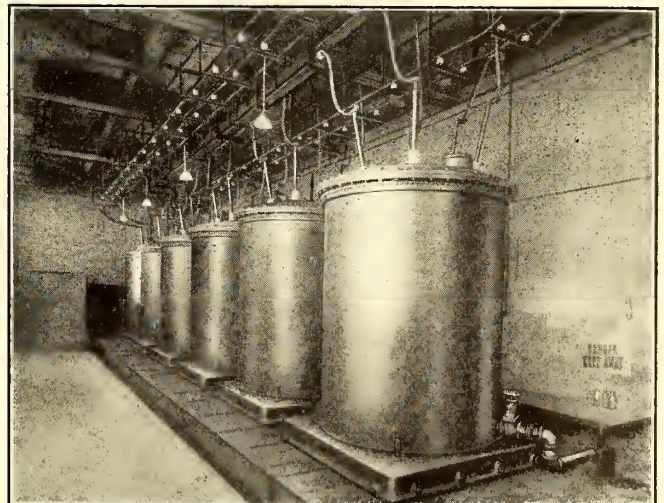


New Haven Electrification—Fig. 13—Diagram of Present Bridge Wiring

controlled from adjacent signal towers. The feeder sections were separated electrically by insulators, such as B, B.

Fig. 10 is a simplified diagram of the new arrangement. This is evidently similar to the Edison three-wire system except that the direct load is on one side of the circuit, the other receiving its share through the auto-transformers which perform the same function as balancer sets in a d.c. distribution.

The diagram shows the Cos Cob power station, which contains 11,000-volt three-phase generators, used single-phase for the railroad electrification but three-phase for the other power transmission. By means of auto-transformers installed at the power house connected as shown the voltage is raised to 22,000, and the middle points of the transformers are connected to the rails. Line auto-transformers are arranged along the track



New Haven Electrification—Fig. 14—7200-Kva Auto-Transformers in Cos Cob Power Station

and similarly connected for the purpose of reducing the electromotive force to 11,000 volts for the trains. The actual distribution of the sectionalizing bridges at which the transformers are located is shown in Fig. 11. The total number is twenty-five, of which seventeen are west of Stamford. The actual arrangement of the conductors is shown in Fig. 12, which, by way of contrast, also shows the old arrangement. On the left-hand pole

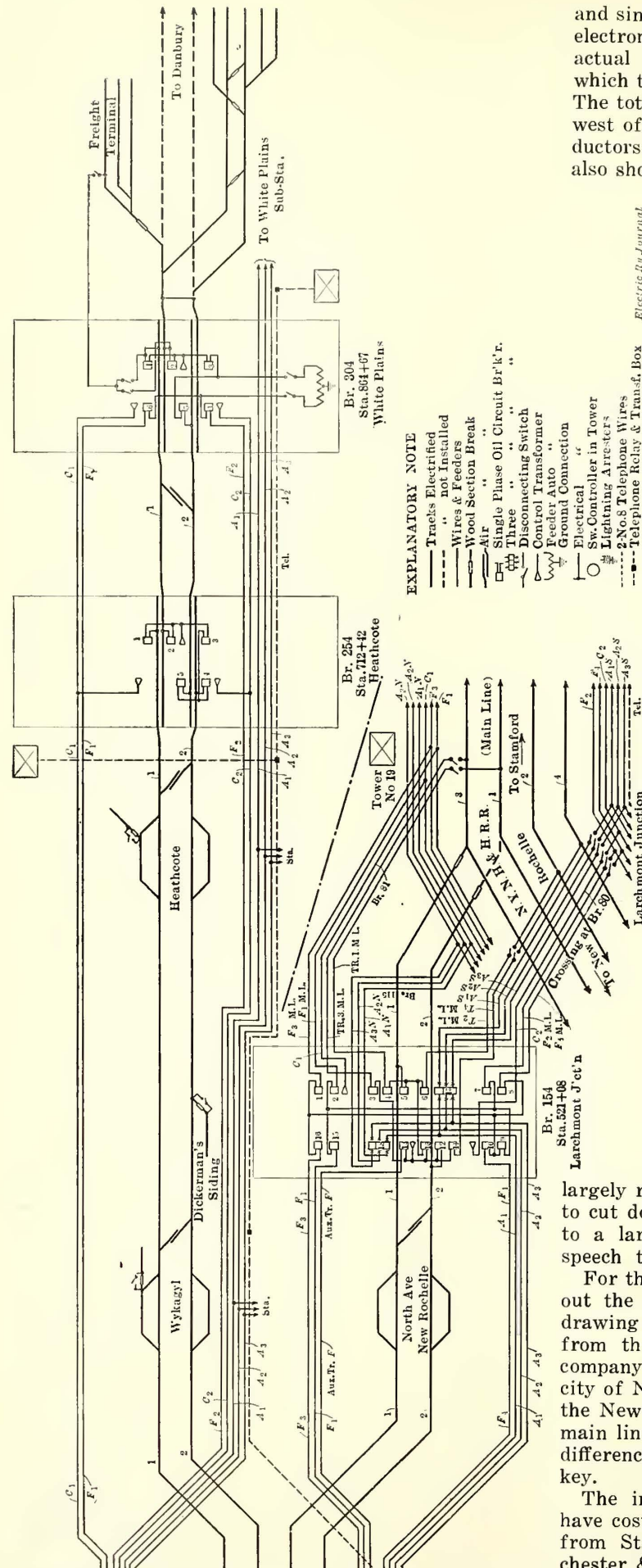
top are seen a set of three-phase wires used for power transmission purposes, having nothing to do with the present study; two feeders, F_1 and F_3 ; a control wire for switch operation and a pair of signal wires. The right-hand pole top contains a second set of transmission wires, two feeders, F_2 and F_4 , a second control wire, and a pair of signal wires. Fig. 13 shows in diagrammatic plan the connections at the sectionalizing bridge. Feeders F_1, F_2, F_3 and F_4 are all normally connected to one end of the auto-transformer, the center of which goes to the rail. The trolley wires are connected through the track buses to the transformer terminal opposite to that to which the feeders are connected.

By the above arrangement approximation is made to ideal conditions for eliminating inductive interference. While data are not yet available to show the exact extent of the neutralization, a very large part of the interference has been eliminated. The reduction of interference is not quite as great as it would be with a completely sectionalized line on account of the general tendency for some current to flow back to the power station through the track. That is to say, the magneto-motive forces produced do not quite balance out. This is due to the impedance of the transformers. The effect is similar to the flow of current in the neutral of a d.c. three-wire system. The magnetic effect could in some cases be reduced by disconnecting the track return at the power station, but this would introduce a hazard to the line transformers if a break should occur in one of the line wires. It would be possible in this case that the nearest line transformer would become a raising transformer for the line beyond the break and might be thus heavily overloaded.

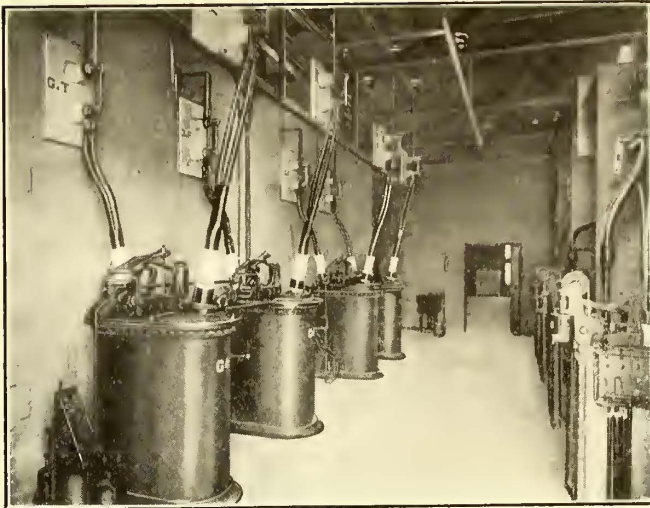
The general return of current toward the power plant is actually not very great, and the disturbance in adjacent lines has been largely removed. The telephone company has been able to cut down the number of compensating transformers to a larger extent, thus improving the efficiency of speech transmission.

For the benefit of those who are interested in tracing out the circuits in more detail than is given in the drawing already presented, Fig. 15 has been reproduced from the standard circuit diagrams of the railroad company. The section selected for illustration is in the city of New Rochelle and includes the junction between the New York, Westchester & Boston Railroad and the main line of the New Haven. The significance of the difference symbols is explained by the accompanying key.

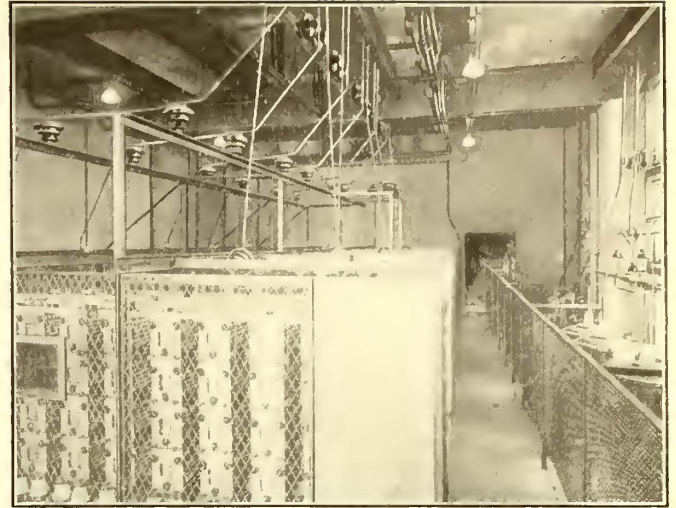
The improvements on the lines west of Stamford have cost about \$750,000. This includes the main line from Stamford to Woodlawn, the New York, Westchester & Boston Railway and the Harlem River Division comprising altogether 222 miles of single track, exclusive of yards. This cost was higher than it would



New Haven Electrification—Fig. 15—Typical Section of the Distribution System



New Haven Electrification—Fig. 16—New Oil Circuit Breakers in Cos Cob Power Station



New Haven Electrification—Fig. 17—Resistance Grids Used in Limiting Short Circuit Currents at Cos Cob

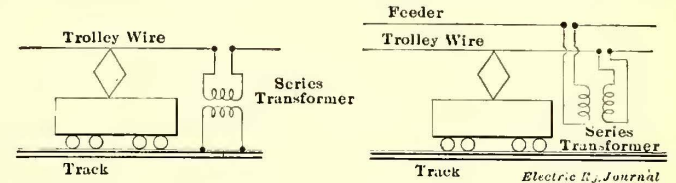
otherwise have been owing to the necessity for making all changes without interfering with operation, one sectionalizing bridge being changed at a time. On the line east of Stamford, the electrification of which will be completed within a few weeks, a different condition exists. There the auto-transformer system and the 22,000-volt transmission system are being installed on a new line. The result is that the cost is greatly reduced, being roughly, for the entire overhead system including bridges, feeders, catenary and transformers, \$40,000 per mile of route or \$10,000 per mile of track. This is only about 60 per cent of the cost of the overhead system west of Stamford without the auto-transformer system.

CHANGING OVER FROM THE OLD SYSTEM TO THE NEW

The change-over from the old system to the new involved very careful planning as it had to be made without any interruption of train service. It involved the putting into operation of the raising transformers in the power house and of seventeen lowering transformers

on the line of an aggregate capacity of 34,000 kva, with all the necessary switch gear and auxiliaries. Moreover, this work had to be done during the dark early morning hours. Sunday morning was selected for the purpose on account of the very light traffic at this time. During the four hours from 2 a. m. to 6 a. m. the few trains scheduled were operated by steam locomotives.

For the change-over operations the power plant was shut down at 2 a. m., and within seventy minutes all necessary line changes had been made, and reports to this effect had been filed with the load dispatcher. The



New Haven Electrification—Fig. 18—Diagram of Experimental Circuits on New Canaan Branch



New Haven Electrification—Fig. 19—Instrument House on New Canaan Branch



New Haven Electrification—Fig. 20—Track-Feeder Transformer on New Canaan Branch

changes in the power house required a total of slightly over eighty minutes. Within eighty-three minutes of the time of shutting down, the turbo-generators were started and in twenty minutes more the control and three-phase circuits had been tested out. By 4:30 a. m. full voltage had been applied to the line, having been built up gradually, and at 4:45 the entire system was pronounced ready for load. Before 5:30 two trains were operating electrically again, and it only remained to test out the protective devices designed to operate in the case of grounds or short-circuits on the line. Fortunately for this purpose a defective insulator grounded during the trying-out period, and the circuit-breakers were given a severe test which they withstood in a satisfactory manner. By 5:31 the operating department was advised that full normal service might be resumed.

The changes described were made under the personal supervision of W. S. Murray, of the firm of McHenry & Murray, acting in his official capacity as consulting engineer to the railroad company. All matters pertaining to the 350 miles of track were delegated to H. Gilliam, who was assisted by Messrs. Tyree and MacKay. E. J. Amberg, of the engineering staff of McHenry & Murray, was responsible for the general preparatory work and for the internal changes in power-house circuits, being assisted in the latter by B. Wheeler.

EXPERIMENTS ON THE NEW CANAAN BRANCH

Some very interesting and useful experiments are now being made on the New Canaan branch of the New Haven Railroad in order to secure a scientific basis for the elimination of inductive disturbances. These tests are being co-operated in by the New Haven Railroad, the Westinghouse Electric & Manufacturing Company, the American Telephone & Telegraph Company, the Western Union Telegraph Company, the Southern New England Telephone Company and other interests.

The tests were begun on account of a series of disturbances which occurred in the New Canaan office of the Southern New England Telephone & Telegraph Company. The program of the tests was laid out with a view not only to correcting the local difficulties but also to yield data of reference value in the solution of larger problems. The New Canaan branch is well adapted to these tests as it is off the main line and is not supplied with the auto-transformers like the main line. In fact it is not suited for this method of compensation, being a stub-end line.

The plans under test consist of two parts and involve a track and line compensator plan, somewhat similar in principle to the scheme already described for the telegraph line. A series of compensating transformers, about one to the mile, are distributed along the line, which is between 6 and 7 miles long. These tie together either the trolley wire and the track or the trolley wire and the feeder. The transformers have a one-to-one ratio. The general idea can be seen by inspection of Fig. 18. The currents in the primaries and secondaries of the transformers must be substantially equal, hence at the points where the transformers are applied the currents are confined to the circuit in which the transformers are connected. The transformers obviously neutralize return drop.

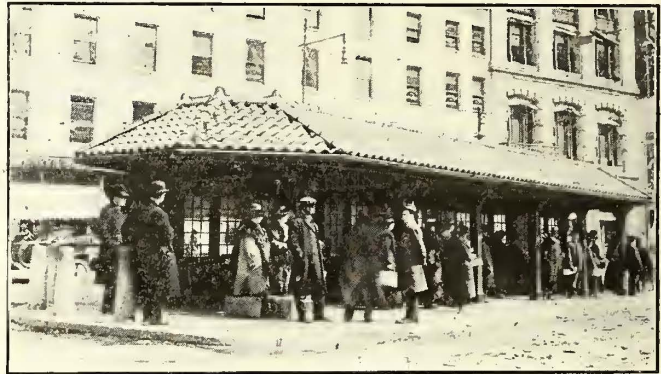
The tests are being made with and without the transformers and under all conditions of weather and other variables. To make conditions perfectly definite a current of 200 amp is sent through the line for night tests, and during the day measurements are taken under regular operating conditions. The measurements are made on lines in the vicinity of the track and at different dis-

tances therefrom. In these lines measurements of voltage, current and phase positions are made.

The New Canaan tests are probably the most elaborate which have yet been made on induction interference from single-phase railway currents, and the results will be awaited with great interest. The mass of data being accumulated is so great that some time will be required to edit and digest it. It is understood that the results are to be published as soon as available.

PASSENGER SHELTER BUILT BY CITY IN CIVIC CENTER

An attractive shelter for electric railway passengers has recently been completed by the city of Hartford, Conn., at a cost of \$2,100, and it is illustrated in the accompanying half-tone. The shelter is located on State Street, opposite the City Hall, and is about 90 ft. long and 14 ft. wide, with removable wooden sides, windows and a Spanish tile roof. The platform is of concrete,



Passenger Shelter in Hartford, Conn.

being raised 5 in. above the street surface, and the roof is supported on wooden posts and trusses carrying five 60-watt lamps at a height of 8 ft. above the platform. The latter is somewhat larger than the shelter proper, which is 40 ft. long inside. Three cars can be loaded at the shelter without congestion. The local street railway service is furnished by the Connecticut Company, and the lighting circuit is supplied by the Hartford Electric Light Company, the wiring being in conduit, with a key switch and fuse box mounted on the outside post, as shown in the illustration.

ARRANGEMENT FOR CENTRAL STATION ENERGY

Under the terms of the contract with the Philadelphia Electric Company which will supply the energy to operate the Pennsylvania's electric trains, the initial minimum of 3750 kw is to be ready in September of this year. The railroad will erect its own substation at a point opposite the Christian Street plant of the electric company and will purchase twenty-five-cycle energy at 13,200 volts. Although at first this demand will be chiefly for single-phase service, the other two phases will be required with further extension of the electrification, special provision being made for variations on any leg of the circuit. A minimum load factor of 25 per cent is specified.

The rate for this railroad service will be made up of a stand-by charge for kilowatts of demand and an energy charge per kw-hr. consumed. The rates will be increased proportionately if the power factor is less than 70 per cent. When the railroad company can guarantee a maximum demand of 15,000 kw and 35 per cent load factor the rate will be proportionately reduced.

Lowlanders and Highlanders—The Problem of Co-operative Publicity

The Need Is Expressed of a Direct and United Presentation of the Case of the Public Utility Companies but This Must Be Preceded by a Recognition by the Companies Themselves of the Necessity for Such Action

BY HENRY C. HAZZARD, SECRETARY PACIFIC COAST ELECTRIC RAILWAY ASSOCIATION

The purpose of publicity is to correct misconceptions which have come to exist in the public mind regarding public utilities, and to create and maintain a more favorable public sentiment toward the industry.

It is not my intention to discuss the need of public utilities engaging in publicity work. The subject has been too often and too ably analyzed to call for further exposition at this time. And among those who have at heart the best interests of public utilities and of the communities they serve, there is no disagreement on the question of necessity. It is the consensus of opinion that the time has come in the great trial of the people vs. public utilities when the defendants should not permit judgment to be taken against them by default but should marshal their facts and present their arguments vigorously and with the utmost candor.

Rather is it my purpose to attempt a statement of the difficulties in the way of the public utilities presenting their case, for, upon the question of procedure, there is far from being a unanimity of opinion. In fact, the problem of ways and means is so involved with conflicting considerations that it has not as yet met with satisfactory solution. Nor is it reasonable to expect that an effective solution may be reached until there is a clearer conception of the general causes which have contributed to the existence of the sentiment with which the public utilities must cope and at least an approximate measurement made of the depth and breadth of the public temper, so that the public utilities may be guided thereby in the required scope and extent of their publicity efforts.

In every walk of life, whether the significance of the trend of events is of real concern or not depends upon the individual's judgment as to the proximity of effects upon his interests. The public utility industry is no exception. The public utility official who has been singularly fortunate in operating the properties in his charge with a minimum of expressed public dissatisfaction naturally is apt to regard the talk of widespread and underlying public antagonism toward privately owned plants largely as an abstract matter. Such antagonism in his opinion may be, and probably is, very greatly exaggerated. But even if it is not, what bearing has it upon his interests that it should require a departure from the conservative policy which he has followed? He does not disbelieve in publicity. In fact, his company employs a publicity agent and pursues with more or less consistency the practice of keeping the public informed upon matters pertaining to the business which he believes should be of interest to the public. He and his associates are identified with every worthy movement for the betterment of civic conditions, and favorable opportunities are not neglected by them to impress upon the community, in public talks, the dependence of its prosperity and welfare upon the continued prosperity of the public service corporation. Furthermore, the company's employees are held to rigid accountability for lack of courtesy in dealing with the public, and in all respects the laudable endeavor con-

stantly is made to please the public and to let the public know of the desire to please. Then, why should he jeopardize this favorable situation in anticipation of a change in local sentiment, and launch aggressively into a publicity campaign for the correction of conditions which are not directly associated with his properties? Other public utilities might be urging him to join with them in an associated publicity movement to be conducted through a central agency and to be carried on throughout a wide area. More than likely most of the participants in such plan occupy a much less favorable position in the public esteem than does his company. Should he then, for a doubtful gain, incur the risk of weakening the prestige of his position that the situation of less fortunate associates might be improved? What means of publicity would be employed? What would be the scope and extent of the movement and what the expense? Who would guide and direct the policies? Would not his responsibility for the integrity of large interests, so far as the integrity could be jeopardized by wrong public relations, be placed beyond his control?

On the other hand, there is the public utility executive who, confronted at every turn with public distrust and hostility, is ready to abandon the policy of dignified silence or the indirect, spasmodic and ineffectual publicity efforts which have been made in the past, and is willing and anxious to enter upon a direct and comprehensive publicity campaign, either locally or in alliance with other public utilities, if practicable ways and means, offering reasonable promise of relief from oppressive conditions, can be formulated.

Like lowlanders and highlanders, there seems to be no meeting ground upon which these divergent views may be brought together for the common good of all. The highlanders may see the steady rush of ever-rising waters, may view with alarm the inundations of hitherto prosperous properties and the partial impairment of other properties, but they have faith that the flood will subside and leave undamaged the holdings over which they are standing guard. The lowlanders, slowly becoming submerged, are casting about for ways and means to erect safeguards. New embankments of considerable proportions are being constructed to surround several scattered properties; about others the same old low dikes are being maintained; the protection of other properties is being wholly neglected except for occasional efforts which are made as danger may, for the moment, seem imminent. Nowhere is there unity of action. Yet, it is apparent that the course of the flood waters may not be directed and kept confined to their proper channel without the construction of a continuous and substantial levee and that, except as supplementary thereto, disjointed and in most part superficial and inadequate barriers, which may be erected by separate efforts, are ineffectual and economically wasteful.

Is the above analogous to the public utility situation? Are the flood waters of public sentiment steadily rising? How high will they go? Are all properties likely

to be affected? These are questions upon which intelligent judgment cannot be expressed without an investigation into the sources from which the flood waters emanate.

COMPARISON OF PAST AND PRESENT CONDITIONS

Until very recent years, municipalities, states and the federal government pursued the open door policy toward public utilities of every kind. The utmost liberality was shown. Interstate carriers received substantial bonuses from the government to facilitate construction; the use of streets and highways for distribution systems was but a formality of possession; restrictions upon corporate practices and conduct were minimized in state and local franchises, or loosely enforced; communities vied with communities, and states with other states in their endeavor to direct and encourage the investment of capital in the furnishing of light and power and transportation, all indispensable requisites to the comfort, prosperity and general welfare of the people and to the development of the country, and private capital responded to the call.

These things were typical of the intense commercialism of the nineteenth century. During this period the energies of the entire nation were concentrated in material development. Not the public utility industry alone but industrial activities of every kind, aided by the sympathies and co-operation of the people, moved forward with tremendous strides. Inventions tending to annihilate time and space broke down state boundaries and welded the country into one large community; commercial pursuits broadened; individual enterprises gave way to co-partnerships and associate efforts, and these in turn were succeeded by corporations and eventually by combinations of corporations. The very magnitude of the field of operations made these changes a natural evolution. And with this evolution, bringing as it undeniably did, the concentration of financial and industrial power, came a growing fear among the masses, encouraged by the occasional voice of the statesman and the prophet that we were becoming a government by oligarchy.

This sentiment, segregated at first, has been spreading and cementing. It has been facilitated in so doing by the very agencies of invention that have made possible the cohesion of forces in other respects, until now it has burst forth in collective strength and is seeking the realization of profound political, industrial and ethical reforms. It is being voiced in the columns of the press, in legislative halls, by executives and in all forums of the people. And it is finding tangible expression in augmented duties of government toward the people, in the popularization of government, in the disruption of existing political parties and in the trend of legislative and judicial decisions. As a movement which grew out of the worst tendencies of a commercialized age, it is going to the other extreme to correct these tendencies, to establish new ideas and ideals, or re-establish old ones, to democratize our institutions and forms of government. As a movement, which has assumed in the brief period of a dozen years the proportions of a revolution, it is characterized as much by determinedness of purpose as by impatience and impetuosity in the accomplishment of its altogether too indefinite aims.

And yet the present is but a period of experimentation and assimilation. Radical progressivism is competitive between individuals and in the exercise of government functions—municipal and state. New ideas are being advanced and, without general acceptance, are being tried out. Notions at first received with incredulity are ending by becoming dogmas. For these reasons a movement of this kind renders imperative

the need of counteracting agencies to combat the impracticable theories of idealists and extremists, and to arouse the sober second thought of the people.

THE PROBLEM IS NATIONAL

It is to this task that public utilities desire to direct their energies. The problem which confronts them is less local than it is territorial or national in its essential characteristics. The government's assumption of control over all classes of public utilities, the rapid succession of drastic regulatory laws, the gradual encroachment under the new order of things of costs upon earnings, the enforced dissolution of corporations, the steady verging toward governmental ownership, the occasional actual and frequently threatened indirect confiscation of properties in the process of establishing governmental ownership—these are some of the gages with which measurement may be made of the task. That here and there are to be found steam roads, electric railways, power companies and other public utilities urgently upon the defensive are but instances of specific expressions of widespread and deeply rooted unrest; and, while the exigencies of each particular situation requires the application of local remedies, permanent relief and assurance of continued immunity may be found only in corrective measures which are addressed to the broad underlying causes.

In other words, local publicity efforts of separate companies must become subordinated to co-operative efforts, sectionally over wide areas or nationally. Only through co-operation may the publicity means employed measure up to the conditions sought to be corrected.

And yet, in co-operation lies the fundamental difficulty to successful publicity—first that of bringing together, and then of holding together, the lowlanders and the highlanders in a comprehensive publicity campaign. For, publicity ways and means that may be acceptable to the one as none too adequate, are quite certain to be rejected by the other as extreme.

Assuming that the necessity of united action becomes generally recognized and that a sectional or national organization undertakes to put into practice the theory of co-operation in publicity, there at once is presented the unsolved and complex problem of how to proceed.

METHODS OF PUBLICITY

Broadly speaking, there are three methods of publicity: *a*, indirect; *b*, direct, and *c*, direct supplemented with indirect.

By "indirect" is meant the avoidance of argument and appeal. The means most largely employed in such methods—the columns of the daily press—compel indirectness. While such means present the advantage of economy through the use of established agencies, they are uncontrolled and non-dependable agencies. It is well known that the columns of the press are not freely open to propagandism and that contributions of whatsoever character are subject to editorial modification or rejection. The real purpose of advancing a cause cannot find expression by these means, except under the restricted guise of "news items," and the press that would be most likely to give space to the public utility cause is the press least likely to be of the greatest service in that cause. At best, the indirect method is a halfway measure serving the sole purpose of intermittently directing the public attention to the public utility industry.

By "direct" is meant, of course, the converse—argument and appeal, supported by facts.

Between these two methods, the indirect and direct, there is no longer a choice. If the indirect ever was effective, it now largely has ceased to be so. To be

effective it must be employed frequently. To employ it frequently is to destroy its effectiveness. The public has come to recognize the handiwork of the press agent, to look for it and to discount it, and the newspaper manager is intolerant of it. Regarded complacently as legitimately resorted to in certain callings, its ineffectiveness in the public utility field lies in the very fact of its indirectness; for, however laudable the motives behind such methods, indirection is identified with the methods of "big business" and public opinion disapproves. Nor can we lose sight of the fact that hostile public sentiment has grown up with the work of the press agent—in spite of it—nor avoid the conclusion that reliance no longer can be placed upon indirect methods, except to the extent that they may usefully supplement the direct.

Co-operation having been decided upon, the first step toward the solution of the problem of ways and means is to recognize the fact that old methods should be discarded for new, that public utilities must adopt a perfectly frank attitude toward the public and endeavor to inform the public openly and frankly. And that a campaign with such an end in view must be straight to the point, artless, candid and unreserved. It should be accepted as a matter of fact that the cause is worthy of being expounded and that the best interests of the public demands plain speaking even more urgently than the best interests of the public utilities. For who may deny that the public utilities, if permitted to prosper, are just as necessary to the state as the state is to the public utilities.

The next step is to determine upon the new and direct method of co-operative publicity that is to take the place of the old indirect methods of individual companies.

COMMITTEE ON PUBLIC RELATIONS

That this question is receiving painstaking consideration is indicated in the recent action of the American Electric Railway Association in appointing to quote its president, "a committee on public relations, consisting of the ablest men in the industry, together with leading representatives from the principal manufacturing and banking interests which are closely allied with the electric railway companies. It is expected that this committee will formulate not only some comprehensive and effective publicity campaign but also a financial plan for carrying it out successfully."

There is little doubt that the perplexing problem of ways and means will be satisfactorily solved in this manner and that the hearty and active support of electric railways generally may be depended upon in carrying out the program.

CO-OPERATION NECESSARY

It should be said, however, in closing, that the fundamental difficulties in the way of co-operation in publicity, as pointed out in this paper, were disclosed as the results of a pioneer effort along these lines which progressed beyond the point of formulating plans. On the Pacific coast an association of electric railway companies, operating in the states of California, Oregon and Washington, was organized in the summer of 1913 in expectation that ways and means of engaging in publicity would be devised, and that the union of efforts would enable the campaign to be carried on throughout this logical publicity area.

A specific plan of procedure was evolved based upon the fundamental considerations which have been discussed:

First—That, unless the means employed measure up to the conditions sought to be corrected, publicity

efforts to eradicate adverse public sentiment had best not be undertaken.

Second—That the conditions sought to be corrected are broadly territorial as well as local in their characteristics; that fundamentally, they are of equal concern to all public utilities, and that the means of solution should be in accordance with these characteristics.

Third—That all public utilities should unite in the attainment of a single aim of common advantage. As consolidations of companies are effected to secure economies in operation and to avoid competition and wastefulness, so it should be commercially and economically expedient and desirable through union of efforts to avoid overlapping activities in the broad field of public policy.

The plan provided for direct means of presenting the public utilities' case to all classes of the people periodically and regularly, and it contemplated that degree of co-operation which would make practicable, through the support of public utilities of every class, the carrying on of a campaign within the large territory of the three Pacific coast states in a manner extensive enough to impress the public with the seriousness of the cause, and with such continuity as to promise attainment of the aims desired to be accomplished. That this plan failed of formal adoption, though generally indorsed as offering an effective, comprehensive and financially practicable solution, is significant only because of the concrete illustration thus given of the one real big obstacle in the way of successful co-operation in publicity—the difficulty of securing unity of action upon commensurate corrective measures. Until this difficulty is removed, inadequate and comparatively ineffective means will continue to be employed. From which we conclude, and without criticism of either, that the lowlanders must educate the highlanders and the highlanders must educate the lowlanders, before they may hope to co-operate in successfully educating the public.

JOINT COMMITTEE ON JOINT USE OF POLES

A meeting of the joint committee on the joint use of poles of the American Electric Railway Association will be held at association headquarters on May 4. The A. E. R. A. committee comprises W. J. Harvie, A. S. Richey, C. L. Henry, W. S. Twining and E. G. Allen. The following members of the committee represent other associations or interests as follows: Farley Osgood, P. H. Thomas and F. B. H. Paine, representing the A. I. E. E., W. T. Oviatt and Thomas Sproule, representing the N. E. L. A., and F. H. Bethell, representing the A. T & T. Co.

The present-day successful co-operation between the electrical engineer and the banker is set forth as an efficient object lesson for the future of chemistry, according to Arthur D. Little in a reprint entitled "Industrial Research in America" from a presidential address delivered before the American Chemical Society. The great industrial applications of the sciences involved in the electrical and other established engineering professions are shown by the author to have been in a large part due to the activities of firms or organizations like Stone & Webster, J. G. White & Company and other firms which have logically evolved themselves from the status of engineers to that of engineers and bankers. Such an evolution, Mr. Little believes, as the close alliance between chemistry and banking is a fundamental prerequisite if the results of industrial research are to find their full fruition in America.

Chicago's Experience with Solid and Insert Manganese Special Track Work

A History of the Exhaustive Experience in the Use of Manganese Special Work in Chicago with Detailed Accounts of Individual Installations

In probably no other city has manganese steel special work received a more thorough and exhaustive test than on the surface lines of Chicago. Experience with the three types of special work, namely, solid manganese, cast-iron bound manganese insert, and cast-steel manganese insert, began in 1908. Since that time more than 1000 installations, including more than 10,000 pieces, have been laid down. This large number of installations, as well as the wide divergence in the character of traffic, namely, from a density of a few seconds' headway in the downtown district to several minutes' headway as found on outlying cross-town lines, makes this test exhaustive in scope and convincing in results. Moreover, installations were furnished by practically all of the large manganese track special work manufacturers in this country; consequently it should be representative of what may be expected of various designs of this material as installed in Chicago. Experience there under all classes of traffic has demonstrated clearly the advantages and disadvantages of the different types in a much shorter time than could be possible in any other city where the traffic is lighter.

It may be well first to consider the conditions under which this manganese special work was purchased. In 1907 and 1908 ordinances were passed granting franchises to the four surface railways operating within the corporate limits of Chicago. Among other things they provided for a comprehensive reconstruction of all the tracks inside the city. This work was done under the direction of the Board of Supervising Engineers. In the board's endeavor to make the rehabilitated work as permanent as possible, it thoroughly investigated many of the different types of track construction and track materials in general use at that time and consulted with the manufacturers. Specifications under which the manufacturers were willing to bid with a three-year guarantee were then adopted. The specifications issued at that time for the manufacture of track special work were the first general specifications for that kind of material to be prepared by anyone.

The clauses in the ordinances which referred to special

work merely required that at all track intersections suitable steel special work of ample strength and weight, to correspond with the structure to which it connected, should be provided and that frogs, switches and mates should be furnished with wearing plates of hardened steel. Investigation by the board developed the fact that special work manufactured of hardened steel or manganese steel designed to withstand extraordinary wear could be purchased with a three-year guarantee. This made it desirable from an economy standpoint, and at that time it was believed that solid manganese would give a maximum wearing life at the minimum cost of operation. It should be noted, however, that the guarantee clause was eliminated from the specifications about February, 1910.

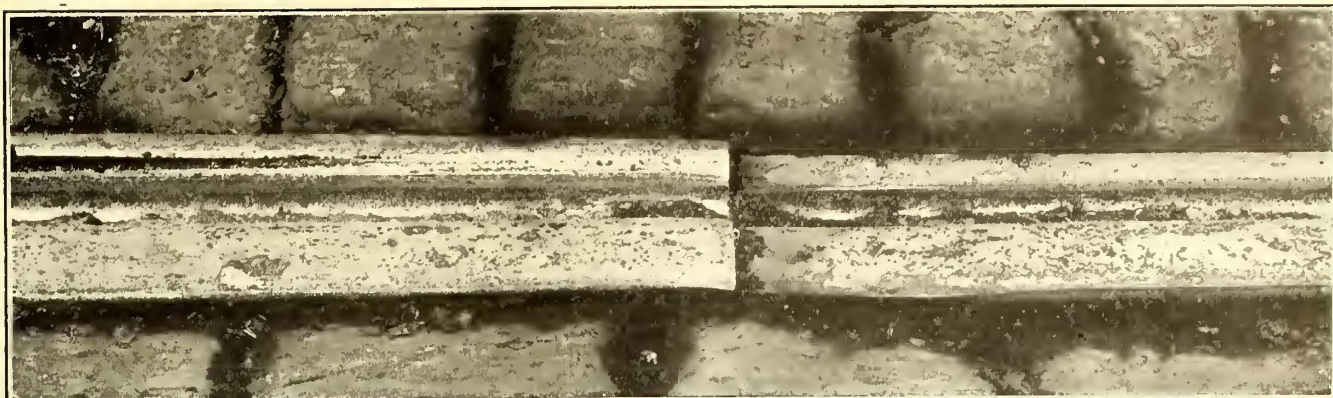
SPECIAL WORK SPECIFICATIONS

The specifications governing the manufacture of track special work were made to cover four types, namely, A, B, C and D, and each type was specified in 7-in. and 9-in. rail depths. Type A was made with a solid-steel casting for running rails, with manganese steel plates inserted at the wear points. Type B was made of solid manganese castings, arranged to fish with abutting rails. Type C was a cast-steel bound or cast-iron bound construction, using standard Chicago rail with manganese steel plates inserted at the points of greatest wear. Type D was ordinary built-up track special work composed of rolled Chicago rail sections and mechanical joints. Other portions of these specifications provided for over-all dimensions, tolerances, drilling and inspection.

All special work was built to a gage of 4 ft. 8½ in. on straight track and on curves having a radius greater than 80 ft. On curves sharper than an 80-ft. radius, the gage was increased ¼ in. In all special work, however, a maximum variation of ⅛ in. greater than standard gage was allowed. All switches, mates and frogs were designed for 3½-in. wheel-tread clearance, a 1¾-in. throat and a tongue throw of 1¼ in. All exterior frog arms were required to be of sufficient length to



Chicago Special Work—Fig. 1—Showing Cupping of Manganese Mate at Run-off from Chicago Rail, Installed October, 1903; Traffic, 80 Wheels Per Hour



Chicago Special Work—Fig. 2—Showing Slight Cupping of Chicago Rail at Run-off from Manganese Mate, Installed October, 1908; Traffic, 80 Wheels Per Hour

permit easy access for placing the joint plates. In all cases it was required that the over-all length should not be greater than these specified dimensions or more than 1/8 in. less than the same. Ninety-degree crossing frogs were considered in a separate class, and the exterior arms were required to be of a length equal to one-half the distance between the gage lines of the inside rails of parallel tracks, with an allowance of 1/16 in. for joints. The object of these limit dimensions in 90-deg. crossings was to make them interchangeable.

At the time the special work specifications were adopted there was considerable discussion among the members of the board as to the proper depth of groove. It was agreed that the shallow groove would tend to reduce noise. After a discussion of the various types, it was finally decided that all points involved could best be served by making the groove depth 11/16 in. It was thought that this depth would provide entire safety for the passage of cars and at the same time reduce noise, or at least that it would determine the effect of depth of groove upon the elimination of noise at crossings. This was in 1909, and since that time the 11/16-in. depth has remained the standard.

Some time during 1906 the 129-lb. Chicago girder-grooved rail section was adopted. The specifications for the manufacture of this rail were drawn in such a way as to provide rails that would give a maximum wearing life under heavy street railway service. The specifications also provided for a chemical composition for rail production as follows:

	Percentage
Carbon	0.50 to 0.60
Sulphur not to exceed.....	0.08
Phosphorus not to exceed.....	0.10
Silicon not to exceed.....	0.20
Manganese	0.80 to 1.10

TESTS TO DETERMINE CHARACTERISTICS OF MANGANESE STEEL

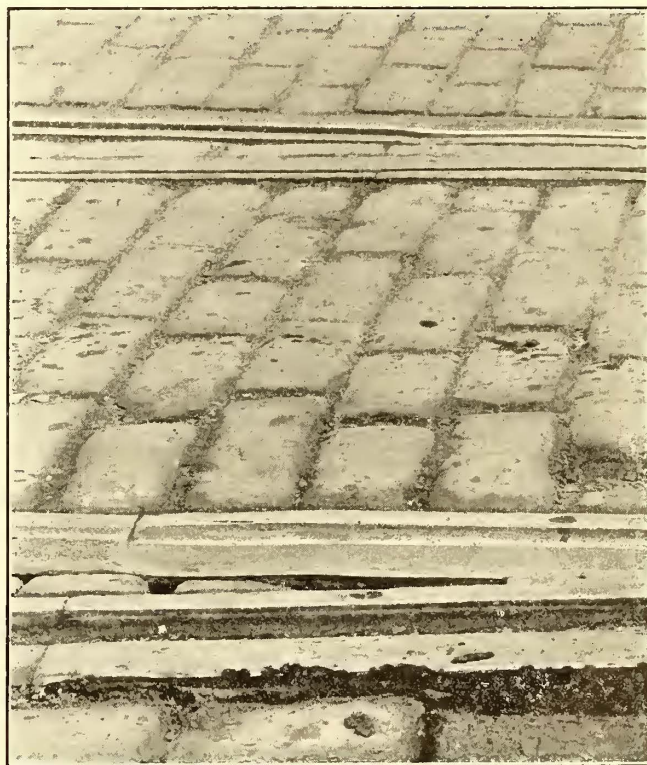
The specification did not call for any particular chemical composition in the manganese steel used in the solid and insert track special work, it being left to the manufacturers to furnish material that would meet the three-year guarantee. In 1909, however, after considerable solid manganese work had been installed, it was thought desirable to obtain information as to the character of manganese steel placed in the track special work. Accordingly, a number of switch tongues were purchased from the manufacturers supplying the special work for Chicago, and these pieces were tested for physical characteristics by a firm of inspecting engineers.

The tests to which the manganese switch points were subjected were of three kinds, namely, drill tests, ball

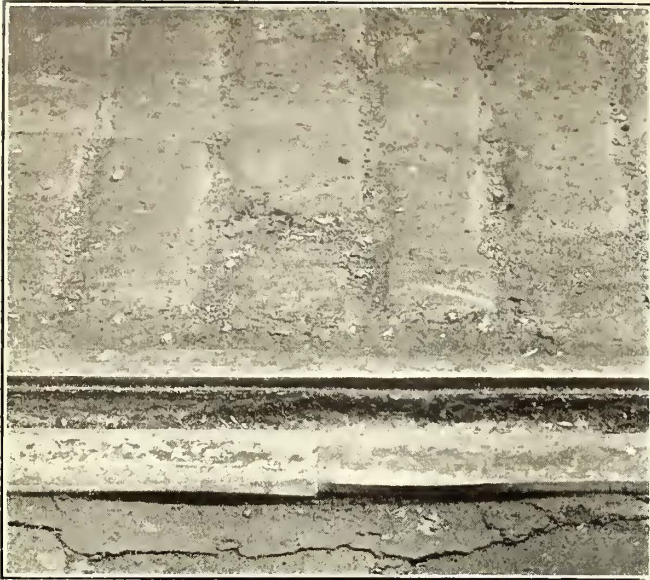
impression tests and transverse bending tests. In the first tests, the drill was used for a period of two minutes, then resharpened, and the operation repeated four times. It was found that all of the samples were practically undrillable. The depth of the holes, after the completion of the tests, were measured to the nearest 0.001 in., and the average for the three was 0.0327 in.

In the ball impression test a steel ball 7/16 in. in diameter was set on the faces of the three tongue-switch specimens and subjected to a load of 35,000 lb. Upon removal the diameter of the impression in the surface of the manganese tongue was measured, and in each case it was found to be 0.32 in. This indicated that the surface hardness averaged approximately the same in the three sample switch tongues tested.

In the transverse bending tests of manganese tongue switches, great care was exercised in applying the load to the three samples so that the test conditions for each might be the same. Each tongue was laid on supports



Chicago Special Work—Fig. 3—Showing Cupping of Manganese Switch and Mate at Run-off from Chicago Rail, Installed January, 1911; Traffic, 221 Wheels Per Hour



Chicago Special Work—Fig. 4—Showing Slight Cupping of Chicago Rail at Run-off from Manganese Switch, Installed January, 1911; Traffic, 221 Wheels Per Hour

exactly 3 ft. apart, and the load was applied at the lug, the tongue resting on these supports in an inverted position. In each case it was found that the elastic limit was reached when the load was approximately 14,000 lb.

CHEMICAL ANALYSIS OF THREE MANGANESE TONGUES, CHICAGO

	"A" per cent.	"B" per cent.	"C" per cent.
Carbon (combustion)	1.100	1.260	1.240
Carbon (color)	1.010	1.150	1.190
Silicon	0.470	0.260	0.350
Manganese	11.440	10.880	12.480
Manganese (check)	11.280	10.960	12.560
Phosphorus	0.067	0.056	0.084
Sulphur	0.021	0.036	0.033
Copper	None	0.340	0.090

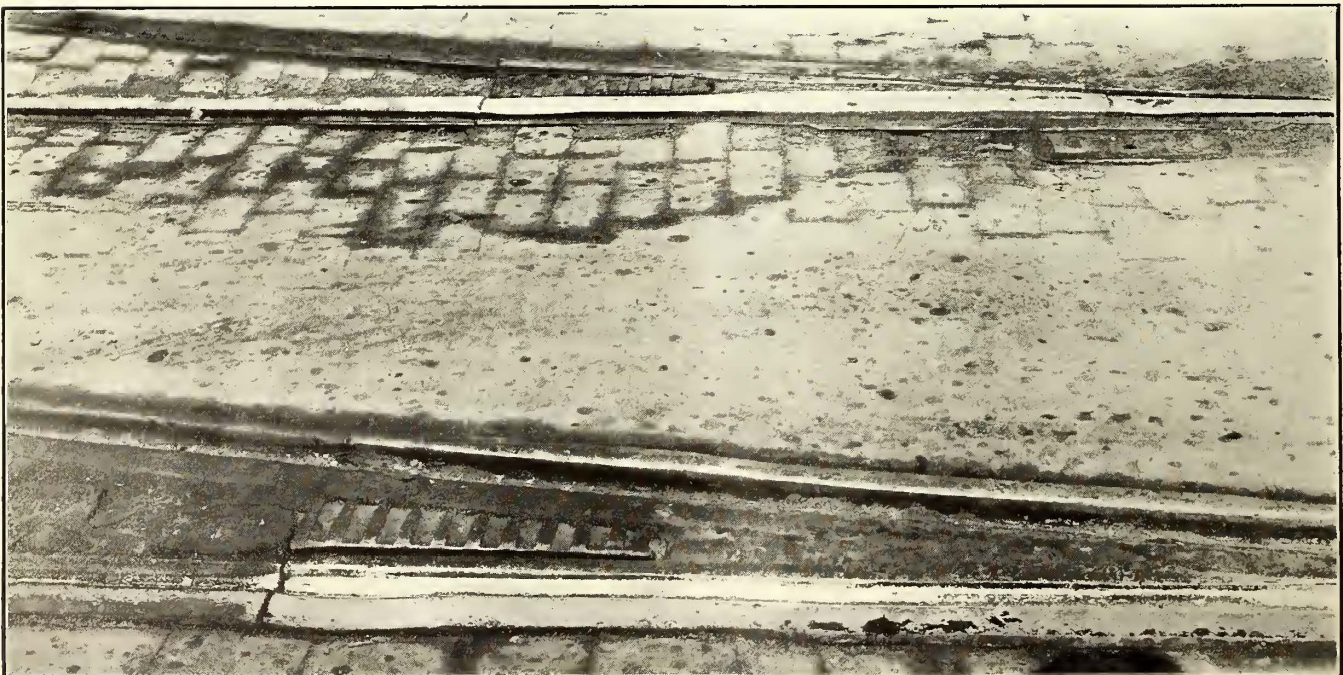
In addition to the physical tests a chemical analysis was made of three sample tongues by two representa-

tive analytical chemists. While there was some variation in the results of the chemical analyses made by the two chemists, the relative proportions of the constituent elements in the three samples were approximately the same.

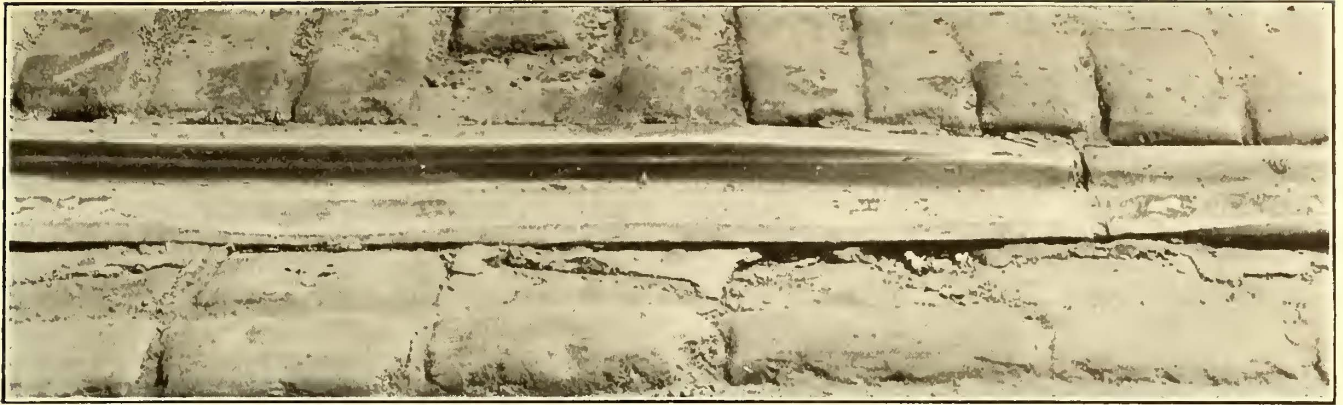
As an additional precaution in the board's endeavor to secure special work pieces equal to the specification and containing no mechanical defects, all work was inspected at the point of manufacture. Besides the inspection for correct dimensions, evidences of cold shot, fractures or segregation of the metal in the head or wearing part of any special-work casting were considered sufficient cause for rejection. Other fractures or cracks appearing in the base of the casting which, in the judgment of the inspector, did not extend into the web or strain a bearing part of the casting, sufficiently to impair its usefulness, were not considered cause for rejection.

Cracks were permitted in the web of the rail at the end, provided they did not extend beyond the first bolt hole in either the upper or lower row. Cracks in the end of the web of the rail which did not terminate in the bolt holes were considered sufficient cause to reject a piece, provided these cracks extended more than 1½ in. in from the end of the rail. Fractures or cracks in switch pieces near the box which did not affect the strength of the switch piece, in the judgment of the inspector, did not cause rejection of the piece.

The foregoing information is to give the reader an idea of the extent to which the Board of Supervising Engineers went into the design and manufacture of all special work. This information is a summary of all the work done by the board, and from it one may draw the conclusion that the process of manufacture as well as the chemical composition of the manganese in the solid castings and insert pieces rested entirely with the manufacturers. The results of the three tests made on manganese switch tongues indicated that manganese had a high abrasive value but showed a low elastic limit under transverse bending strains. The ball impression tests brought out quite clearly the results that might be expected under cold rolling. The steel ball with a 7/16-in. or 0.4375-in. diameter was embedded so that the diam-



Chicago Special Work—Fig. 5—Showing Cupping of Manganese Switch and Mate at Run-off from Chicago Rail, Installed June, 1910; Traffic, 150 Wheels Per Hour



Chicago Special Work—Fig. 6—Showing Equal Cupping in Manganese Mate and Chicago Rail at Run-off from Mate, Installed September, 1909; Traffic, 221 Wheels Per Hour

eter of the impression in the manganese surface was 0.32 in.

SPECIAL WORK INSTALLATIONS

To give one an idea of the immense amount of special work used in laying out the surface railways of Chicago, the accompanying table was taken from the annual report of the Board of Supervising Engineers showing the number of lay-outs, both new and old, up to Feb. 1, 1911. Since that time, however, many new lay-outs have replaced other old ones, but the total number remains approximately the same with a possible addition of a few lay-outs made necessary by track extensions.

NUMBER OF SPECIAL WORK LAY-OUTS IN CHICAGO UP TO FEB. 1, 1911						
	C. C. Ry.	C. Rys.	S. S. Ry.	C. & S. C. Ry.	Joint Property	Total
New	307	551	30	142	19	1049
Old	200	384	16	120	14	734
Total	507	935	46	262	33	1783

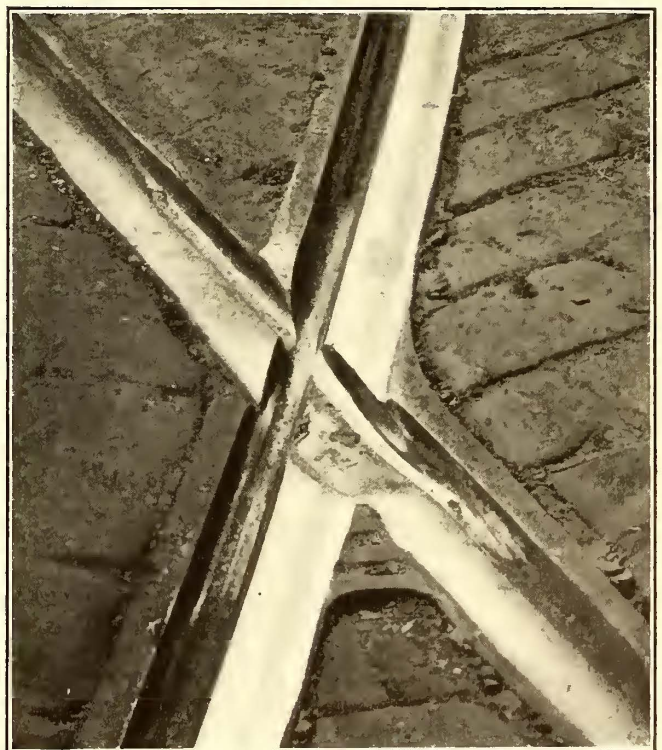
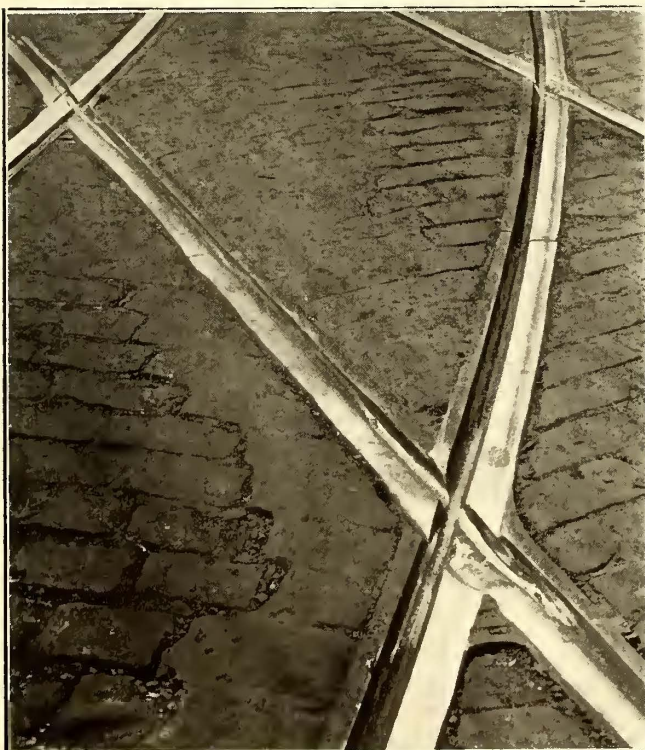
MANNER OF INSTALLING SPECIAL WORK

In practically all cases the method of installing track special work in Chicago has been the same. This includes an 8-in. crushed-stone ballast foundation, 7-in. x 9-in. white oak ties on 2-ft. centers, cut to special lengths to fit each crossing. In most instances it was impos-

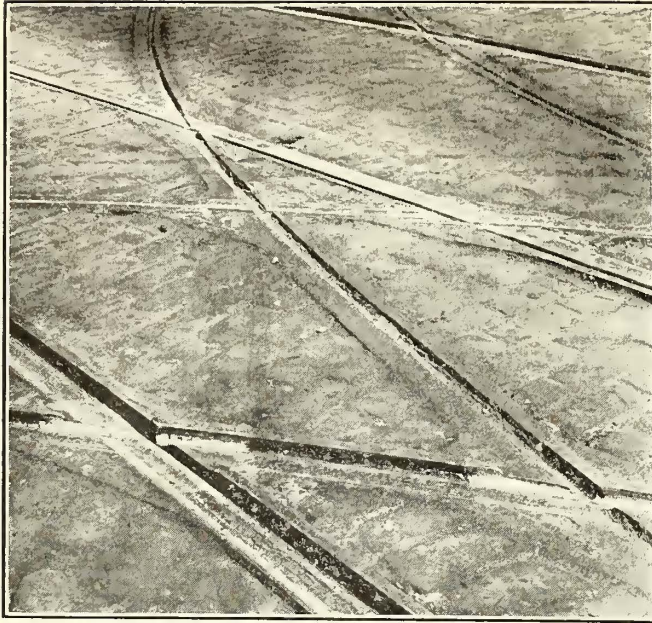
sible to roll the crushed-stone foundation under these crossings because intersecting traffic could not be interrupted. This made it necessary to leave out the paving for a certain period so that the crossing could be re-tamped repeatedly until a thoroughly compact bearing was secured. As will be noted in the illustrations, the character of foundation has not been the cause of crossing failures except in a very few instances. In fact, the failures at points where the foundation has given way are no worse than those where the foundation has stood up. All complicated crossings were purchased built of several pieces so that renewals could be made by replacing only the failed or worn-out portions. Simple right-angle intersections as a rule were purchased in a solid piece for each track crossing. In order to allow for expansion and contraction as well as to preserve the temper of solid manganese special work, all connections were made with mechanical joints.

SOLID MANGANESE STEEL SERVICE RESULTS

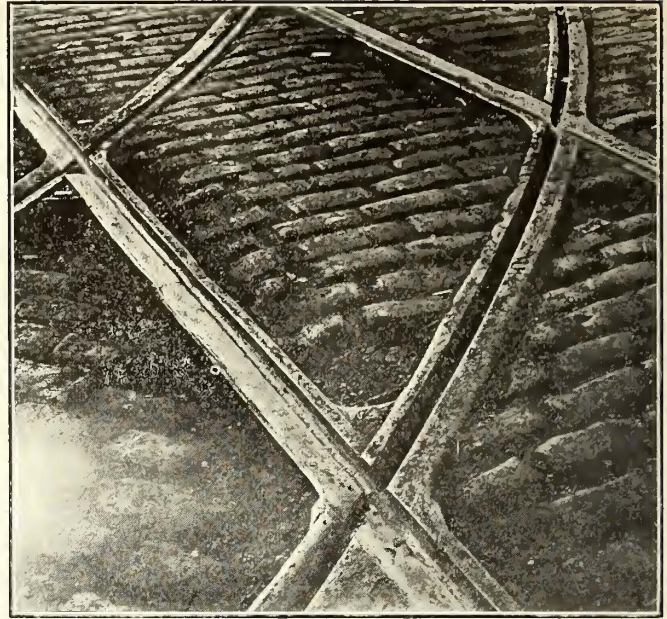
A most careful and impartial inspection of a great number of special-work installations shows all too plainly what effect traffic has had on the three types of special work used in Chicago. With the possible exception of switches and mates, it is said that more than 50 per



Chicago Special Work—Fig. 7—Showing Cupping and Cold Rolling in Manganese Angle Crossing, Installed July, 1911; Traffic, 325 Wheels Per Hour—The Right-Hand Illustration Is an Enlarged View of the Flangeway Intersection



Chicago Special Work—Fig. 8—Showing Cast Steel Arm Manganese Inset Crossing, Installed February, 1911; Traffic, 221 Wheels Per Hour



Chicago Special Work—Fig. 9—Showing Cupping, Chipping and Cold Rolling in Manganese Angle Crossing, Installed January, 1911; Traffic, 221 Wheels Per Hour

cent of the solid manganese pieces have failed before the end of the three-year guarantee period. Those remaining were in excellent condition at the time of inspection and represent what was expected of the solid manganese when it was adopted for track special work.

Inspections beginning in 1908, soon after the first pieces were installed, and continued to date, show that the solid manganese began to fail by "chipping" at the wear-points soon after the first year. The number of points chipped, however, reached a maximum at the end of two and one-half years regardless of the density of traffic, and in many instances renewals were necessary to provide safe operation. The character of the chipping in most instances was much the same and indicated that the piece was improperly tempered, or that there was a segregation of the metal at the points of failure. In practically all cases, as might be expected, the first pieces were broken from the receiving rail corners. Usually the broken piece took the form of a triangular prism which feathered out in the ball of the running rails and was thickest at the point of intersecting flangeways. One explanation of the failure is that it was the termination of life due to the low elastic limit of the material. According to this explanation the comparatively small area receiving the blow from the narrow tread wheels is stretched and pulled beyond the elastic limit of the material, the great tenacity of the material preventing rupture until the material finally parts in prismatic portions as described. In this respect, the effect differs from chipping which occurs from too hard material with high elastic limit and ultimate strength not much larger than the elastic limit.

Another class of failure in the solid-manganese crossings took the form of cupping or cold rolling. As in the case of "chipping" no definite rule could be drawn, because pieces failed both ways, again indicating that the tempering process or the inherent qualities of the metal made it unsuitable to withstand repeated impact blows. The cupping or cold rolling usually followed the chipping, and in no case was it confined to the intersecting flangeways but was quite evident the full length of the manganese running rails. Some of the solid manganese right-angle crossings were bought in one piece and some in halves. At the present time the tendency among the manufacturers is not to supply the crossing in one piece,

in the belief that this plan is not conducive to long life.

One of the most prominent evidences of cold rolling was found where dense traffic moves over one line and little or no traffic passes over the intersecting line. In many instances the metal has flowed until the intersecting flangeway is practically closed where it crosses the heavy traffic running rail. In other instances the effect of cold rolling is to flatten the ball of the manganese rail. This may be noted in the illustrations, where the tread-wear area on manganese rail is apparently much wider than on the standard Chicago rail. This effect was also quite marked at the points where the standard unbroken main-line frogs were installed in which the floor of the throatway is level with the unbroken main-line running rail. Where traffic was heavy on the main line, as much as $\frac{1}{2}$ -in. wear, resulting in this difference in the elevation of the top of the main-line running rail and the branch-off throatway-floor, was noted in several instances.

In connection with the cold rolling or cupping it may be of interest to note that in most instances the metal flows to both sides of the ball of the rail. That flowing to the flangeway side is sheared off by the wheel flanges, and that on the opposite side forms a lip over the lower portion of the ball similar to low-carbon steel rails under heavy traffic. It may also be of interest to state that the cupping does not appear to depend on the character of support. To substantiate this, the cupping at joints represents the supported form over a single web. That in acute angle flangeway intersections was where the points receiving greatest impact were suspended between two web supports. The 90-deg. crossings usually have one supported and one suspended point of impact. As a general rule it might be stated, however, that chipping predominates in the 90-deg. intersections and cupping at the acute-angle intersections.

Cupping at the manganese receiving rail is found invariably, but it is seldom at the run-off from the manganese to the Chicago rail. In angle crossings or switch pieces cupping in one manganese rail also reflects a cup in the opposite rail. Cupping takes place regardless of the condition of the joint, and in many instances it was found most prominent where there was no appreciable difference in the elevation of the two abutting rails. In other cases where there was consid-

erable offset and the receiving rail was the Chicago section, the cupping was slight.

The tests made on the sample switch tongues indicated that the best quality of manganese steel for track work was its ability to resist abrasion. In order to check this a number of points were inspected, and invariably the result was the same, namely, there was no appreciable difference between this quality of manganese steel and that of the Chicago rail. The slow movement of traffic around the curves caused the running rail to wear and show the effect of cold rolling to a far greater degree than the abrasive wear on the guard. For this reason it is believed that renewals will have to be made for running-rail wear rather than for guard-rail wear.

SERVICE RESULTS OF MANGANESE INSERT SPECIAL WORK

A similar study of cast-steel and iron-bound renewable manganese insert special work under the various classes of traffic and for various life periods was made. While the inspections indicated that the manganese inserts failed by chipping there was little or no evidence of cold rolling. These inspections also indicated that the chipping of inserts began after the first year in most instances but was the worst after two and one-half years' service. Again this appears to be a problem in tempering, but the failures of inserts are fewer, and, on the other hand, many of the faulty inserts may be renewed without any disturbance to the pavement. In contrast with the solid manganese special work, however, very little evidence of cold rolling or cupping was found in the cast steel or Chicago rail arms in the crossing frogs. In fact, many insert pieces were inspected which had been under more severe traffic conditions than the solid manganese, yet the common forms of failure in the latter were not found.

Experience with renewable insert special work in Chicago demonstrates that it is possible to maintain some forms tight in the spelter bed. Although some of these renewable inserts have become loose, a few probably because they were improperly set and fastened by the

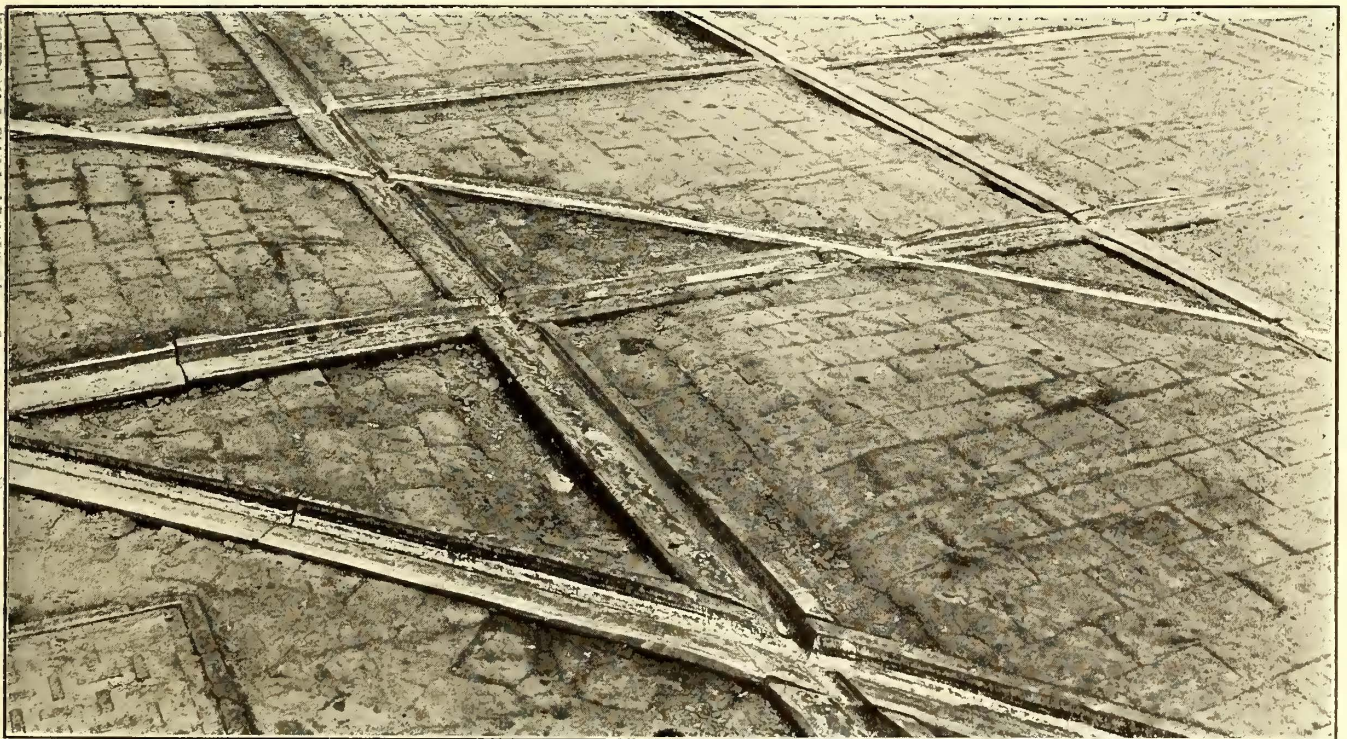
manufacturers, others indicate that the manner of fastening was not of sufficient mechanical strength to withstand the severe impact blows. As a rule inspections tended to bring out the fact that most loose inserts occurred at the 90-deg. crossings and that at angles of less than 90 deg. intersection the loose inserts were seldom found. When these renewable insert pieces did not fail mechanically and were under very heavy traffic, the service results were far superior to solid manganese. This is shown in some of the illustrations. It was also found that, as a rule, cast-steel arms with manganese inserts stood up better under all classes of traffic than the cast-steel or cast-iron bound frogs. In the cast-steel arm type, however, the same problem arose at times as with manganese steel, namely, there was a lack of uniformity in the quality of the cast-steel furnished by the same or different manufacturers. The cupping and cold rolling are also held to be evidences of the quality of the material mentioned in the previous paragraph.

MANGANESE SWITCHES AND MATES

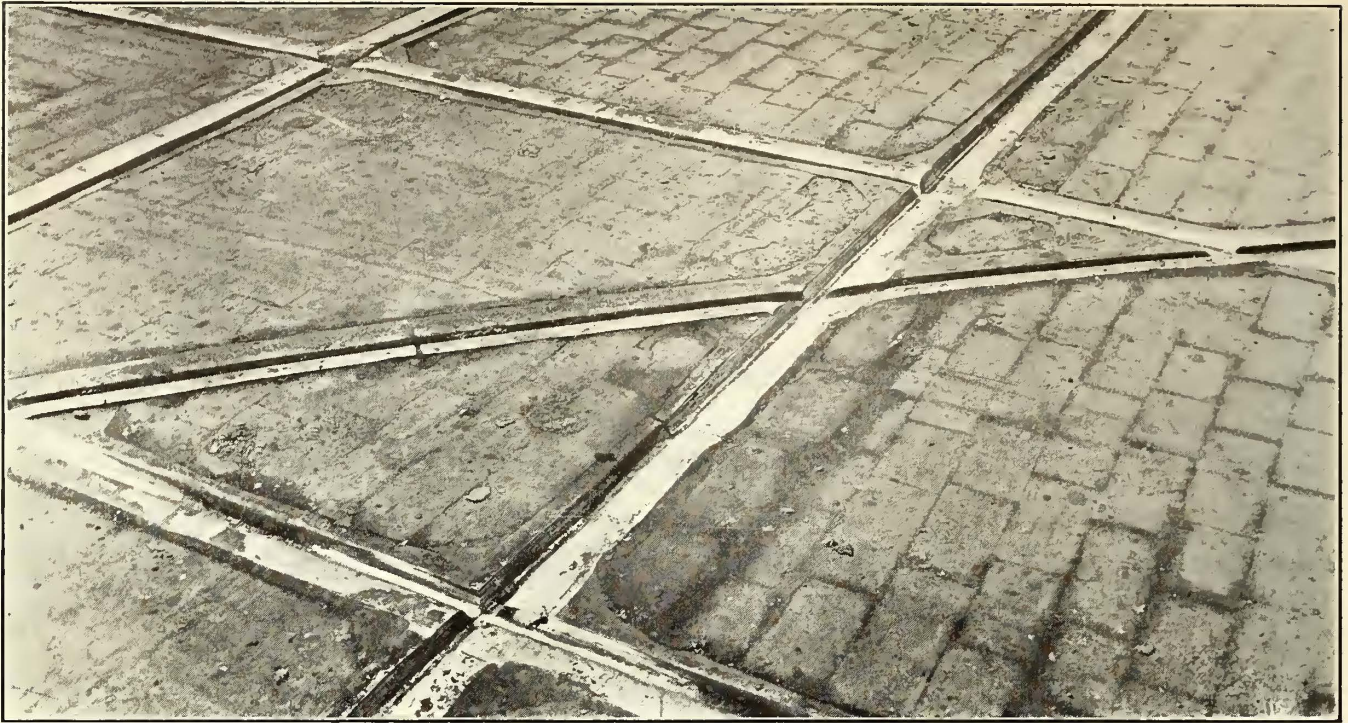
The Chicago standard switches and mates are shown in the illustrations. These, generally speaking, have stood up better than the frogs and crossings, yet under heavy traffic cupping at the receiving end of the manganese piece, as well as at the heel of the tongue, was quite pronounced. Where traffic was heavy through the branch-off, the tongue indicates unusual wearing qualities. Where traffic was heavy along the straight track, cupping and cold rolling throughout the manganese piece was quite evident.

REPAIRING MANGANESE STEEL WITH ELECTRIC WELDER

Another point which may be of interest in connection with solid manganese is the experience accompanying attempts to repair it by electric welding. Tests have been made to build up broken points and cupped joints in solid manganese steel special work in some cases with satisfactory results, though in some others with failures. Here again the peculiar characteristics of the metal make difficult the process of repair with an elec-



Chicago Special Work—Fig. 10—Showing Condition of Built-up Chicago Rail Crossing, Installed November, 1911; Traffic, 309 Wheels Per Hour



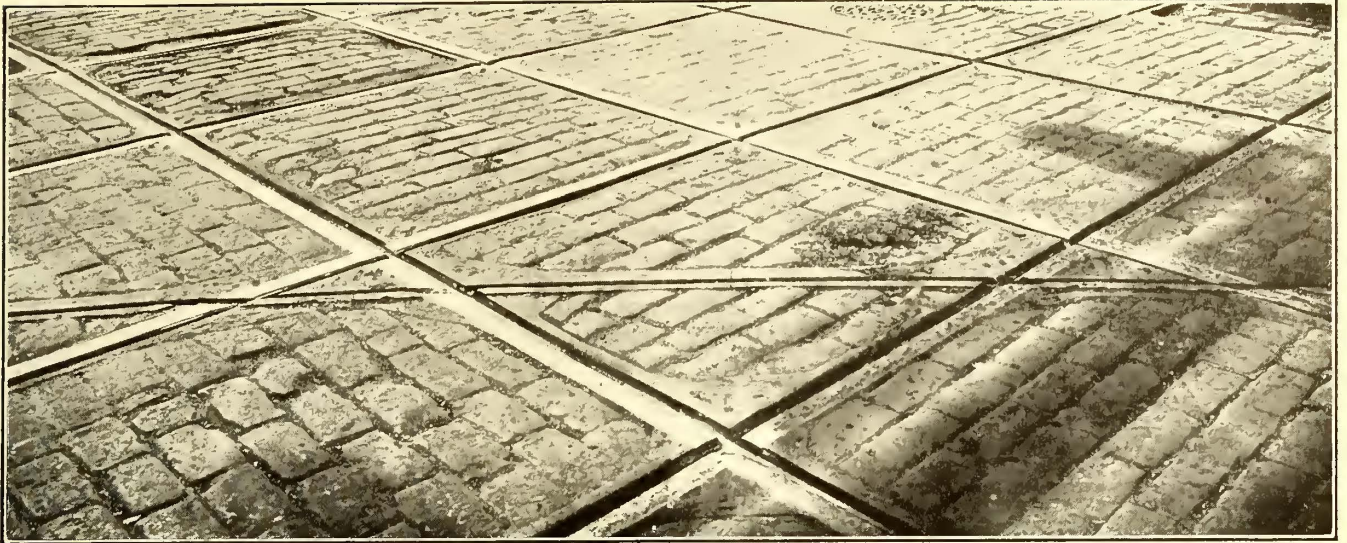
Chicago Special Work—Fig. 11—Showing Chipping and Cupping in Manganese Crossing in Same Location as Fig. 10, Installed June, 1910; Traffic, 326 Wheels Per Hour

tric welder. With manganese alloy in steel the usual tempering process has to be reversed, that is to say, gradual cooling makes a casting hard and brittle. Consequently as the piece comes from the mold it is hard and brittle and the heating or annealing process is followed by quenching which brings about the desired toughness. During the process of welding new metal onto broken points in manganese steel special work, a portion of the old manganese casting becomes heated to a welding temperature. This results in a hardening of a portion of the old casting, which in

many cases becomes quite brittle, and new breaks occur. Fig. 15 is an example of a weld failure in the original casting. Undoubtedly the reason for the success of welds of this kind in those cases where it has proved successful is that the portion of the old casting heated was confined to a very small area. It may be possible to overcome this difficulty, but even under present conditions 50 per cent of the castings thus repaired have stood up under service for a time, and as the cost of making the repair is small the use of the welding outfit seems worth while.



Chicago Special Work—Fig. 12—Showing Chipped Points and Cold Rolling in 90 Deg. Manganese Crossing, Installed February, 1911; Traffic, 345 Wheels Per Hour



Chicago Special Work—Fig. 13—Showing Condition of Cast-Steel Arm Manganese Insert Crossing, Installed February, 1911; Traffic, 226 Wheels Per Hour

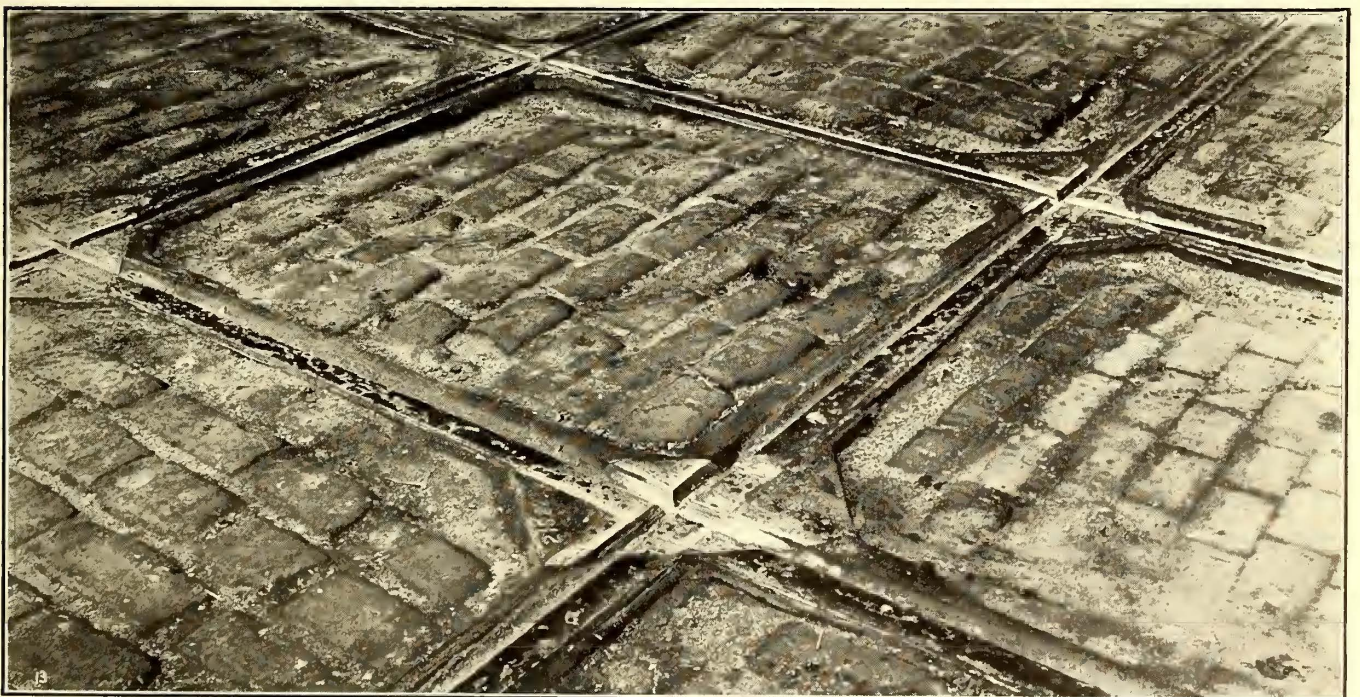
TYPICAL FAILURES OF MANGANESE STEEL

An examination of the solid manganese failures under varying traffic conditions brought out the fact that cupping and cold rolling predominated. It may be stated generally that the Chicago rail laid on various types of foundations has developed little or no cupping up to the present time. There are a number of instances where rail corrugation has developed, but this may be attributed to causes other than that bringing about cupping at the rail joints. On the other hand cupping and cold rolling were largely confined to the manganese steel special work and especially in the solid manganese. Almost invariably where the manganese steel piece was the receiving rail, cupping developed regardless of the density of traffic or the condition of the joint.

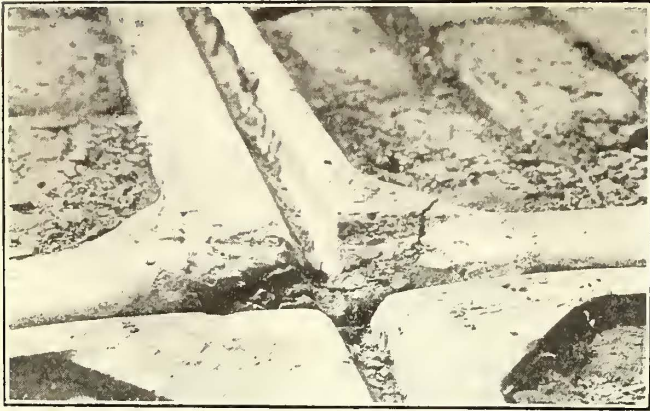
In order that accurate comparisons could be made of the various special work installations, it was necessary to reduce the traffic and tonnage over each point discussed to a unit basis. This was accomplished by com-

puting the total number of cars in all directions, passing over a particular crossing in a twenty-four-hour week-day and a twenty-four-hour Sunday. From these the average number of cars per hour and then the average number of wheels were computed, four wheels being taken for each double-track car as the number passing over any given point. To arrive at the unit tonnage figure, it was estimated that the average double-truck car in Chicago weighed 50,000 lb. and that the average passenger load was 10,000 lb. This total, or 60,000 lb., was divided by eight for the unit load per wheel and was multiplied by the number of wheels passing over a given point per hour.

Fig. 1 illustrates a comparatively light traffic condition where eighty wheels per hour, or 300 tons per hour, pass from the standard Chicago rail to a solid manganese switch and mate. In this illustration it will be noted that cupping of the manganese has developed to a marked degree. An inspection on the ground also shows that both the switch and mate have been affected



Chicago Special Work—Fig. 14—Showing Condition of Iron-Bound Manganese Insert Crossing, Installed February, 1911; Traffic, 297 Wheels Per Hour



Chicago Special Work—Fig. 15—Showing a Case of Manganese Failure After Repair by Electric Welding

and that cupping has also begun at the heel of the switch tongue.

In contrast with Fig. 1, Fig. 2 shows a run-off from solid manganese to the Chicago section under exactly the same traffic and tonnage-per-hour conditions, and both pieces have been in service since October, 1908. In this instance the offset from the manganese rail to the Chicago section is approximately $\frac{1}{2}$ in., hence resulting in a heavy impact on the Chicago rail which has barely started to cup. It will also be noted that the solid manganese rail has begun to round over at the joint to meet the difference in elevation between it and the Chicago rail. At this same point it is also interesting to note that the joint in the opposite rail of this track is in comparatively good condition. The slight cupping shown in the illustration has not been reflected in the opposite rail as might be expected.

To substantiate the statement that cupping seems to develop on the solid manganese pieces regardless of the traffic, Fig. 3 illustrates the point. Here the solid manganese switch and mate are the receiving rails, and cupping has developed to a slight degree, although the traffic is approximately three times greater than in Figs. 1 and 2, or averages 221 wheels per hour, which is equal to 829 tons per hour. At this point cupping has also developed in both the switch and mate, as well as at the heel of the switch point, and these two pieces have been in service since January, 1911.

In contrast with the foregoing Fig. 3, Fig. 4 is shown to illustrate the cupping in the run-off from manganese to Chicago rail at the opposite end of this solid manganese switch. As shown in the illustration, the cupping is just beginning on the Chicago rail, although cold rolling throughout this manganese piece was evident in a careful examination on the ground.

Fig. 6 shows the run-off from a solid manganese mate to a Chicago rail, both of which have been in service since September, 1909. The traffic over this joint is 221 wheels per hour, or 829 tons per hour. Probably the most interesting point of connection with this illustration is found in the fact that the manganese rail had been carried down with the Chicago rail, although the Chicago rail is the receiving one and should show all the cupping. A careful inspection on the ground also shows that cupping has developed at the point of the switch as well as the heel, and both have been reflected in the mate in the opposite track.

Fig. 5 is shown to illustrate an instance where cupping has developed on the manganese piece, regardless of the condition of the joint or the supporting foundation. Here a straight edge laid over the cup showed that the Chicago rail and the solid manganese rail were approximately at the same elevation, and the maximum depth of the cup was approximately $\frac{1}{2}$ inch. In this same illustration the effect of cold rolling throughout the

piece may be noted by the slight wave in the edge of the opposite rail, as also may be the cupping at the heel of the switch point. This particular switch and mate have been in service since June, 1910, under heavy traffic averaging approximately 219 wheels per hour, or 721 tons per hour.

In the foregoing paragraphs describing failures in switches and mates, it must be borne in mind that all switches and mates have not failed in this manner, but these merely illustrate the character of some failures under heavy traffic conditions. In some instances these solid manganese pieces have stood up beautifully under varying traffic conditions, thus the failures recorded indicate that there is a lack of uniformity in the product.

As might be expected most failures have occurred in frogs and crossings, but as mentioned heretofore these too have in a large measure become defective regardless of the density of traffic. On the other hand it must be stated that all solid manganese pieces have not failed in the manner illustrated, but it has been estimated that more than 50 per cent of them have been found defective in one form or another.

Fig. 9 illustrates an angle crossing over which traffic moved exclusively on the straight track. This solid manganese piece of special work was installed in January, 1911. The average traffic over it was approximately 221 wheels per hour, or 829 tons per hour. The movement of traffic was from left to right, and the cupping on the receiving rails may be noted as well as that reflected in the opposite rail. This piece is typical of the effect of cold rolling throughout the solid manganese running rail, and the marked cupping at the intersection of the flangeways in angle crossings of this type is also typical. This piece has also failed by chipping at



Chicago Special Work—Fig. 16—Showing Extreme Case of Crumbling in Manganese Frog, Installed April, 1909; Traffic, 176 Wheels Per Hour

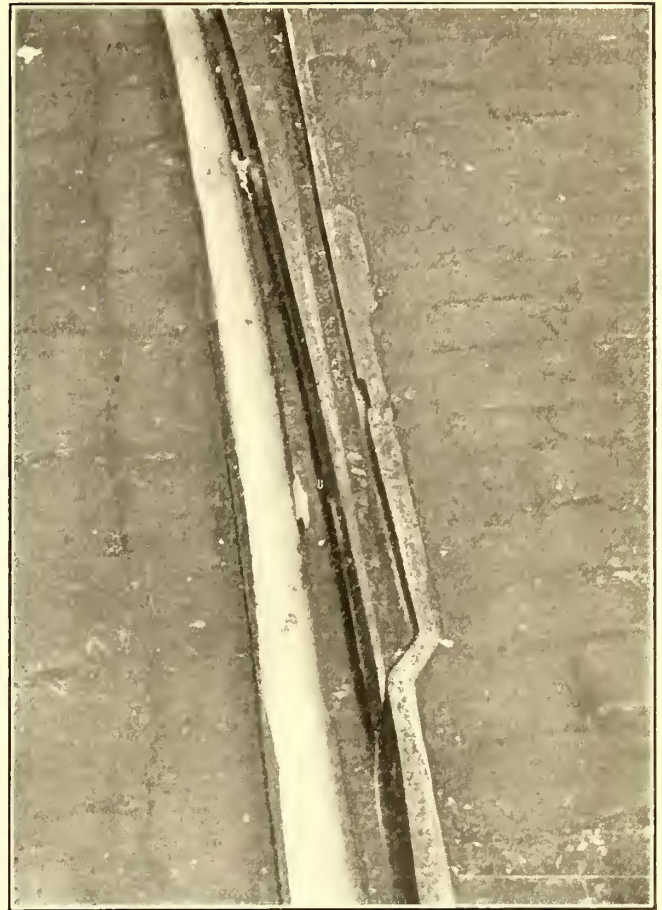
one of the angle points, as well as on one of the arms midway between the intersecting flangeways and the joint. Deep cupping has occurred at the intersecting flangeways, following which the running rail has usually begun to spall off, indicating either an imperfect casting or a change in the temper of the running rail under the repeated impact blows.

In contrast with Fig. 9, Fig. 8 is shown, being a cast-steel arm, renewable manganese-insert lay-out with angle crossings, also similar to Fig. 9. This lay-out was installed in February, 1911, one month after the solid manganese piece in Fig. 9, and exactly the same traffic moved over it. As shown in the illustration this lay-out is in perfect condition, and neither cold rolling nor chipping have occurred in any of the manganese inserts.

Similarly, Fig. 13, which is a cast-steel arm renewable insert right-angle crossing installed in February, 1911, is apparently in good condition. The traffic moving over this right-angle crossing is approximately 226 wheels per hour, or 848 tons per hour. The condition of the inserts, however, is not as good as that in Fig. 8, nine of the sixteen points being broken, but in no instance is the break large enough to affect the safety of operation, and all inserts are otherwise in excellent condition. Attention is also directed to the fact that no cupping or cold rolling has developed throughout the arms of the two cast-steel insert installations. This probably accounts, in a large measure, for the condition of the paving, which in Fig. 9, around the solid manganese piece, is badly in need of repairs.

An example of what occurs to the solid manganese special work and how it compares with the insert work under extremely heavy traffic is illustrated in Figs. 7, 12 and 14. Each of these installations has approximately the same density of traffic moving over it. The solid manganese angle crossing in Fig. 7 was installed in July, 1911, and the average traffic is 325 wheels per hour, or 1217 tons per hour. The cast-iron bound manganese insert right-angle crossing shown in Fig. 14 was installed in February, 1911, five months prior to the lay-out installed in Fig. 7. From a service standpoint the wear on these two lay-outs should be approximately the same.

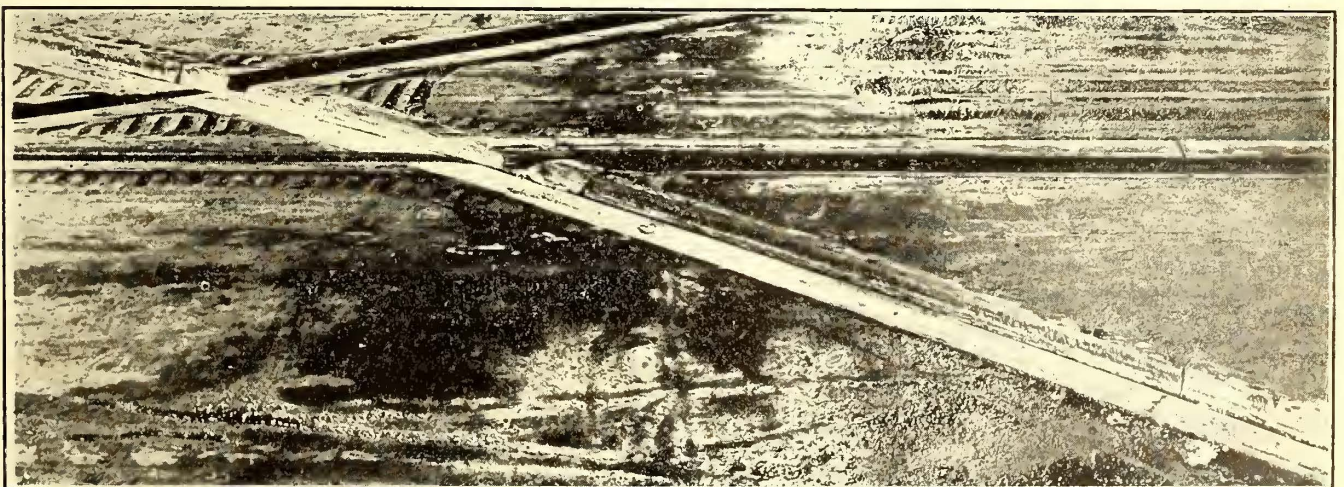
Traffic moves over the solid manganese angle crossing two ways, namely, from left to right on the straight track and from the foreground to the background on the curved track. In this installation, similar to the other angle crossing shown, serious cupping has developed at the intersection of one of the flangeways followed by a spalling off of the metal in the running rail. This is illustrated in the right-hand engraving in Fig. 7. As has been mentioned in connection with other solid-man-



Chicago Special Work—Fig. 17—Showing Tread Wear on Manganese Switch Running Rail, Installed July, 1911; Traffic, 15 Wheels Per Hour

ganesse pieces, the cupping at the joints as well as cold rolling throughout the solid manganese pieces also may be observed in this illustration.

In contrast with Fig. 7, Fig. 14 is shown, being a cast-iron bound manganese insert right-angle crossing. Traffic moves over this crossing in two directions, the average wheels throughout the year being 297, or 1114 tons per hour. These four crossings were purchased in single pieces with standard Chicago rail forming the running rails. Here the manganese inserts are giving extraordinary wear, although some of them indicate that they have begun to loosen on the spelter bed. This lay-out is in a heavy vehicular traffic district, which accounts for the defective paving rather than the condi-



Chicago Special Work—Fig. 18—Showing Equal Wear on Chicago and Manganese Guard Rail, Installed September, 1911; Traffic, 53 Wheels Per Hour

tion of the track foundation, which appears to be in excellent condition.

Extraordinary failure under especially heavy traffic is shown in the solid manganese right-angle crossing in Fig. 12. Here the traffic moves both ways, averaging 345 wheels per hour, or 1294 tons per hour. In the sixteen intersecting flangeways, fourteen have chipped and the cold rolling and cupping may be observed throughout the piece. This lay-out was installed in February, 1911, and unless it can be successfully repaired by electric welding and grinding, it will have to be renewed within a short time.

In these illustrations and comparisons it might be interesting to note the results of heavy traffic on the ordinary built-up, mechanical joint crossings as compared with the solid manganese. This is clearly shown in Figs. 10 and 11. The built-up installation shown in Fig. 10 was installed in November, 1911, and the traffic moving over the right-angle section is approximately 309 wheels per hour, or 1160 tons per hour. The solid manganese pieces in the same lay-out were installed in June, 1910, and the traffic over them averages approximately 326 wheels per hour, or 1223 tons per hour.

In this comparison the built-up piece has been in service two and one-half years under approximately the same density of traffic as the solid manganese piece which has now been in approximately four years. In the illustrations it will be noted that in the built-up piece there is no cupping at the joints, and, if anything, the running rails are in perfect condition except for the loosening of the mechanical joints. One disadvantage of this type of construction is clearly illustrated, namely, that from a pavement maintenance standpoint the one-piece special work is much more to be desired than that held together by mechanical joints. The pumping of the mechanical joints in the built-up work has carried the granite block paving surface with it. In Fig. 11 the pavement around the solid manganese piece is in fairly good condition. Similar to other right-angle solid-manganese special-work installations, the one shown in Fig. 11 has failed by chipping at the intersecting running rails. Cupping and cold rolling may be noted throughout the lay-out.

An extreme case of apparent segregation of the metal, as well as a lower percentage of manganese in the steel, is shown in Fig. 16. This is a standard 100-ft. radius Chicago turn-out frog installed in April, 1909, with a traffic density of 176 wheels per hour, or 660 tons per hour. This is an unusual type of failure and is shown to illustrate clearly what might occur if the foundry practice is faulty or the tempering has not been properly done.

The solid-manganese standard Chicago tongue switch shown in Fig. 17 clearly illustrates the effect of cold rolling and flange wear under comparatively light traffic. This piece was installed in July, 1911, and the average traffic equals fifteen wheels per hour, or 56 tons per hour. A careful examination on the ground shows the effect of cold rolling throughout the solid-manganese running rail, although the piece has given excellent results from an abrasive resistance standpoint. Where the solid manganese rails join the Chicago rail section there is no evidence of cold rolling and the high-carbon guard rail appears to be withstanding the abrasive wear about as well as the manganese guard.

A comparison of manganese steel and the Chicago guard rail under abrasive wear is shown in Fig. 18. Here a cast-iron bound renewable manganese insert lay-out was installed in September, 1911, and the average traffic over it is approximately fifty-three wheels per hour, or 198 tons per hour. While this traffic is comparatively light the illustration serves to bring out the point that the Chicago guard-rail section wears about as well as the manganese guard rail in the insert pieces.

As already mentioned, the advantage of the manganese guard rail under the slow-moving traffic through special work in Chicago is offset by the excessive running-rail wear, which observations to date indicate will govern the life of the piece.

COMMUNICATIONS

INTERSTATE CLASSIFICATION OF ACCOUNTS

CHICAGO ELEVATED RAILWAYS

CHICAGO, ILL., April 22, 1914.

To the Editors:

I am of the opinion that the new tentative classification of electric railway accounts, issued by the Interstate Commerce Commission, effective July 1, 1914, will probably meet with the approval of most accounting officers. Your general discussion of the subject, participated in by various accounting and other railway officials, has covered the subject in a very comprehensive way, but there are a few points that have not been threshed out sufficiently from the railway companies' standpoint.

One of them is the discount on bonds, notes and other evidences of indebtedness, which, according to the Interstate Commerce Commission ruling, are not properly chargeable to road and equipment accounts, excepting that portion of the discount which is equitably assignable to the period between the date of the actual issuance of securities and the time when the property acquired or the improvement made becomes available for the service for which it is intended. Under the present classification of accounts now used by the Interstate Commerce Commission, which it is contemplated to revise this year, the following note appears in general road and equipment expenditures in reference to the charges to construction for interest:

"Discounts and commissions on securities issued for construction purposes or to raise funds for construction should not be charged to this account or considered as a proper charge against construction."

The new system of accounts goes a step in the right direction when it is allowable to charge capital accounts with a certain proportion of the discount on securities. To cover practical methods of financing, this should go a step further and include *all* the discount which is allowed as a brokerage to the banker or investor taking the securities of a new company which has not yet proved its success.

When a railway is built, to the ordinary charges for material and labor used in the construction of the various classifications of property and equipment are added certain overhead charges such as law expenses, interest during construction, taxes levied on the property belonging to the company while under construction, injuries and damages and miscellaneous organization expenses, and these constitute the property or capital account. The brokerage or, as it is usually termed, discount on securities is likewise a charge toward the cost of setting up the railway as a going concern, and may be termed the overhead charges of financing. It should not be considered in the nature of an interest charge to be pro-rated over the life of the bonds, but rather ought to be considered as it is, in effect, a bonus of bonds given to the bondholder to offset the possible loss of value of the securities selling in a market alongside of seasoned securities of demonstrated value.

The electric railway industry is only about twenty years old. To promote its progress the fixed charges should be minimized; hence the above theory, it seems to me, should be utilized even further and the capital account of the railway or, for that matter, any enterprise which depends upon the building up of the territory through which it runs should include the estimated loss in operation, after paying fixed charges during the first

three years of its existence. National and State railway commissions have not seen fit to adopt this view as yet, but the history of a great many of the new enterprises such as hotels, some tunnel systems and others, particularly railway enterprises, show the necessity for providing for this contingency in the original volume of capital required to float them.

During the rehabilitation period of the surface lines in the city of Chicago a plan was adopted of providing a certain stipulated percentage, namely 70 per cent, which would be charged against the income account as the cost of operation, and certain charges in excess of that for a period of three years were added to the capital account. This would be one way of providing for this deficit in the early years of operation; furthermore, this plan would be agreeable to the investor by safeguarding the payment of his interest during the first unprofitable years rather than be objected to by such investor, who accepted the securities of such company. The subsequent investment would be taken care of by a physical valuation of the property which should also include a percentage for brokerage that could not be judged excessive.

Of course this would only be allowed in the case of an entirely new enterprise as discount on refunding bonds should always be amortized out of earnings during the life of the bonds. The result of excess valuation of the property over the cash cost of same, by including the losses of early years of operation, would not be objected to by the public on account of the impetus which would be given to the development of electric railways in localities where they are very much needed, but are at the moment unable to support the capital expenditures. Giving a fighting chance to every new enterprise, until a reasonable time expires when it can justify its existence, would not be against public policy, but would stimulate the building of many miles of facilities not now in existence. These items, viz., discount and losses of early years of operation included in the capital account, should also be included in the valuation of the property shown in the depreciated cost to reproduce and should also be taken into consideration in the basis for rate-making.

The step of the new classification, providing for the discount of securities during the period of construction, is only one in the right direction, but should be changed to include the entire discount on bonds. Otherwise this discount will be included possibly in organization expenses under account No. 549 instead of under account No. 546 where it can be clearly earmarked.

One of the principal changes in the new classification of accounts for electric railways about to be adopted consists in the segregation of the power maintenance and operation accounts. From this it is hoped to disclose the net cost of power. Maintenance in total is thereby decreased, but a corresponding benefit is obtained for the investor who only uses the main subdivisions of operating expenses in his calculations; by providing a means of obtaining a fair comparison of conducting transportation, this enables him to determine a better basis of operating efficiency.

In a comparison of the cost of power between companies which purchase current and those which have their own power-producing plants, consideration must be given to the fact that the primary charge of purchased power includes depreciation and interest on the capital investment, items appearing only in the fixed charges, or deductions from net income in the income accounts of companies producing their own power. This segregation of the power into a fifth division of operating expenses has been in use on the Metropolitan West Side Elevated Railway Company of Chicago for some years, and at the time of the unification of the

elevated lines of Chicago in 1911 was adopted by all the other companies. It has always proved beneficial to the operating departments as well as satisfactory to those using financial statements.

EDW. A. BRION, Comptroller.

DEFINITION OF FAILURE FOR SIGNALS OF THE CONTACT TYPE

STREET RAILWAY SIGNAL COMPANY

PHILADELPHIA, PA., April 23, 1914.

To the Editors:

As a part of the discussion as to what constitutes a signal failure, we should like to see this subject considered by the users of both track- and trolley-contact signals, because the method of operation is somewhat different to that involved by track-circuit control.

When the writer was a repairman some ten years ago, on a steam road, a failure was charged against a signal for every train that reported it out of order. We repairmen always considered this rather hard on us because there was quite a rivalry among us which was made more keen by a monthly report that started from one end of the division and went to the other, being shown to each repairman. I do not know whether or not this rule is still in vogue, but if it is, and if it was applied to the contactor types of signal, there would be each month an appalling list of signal failures on some roads. Therefore I think that a signal failure should be classed as one failure (I refer to contactor type) from the time the signal is reported out of order until it is O.K.'d, it being understood that the car crews should report to the dispatcher, or the proper official, whenever they found a signal out of order.

A signal is placed on a line to protect a train or car. If any part of its mechanism fails to perform its duties the signal is at fault. But, if the signal goes to a "stop" position—we are not discussing "clear" failures as they are obviously failures and need no discussion—because of an open switch or a broken rail, a gang working, or an improper car movement, it is performing its proper duties and should not be charged with improper operation.

To my way of thinking signal failures are divided into but two classes: blamable and unblamable, a blamable failure being one caused by defect of any part of the signal apparatus, lamps being included. All other failures, such as "work-train in block," "switch open," "broken rail," "gang at work" are unblamable failures.

H. R. STADELMAN.

At the recent hearing before the Interstate Commerce Commission, J. T. Wallis, general superintendent of motive power of the Pennsylvania Railroad Company, testified concerning the increased maintenance of equipment expenses incidental to the operation of the Pennsylvania Railroad System. Mr. Wallis said: "At the present time the Pennsylvania Railroad Company charges depreciation on the following bases: locomotives and passenger cars on a basis of 4 per cent of the original cost of the equipment, and on freight cars on a basis of 3 per cent on such cost, for the reason that we believe a locomotive will last about twenty years, and based on the final value of the scrap being 20 per cent. of the original value, the depreciation plus the salvage will equal the original cost. On passenger cars we believe that our wooden cars will last twenty years. As far as steel cars are concerned, we do not know how long they will last, but in order to provide for the replacing of our wooden with steel cars in a reasonable time, and for the steel cars when they shall have to be retired, the best figure we have been able to arrive at is 4 per cent."

Concluding Session of Iowa Association

A Report of the Meeting on April 24 at Cedar Rapids—Abstracts of Papers on Public Policies and "Safety First"—Election of Officers

The proceedings of the first day's session of the annual meeting of the Iowa Street & Interurban Railway Association were reported on page 928 of last week's issue. The closing session was attended by about 75 delegates. The paper on car cleaning and sanitation by M. M. Lloyd, master mechanic, Des Moines City Railway, was read by the author and discussed in detail by several railway men, including R. A. Leussler and William Musgrave of Omaha, O. S. Lamb of Waterloo and C. M. Feist of Sioux City. They urged that too much attention could not be given to keeping cars in a clean, sanitary condition. The appearance of the car has much to do with the public relations question in any community. At Sioux City it is a practice to clean cars, car bodies and interiors in the daytime and to wash windows at night. The ceilings are cleaned once every six months. The railroad company does not disinfect the cars, but whenever there is any knowledge of a possibility of contagion, it calls upon the city health authorities to do so.

C. M. Feist related that until about a year ago his company had had good results with the varnish used on car exteriors, but since then the life of the varnish has been remarkably short. This rapid deterioration of varnish was attributed to the new concrete pavement, 30 or 40 miles of which had been installed within the last two years. These pavements have a concrete surface, and when the dust from this settles on the cars it mixes with the washing water and produces a chemical action on the varnish. No remedy has yet been found to prevent this.

A paper entitled "Modern Public Policies of Public Service Corporations" by P. P. Crafts, general manager Iowa & Illinois Railway Company and Davenport & Muscatine Railway Company, was then read by the author. This paper will be found in abstract below.

In discussing Mr. Crafts' paper, Mr. Leussler summarized the public sentiment of Omaha and told of the work which the Omaha company had been doing for a number of years, regretfully pointing out some of the results. Notwithstanding strong efforts on the part of the railway to meet every reasonable demand, ordinances including such features as seven fares for a quarter had been placed before the voters. The latest ordinance voted upon won by a majority of but 700 votes, only 8700 votes out of a possible 25,000 being cast. The court has granted the company a restraining order. E. G. Schmidt, of Des Moines, expressed his belief in the fairness of the public. He thought it wanted good service rather than low fares. In Des Moines the problem now is to reach an agreement with the city as to the value of the railway property. The mayor thinks that a reasonable investment included only the property at its depreciated value. F. V. Hanlon told of recent occurrences in Mason City when the city officials prepared an ordinance for a new municipal lighting plant. This ordinance was defeated three to one in general election, and since that time the local public service company had filed a petition for a new ordinance for its own company. H. E. Weeks described how the gas and electric lighting companies in Rock Island, Moline and Davenport had used the newspaper advertising space to inform the public that they would be glad to receive complaints.

Mr. Crafts said that every public service company

frequently got letters of unjust complaint. He thought that these should have full answer and that, wherever necessary, a thorough investigation should be made. The policy of giving the complainant full particulars of the results of the investigation and even going so far as to furnish him with inter-department reports has a great deal to do with building up good-will for the local public service corporations. E. C. Allen of Cedar Rapids said that it often became desirable for the manager to make a personal investigation and help in the settlements. He felt that courtesy on the part of the employees was the biggest asset which an electric railway could have. One slogan that he used was "treat the passengers as you would like to have your own family treated." J. D. Wardle, Cedar Rapids, said that he had found that the public intended to be fair if it had the information on which to base its judgment.

At the conclusion of the discussions of the paper on public policy, the association went into executive discussion. Later it was announced that the next annual convention would be at Keokuk in the spring of 1915.

The following officers were elected and installed for the coming year: President, R. A. Leussler, Omaha & Council Bluffs Street Railway; vice-president, J. F. Porter, Tri-City Railway & Light Company; secretary and treasurer, H. E. Weeks, Tri-City Railway & Light Company.

At the conclusion of the meeting on the last day, J. A. Wardle entertained several of the delegates with a trip in a special car over the new Mount Vernon extension of the Cedar Rapids & Iowa City Railway.

MODERN PUBLIC POLICIES OF PUBLIC SERVICE CORPORATIONS

BY P. P. CRAFTS, GENERAL MANAGER IOWA & ILLINOIS RAILWAY AND DAVENPORT & MUSCATINE RAILWAY

It can safely be asserted that a considerable change has been wrought in the public policies of the public service corporations, and it is the purpose of this paper to analyze and briefly discuss the modern policies, with the reasons therefor and the results thereof.

There seems to be no reason for much comment of the old policies now conceded to be archaic, unless it is to excuse Commodore Vanderbilt for having uttered his famous expression, if indeed he ever made it, on the ground that he might have been unduly irritated by a caustic complaint of some patron; something which occasionally upsets the highly developed mental balance of even the present up-to-date public utility official.

For many years it was the ruling policy of the public service corporations to conduct their business with a great show of secrecy and to impress upon their patrons the futility of raising objections to their methods or service. It is true that the state of the art did not then permit of giving such reliable service as is now demanded and can generally be given, but that weakness was too strongly featured when dealing with service complaints, and too little attention was given to prompt and efficient correction of the real causes. Federal, state and municipal bodies and individual patrons were too frequently led to believe wrongly that the func-

tions and service of the utilities were peculiar and could not be conducted along the same lines as those of private corporations.

FUNDAMENTAL PRINCIPLES

A public service corporation whose activities are confined to one community or to a correlated group of communities should be a monopoly so far as the particular class of service which it renders is concerned. It is entitled to protection from destructive competition; it should not be unduly restricted in the conduct of its business; and it is as much entitled to a reasonable profit, based on something besides the replacement value of its physical property, as any private business. But to attain these very desirable results, private business must be distanced, if anything, in square and above-board dealing with governmental bodies and with patrons, in service rendered and in courtesy and attention accorded to all. Rates too low to be commensurate with good service will not attract business. Although low rates are demanded, many instances can be cited indicating that the public is as willing to pay reasonable rates for good service rendered by public service corporations as it is to pay reasonable prices for good butter, eggs, shoes and other necessities of life. But it is necessary to give good service *first*.

GOOD SERVICE

The public cares nothing about shops, barns, power houses and gas works, their condition or the methods used in operating them. It wants, however, to ride in clean, comfortable cars which are run on time, over reasonably smooth track; to have its electric lights steady and the service reliable, and to have its gas contain the proper number of heat units and delivered at fairly even pressure.

Good service also demands alert, clean and courteous employees from the officials down and the rendering of prompt and efficient service by those employees, no matter what it may be. This brings us to the matter of courtesy, one of the most important factors in maintaining pleasant and profitable relations with the public. What can offset the effect of a clean, comfortable car on a bright morning any more than a surly or unkempt train crew, or what can spread more ill feeling in the neighborhood toward the company than to have a front porch conference develop the fact that complaints of low gas pressure by two or three neighbors had been curtly received at the office and apparently no attention given them? The facial expression of an employee when conversing with patrons, the inflections of the voice when talking over the telephone; his attitude toward his fellows, his superiors and the company; his general appearance, habits and conduct, all have a great tendency to influence the public for or against the public utility company.

Every employee comes in contact with the public either in business or in private life, and it is essential to avoid as far as possible the employment of men who drink to excess or whose private life is such as to render them objectionable to the majority of their fellow citizens. Such men are always likely to be exceptionally slack in their personal appearance and are generally inclined to waste their own and the company's time discussing the acts of their superior officers and the company's methods, often in a derogatory manner.

DEALING WITH COMPLAINTS

Complaints should be handled promptly and efficiently, and to that end care must be taken that the full address of the complainant be taken, that he be told that an investigation will be made promptly of the result of which

he will be duly advised, and without question he should be promptly informed of the result.

The writer frequently follows the practice of forwarding a letter setting forth the results of an investigation and attaching thereto all of the inter-department correspondence in order that the patron may know exactly what has been done. Sometimes it is necessary to inform the patron that he is at fault, and although most patrons dislike to be so informed, I believe that this can be done so diplomatically as to avoid offense and thereby make a complete settlement of the complaint without leaving the patron to feel that the company has not given it proper attention. One of the greatest errors which can be made is for a company to assume a responsibility which rests with the patron. Settlements of this character establish one precedent after another until the company is expected to bear the brunt of every complaint, no matter how unjust it may be.

Another error which nullifies respect for the company and its methods is to have complaints accepted in a cringing manner. It is far better to accept a complaint in a quiet, dignified manner. This often has a decided effect upon people who may be inclined to lodge unjust claims, and in all cases such a manner promotes respect. Another error is the use of the "Oh! Be joyful" or "back-slapping" method of receiving complaints. Generally a complaint is made because the complainant feels he has a real grievance, and he is not in a mood to do or accept much "jollyng." Consequently he feels that the attitude of the company is not sincere, and he is therefore distrustful. Reserve your "Hello Ike, what's the matter now?" attitude for your intimate personal friends, and even then, be prepared to "square" yourself occasionally when "Ike" happens to be in deadly earnest and takes offense at your breezy manner. But the greatest mistake of all is to receive complaints in a manner indicating displeasure or with an intimation that the company's service is considered perfect. The first creates antagonism immediately, and the second creates distrust of the ability and intention of the company to maintain good service.

All employees should be taught to be keenly on the lookout for adverse comments or criticisms made in their presence or repeated to them by friends, and promptly to report such to the proper officials. Many of our patrons seem to abhor making complaints to the company, and frequently there is no knowledge by the company officials of anything radically wrong until the accumulated trouble bursts like a thunderclap upon the management. Often an employee may have casually heard of the trouble in its early stages, and a prompt report from him would have prevented serious ill feeling on the part of a large and rapidly increasing number of dissatisfied patrons.

It is astonishing to realize how many patrons, unassisted by the newspapers, will learn, remember and circulate adverse criticism of service while few will be equally diligent to advertise a good feature. Perhaps this is human nature. The floor managers of the best department stores and the managers or clerks of the best hotels frequently ask their patrons if they are being properly served, in fact, they invite criticism. They do this because experience has taught that it is one of the best methods to detect inefficiencies in the service. There can be no effective argument against the use of the same method by public service corporations. Such inquiries do more good for the cause than can be easily appreciated provided, of course, that merited criticisms so elicited are given due attention.

Complaints made after office hours should not be neglected. What is more irritating than to have the electric lights go out, the gas pressure drop, or the street cars stop, and, then, upon telephoning for in-

formation, to be told by the operator "The office is closed," or "They do not answer." The telephone directory, at least, should indicate some department or individual who can be called after office hours if the revenues do not permit the expense of keeping a man on duty under pay. The organization should be such that this feature of the service is not handled in a slipshod manner, as is too often the case. The one appointed to this duty should not leave his telephone unattended without arranging to have calls transferred to a substitute selected for that particular purpose.

PUBLIC UTILITIES AND POLITICS

In conclusion, I desire to say a word regarding the relations between the public service corporations and governmental bodies. I fully believe that honest, businesslike and dignified dealing, without fear or favor, will eventually overcome any prejudice which may exist, with the final result that both parties concerned will approach each negotiation with open minds and each will gain by the transaction. Any self-seeking politicians, members of such a body, whether or not they constitute a majority, must eventually cease persecution of any corporation if the latter earns a reputation for square dealing, good service, and a desire to please its patrons. The constituents of such politicians must eventually enforce justice.

It is gratifying to be able to say that public service corporations are, and have been for several years, conducting their affairs along the lines indicated in this paper, but there is still room for improvement, and no doubt, future improvement will be rapid as advanced methods are suggested and invented.

SOME RESULTS OBTAINED FROM A "SAFETY FIRST" MOVEMENT

BY M. A. WELSH, JR., WATERLOO, CEDAR FALLS & NORTHERN RAILWAY

The "safety first" movement on electric railways was inaugurated through a genuine desire to eliminate as far as possible the hazards to all men engaged in the use and operation of the lines. The movement was planted upon the propositions that everything must be subordinate to safety, and that success in reducing accidents to a minimum depended upon the co-operation of the three classes whose interests are involved—namely, the railway management, the employee and the public.

This movement exacts from the railway management, as regards the employees, a full compliance with the rule of master and servant, in that the company must furnish a safe place in which to work, safe tools and a sufficient number of competent workmen to assist in carrying on the work. The railway's obligation to the public necessitates the highest degree of care, in that it must furnish safe and suitable equipment, a safe roadway, safe employees and safe methods and practices. In connection with the obligations of the employees and their relation to the "safety first" movement, it may be said that the employee owes it to himself and to those dependent upon him to guard well his own safety and not to expose himself to unnecessary hazards. He also owes a duty to his fellow workmen to guard their safety at all times. Furthermore, he owes it to the railway and the public to comply with the established rules and regulations and to refrain from practices that expose to hazard those entrusted to his care. The public for its part should exercise care for its own safety while in and around trains. Simply reasonable care by it will cause a decided decrease in the number of accidents.

The Waterloo, Cedar Falls & Northern Railway, in inaugurating the "safety first" movement, first conducted a campaign with the management, then with the employees and finally with the public. By the company carrying on a campaign with the management is meant the sanctioning of safety methods and appliances and the authorizing of the necessary expenditures for their adoption. Some of the following examples of what the management has caused to be done will show that the "safety first" movement is something more than a literary effort.

The interurban cars on regular schedules are relieved every third day and sent to the shops for a general complete inspection and correction of any defects. This is in addition to the regular daily inspection at the carhouse. The foot gongs on the interurban cars have been supplanted by the air bell ringer, and the valve controlling this bell ringer has been placed so that it is in the most convenient place for the motorman's foot.

In one of the interurban districts, where the curvature is especially sharp at two or three curves, and no block signals have been provided, safety stops have been installed for all trains in both directions as a protection against the danger of collision. The company believes that its trainmen are just as careful and just as qualified to handle trains as any other trainmen, but it recognizes that the "human factor" enters into the execution of train orders. There are also eleven safety stops on the local lines, most of them having been put in on account of heavy vehicular traffic.

Mirrors have been placed on both sides of the exterior of the forward end of interurban and package cars, which are single-end operation. These mirrors enable the motorman at all times to command a view of the rear step while the car is standing or in motion, and also give him a view of any person or object in close proximity to the car as it is swinging around a city corner. The accidents formerly caused by the car body (58 ft.) or the rear step of the car striking a person or object at corners have been nearly eliminated.

On local city cars, which are double-end operation, we have a motorman's mirror at each end of the car, on reverse sides. The mirror has practically eliminated the boarding or "premature start" accident, and has reduced the danger of the alighting accidents. We still have about the same number of alighting accidents, but they seem to be attended with less severe injuries and most of them with no injuries, for if a person appears on the step as the car starts, the motorman very often notices it in the mirror and stops the car. On the other hand, in the operation of the cars without the mirrors the motorman was in ignorance of what was occurring on the rear step, and probably increased the speed of the car just as the person was about to step off, thereby aggravating the accident.

In connection with the alighting accident, it was found that our car steps were too high, and arrangements were at once made to lower them to a more suitable position. Moreover, spring switches have been installed on city lines wherever practicable, to obviate the necessity of conductors absenting themselves from the platform while handling switches, thereby reducing the number of alighting as well as boarding accidents.

Concerning the matter of accidents that occur where autos, buggies and farm wagons are struck by trains at highway grade crossings in the rural districts, it seems that one "Danger, Look Out for the Cars" sign close to the track, such as is used in many cases, is not sufficient to protect the approaches to the track from both directions. Travelers on the highway, especially at night, encounter the track first and then the warn-

ing, provided they have not in the meantime encountered the train. The railways themselves recognize as an absolute necessity, wherever their tracks cross another railway at grade, that signs be maintained at both approaches to this grade crossing 800 ft. back to call it to the engineer's attention every time he passes over that section of track, that he will encounter the railway crossing within the 800 ft. If such a precaution is necessary as far as their own trains are concerned, it should also be necessary as regards autos and vehicles traveling on the highway. We have erected at rural highway crossings and also at outlying street crossings in the city limits, crossing signs at both approaches and have supplemented these with other signs located 300 ft. back on the highway in both directions. These signs read, "Danger—Railroad Crossing 300 ft." We have not had a highway grade-crossing accident since their installation.

At the ends of all of our local lines, where arc lights are not maintained by the city, the company has installed electric light clusters. Semaphores, train order signals, switches, shop yards, station platforms, carhouses and yards, as well as most of the wayside stops, are electrically lighted.

All buildings and structures on the waylands of the company that did not permit of sufficient clearance have been moved back, with the possible exception of stock chutes. On new construction of overhead lines, sufficient clearance is provided to permit a trainman to go over a train in safety.

Sub-station operators are forbidden to attempt to do any work on machinery other than that in connection with their duties of starting and stopping their machines, all other work being done by traveling electricians.

Guards have been placed on all machinery at the shops and arrangements are being made to furnish goggles to all employees in different departments whose duties require them to do work or be in and around work that exposes the eyes to injury.

We have formerly had some accidents on account of cars striking pedestrians who were trespassing on our bridges. To overcome these accidents, sidewalks, protected by railings, have been constructed on each side.

This company carries on semi-monthly safety meetings and business meetings with its trainmen. A plan was worked out by the management about two years ago, whereby the company and the trainmen contribute equal amounts for the maintenance of a sick benefit fund. The men pay 50 cents a month for the maintenance of the association. Under this arrangement, every man in our train service department is a member of the association, and if disability through illness necessitates his absence from service he is paid \$9 per week during such disability, the payments continuing through a period of thirty-six weeks. Claims are paid for sickness as well as for accidents.

One illustration will suffice to show how the trainmen are interested in the safety movement. Some few months ago a conductor employed in one of our districts was fairly popular with the men. He became lax, however, in the reading of his train orders, the handling of blocks, flagging of crossings, etc., and some of the trainmen called his attention to this. Finally, when no improvement was made, a committee of three motormen signed a joint letter addressed to the superintendent, asking that he dismiss this man, as they did not feel that he was a safe man for the company's service.

We have carried on an extensive safety campaign with the general public and also with the school children. During this campaign we circulated 120,000

blotters to the business houses, residences and schools at all stations on our line. There were eleven different series of these blotters, each containing a different illustration of how accidents occur and suggestions for preventing them. We had large cards containing illustrations and suggestions posted in all of the local and interurban cars on the line and in conspicuous places in the waiting stations, heavy traffic points, etc. We made a contract with one of the prominent morning newspapers whereby it was to handle 10-in. cuts and copy on the first page every other morning. We also had attractive slides made containing illustrations of accidents. These were exhibited for ten weeks at moving picture theaters at different points along the line, a slide of a different series being furnished every week. In order to make these slides most effective, we used a short, snappy phrase that could be instantaneously grasped.

All public and parochial schools on the line were visited every week and the matter of safety was taken up with the principals and the teachers. We succeeded in securing the co-operation of every teacher in every town along the line. In some schools the principal, attracted by the idea of safety, had the pupils write compositions on that subject.

As the campaign with the public and school children was nearing an end, we offered prizes to the school children who would write the best twenty rules which, if followed by the public, would prevent accidents and injuries. The contestants were divided into three groups, as follows: Group 1 consisted of the pupils in the seventh and eighth grades; Group 2 of the pupils in the fifth and sixth grades, and Group 3 of the pupils in the third and fourth grades. Three prizes were given for each group, as follows: First prize, \$15; second prize, \$10 and third prize, \$5.

We issued circulars through the principals of the schools to all school children, advising them of the rules of the contest. One was that the papers were not to be prepared in school or during school hours, but at home. The reason for this was that we did not wish to take the children's minds away from their studies and thereby lose the co-operation of the school officials. Furthermore, in this way there would be a general discussion by all members of the family which would not only bring home to the child the things to be done to avoid danger, but would also impress them upon the other members.

At the close of this campaign we received 199 compositions. Some showed a great deal of thought, and some offered suggestions which we ourselves possibly had not thought of in conducting the campaign. About 90 per cent of the rules submitted were the ones we had originally suggested in the campaign. At the close of the campaign, we requested that the parents bring in the photographs of the successful contestants and we contracted for a full page in the daily papers and published all of the photographs, together with the rules submitted.

The delight of a tort lawyer has always been to tell a jury how little railways care whether there are accidents or not, so long as they are not financially responsible for them. The inaugurating of a safety campaign such as described, however, convinces the public that electric railways do really care whether accidents happen. It is something to the public to know that the companies are making an honest effort to cut down the accidents regardless of the financial proposition. Public opinion is a thing that can become either an asset or a liability with a railway or public service corporation, and a properly conducted safety campaign can do much toward capitalizing it as an asset.

Car Lighting and Track Construction Discussion at Boston

The New England Street Railway Club Has an Extended Discussion of Car Lighting Progress and an Informal Interchange of Ideas Regarding Maintenance of Way Practice

The regular monthly meeting of the New England Street Railway Club was held at the American House, Boston, Mass., on April 23, with President John T. Conway in the chair. After the usual dinner ten new members were elected. The subject for the evening was "Recent Progress in Car Lighting," the principal speaker being George H. Stickney, illuminating engineer, Harrison Works, General Electric Company.

Mr. Stickney said that the need of better illumination in street cars had been recognized for nearly a decade, pointing out that an editorial in the *STREET RAILWAY JOURNAL* of Dec. 10, 1904, called attention to the defects of car lighting practice at that time and sketched the advance of high efficiency lamps into the field. The reasons for installing better lighting are based upon safety, comfort and advertising value. New cars can be provided with good illumination at a lower operating cost than by the older methods of lighting, and it pays gradually to rewire old cars. The 23-watt lamp gave 10 per cent more light than the old 64-watt carbon lamp, unit for unit. Many companies have used the 36-watt lamp. The cost of renewals was at first high in the case of the 23-watt lamps, but with decreasing prices the cost of lighting will soon be on a par with the expense of using carbon lamps. The evils of glare in car lighting are less than in residential lighting on account of the shielding effects of hats. The speaker described the experiments of the Bay State Street Railway in applying 60-watt and 56-watt lamps with prismatic reflectors to 28-ft. and 34-ft. cars, and referred to the illustrated article upon this subject which appeared in the *ELECTRIC RAILWAY JOURNAL* of Sept. 28, 1912. Since this installation was made no reason has been seen to change its illumination characteristics, although much study has been given to reflector and holder design for railway service, and the manufacturers have improved the lamps mechanically.

The latest design of holder, which is the result of exhaustive study and conferences participated in by the Bay State Street Railway and the manufacturers, consists of a four-part metal device in which the reflector is clamped in place and locked against becoming loose by a bayonet joint. A flange hanging down below the reflector guards against dropping, and an extra ring is provided which reinforces the bayonet joint and holds the reflector snug, preventing rattling. A marine screw thread is also used in the socket, which gives the lamp a slight amount of play and softens the jar of the running car. The advantages of the new holder are that it supports the shade from below independently of the lip of the latter, that the glass cannot fall unless broken in pieces, that the shade is held rigidly in place, that it is convenient and safe to wire, and that it is easy to remove for cleaning and affords ample space for the use of a strong, well-designed socket. Mr. Stickney also briefly described the experimental installations of high-efficiency lamps in Cleveland, Athol, Mass., Washington, D. C., Portland, Me., and elsewhere. He figured a saving in initial cost of about \$7 per car by using 56-watt lamps, compared with one circuit each of 94-watt and 23-watt lamps, with a saving of about 10 per cent in operating expense. Closing, he urged the importance of regular cleaning and the use of light

finishes in the upper portions of cars as aids to better illumination. Reflectors left unclean often absorb 50 per cent of the light flux.

DISCUSSION

C. O. Bond, Philadelphia, president of the Illuminating Engineering Society, contended that an intensity of illumination of 2 ft.-candles is high enough for railway service on the reading plane. He advocated designing reflectors for use in cars giving a light distribution about halfway between the intensive and extensive curves. Preston S. Millar, Electrical Testing Laboratories, New York, advocated testing all lamps new to railway service before putting them on the cars. He believed that the tungsten lamp has been improved in strength until it is nearly of the same order of ruggedness as the carbon lamp. More attention should be paid to studying the principles of scientific illumination, with particular reference to the psychology of contrast.

J. Walter Allen, acting electrical engineer, Boston Elevated Railway, said that 23-watt lamps have been generally substituted for 64-watt carbon lamps on the Boston system, but that the life of the former was not as great as anticipated. Tungsten lamps are not adapted at present to the hard service of pit lighting by portable units. The speaker suggested the desirability of manufacturing tungsten lamps for air-gage lighting to be run in series with the other lamps.

L. C. Doane, chief engineer Holophane Works, Cleveland, Ohio, presented curves of light distribution for different types of reflectors, including clear prismatic glass, heavy, medium and light-density opals. The first-named has a total light efficiency of 57.4 per cent in the useful zone, and the other types run lower. Reflectors should be designed for railway service so that as much light as possible is cut off from the eye between the angles of 0 deg. and 22 deg. in the line of sight. Cleaning is easier with opal reflectors than with the prismatic type, although the latter is the more efficient. The speaker gave the following figures of relative cost for three designs adapted to a car with a 28-ft. body and an inside width of 7 ft. 6 in., the intensity of illumination being the same in each case.

Car Equipped with	Yearly Costs, Energy for Lighting	Lighting Service Maintenance	Investment per Car
50-watt Gem lamps.....	\$26.10	\$6.87	\$26.76
23-watt Mazda lamps, heavy density opal reflector.....	12.00	5.75	47.97
Five 56-watt Mazdas, prismatic reflector	10.17	3.34	26.86

Estimates prepared for illuminating 1000 elevated railway cars in Chicago with 56-watt lamps used bare, with heavy density opal reflectors, and with prismatic reflectors, show that the use of opal reflectors saves \$11,438 per year as compared with the bare lamp, and that the prismatic reflector will save \$18,318 per year over the first-named.

S. G. Hibben, Macbeth-Evans Glass Company, Pittsburgh, Pa., pointed out that two years ago about 3 per cent of the 200,000 cars in service were regularly equipped with tungsten lamps and any form of reflectors. A year ago carbon-filament lamps were in use

on 60 per cent of the cars; bare graphitized lamps on 10 per cent, and tantalum and tungstens together on 28 per cent. To-day it is estimated that at least fifty companies are using the most highly developed system of tungsten lamps and glass reflectors, while 100 companies are experimenting with such units and more than a majority have discontinued carbon lamps. The campaigns of railway companies also operating central-station lighting systems cannot have their full effect nor their best returns when such companies themselves maintain inefficient and optically unhygienic car-lighting installations. In Cleveland the use of tungsten lamps with Alba reflectors in place of bare carbon lamps increased the light on the reading plane from 2.2 ft.-candles to 4.1 ft.-candles, cutting down the energy expended from 3.91 watts to 1.31 watts per square foot of car floor. In another test the available illumination was increased 62 per cent. The following table is also typical:

	Carbon Lamps, No Reflectors	Tungsten Lamps, Alba Reflectors
Lamps used, body and rear platform.....	25 64-watt	5 94-watt
Lamps used, signs, headlight, front platform.....	5 64-watt	5 23-watt
Energy consumed, body and rear platform.....	1600 watts	470 watts
Energy consumed, signs, headlight, front platform.....	320 watts	115 watts
Cost of lamps, body and rear platform.....	\$2.68	\$2.56
Cost of lamps, signs, headlights, front platform.....	\$0.54	\$1.10
Cost of energy, body and rear platform, year.....	\$48.00	\$14.10
Cost of energy, signs, headlight, front platform.....	\$9.60	\$3.45
Total, energy and renewals, 2000 hours.....	\$60.82	\$21.21
Lamp cost figured as renewal cost for 2000 hours' life for tungstens, 800 hours to carbons. Energy cost at car, 1.5 cents per kw-hr.		

The estimated cost of dusting reflectors is 60 cents per car per month, and of washing, \$1.25 per car per month, the latter being done every two weeks.

L. C. Porter, Harrison, N. J., said that tests in Chicago showed that a change in car ceiling decoration from pea green to light buff increased the utility of the illumination 50 per cent. E. G. Haynes, Bay State Street Railway, Boston, said that 110-volt fittings are satisfactory for series circuits in car lighting and that the cost of wiring for a modernized illumination service is liable to vary from \$2 to \$30 per car. The total cost of equipment with the most efficient lamps sometimes rises to \$50 per car.

E. W. Holst, superintendent of equipment, Bay State Street Railway, said that the most difficult features of the lighting modernization work in his charge were the short life of the lamps and the design of a safe reflector. The cost of providing a new car with modern illumination need not exceed the expense of the older type of lighting, but the total cost of changing over old rolling stock runs from \$10 up per car. The "1909" type of Bay State cars was designed to meet the demands of modern lighting, so that the cost of changing over has been nominal here. On older cars wired with three circuits of 16-cp lamps and two of 8-cp lamps, the cost has been heavier. The 56-watt lamp gives better life results than the 23-watt unit, and saves in the number of lamps needed. Substituting ten tungsten lamps for twenty-five carbons saves in a representative calculation 720 watts per car, or \$32 per car per year in energy, burning the lamps seven hours daily in winter and four hours in summer. The average life to be expected from the 56-watt lamp is 1400 hours against about 400 hours with the 23-watt unit. The entire Bay State system is gradually being changed to the 56-watt standard.

Concluding the discussion, Mr. Stickney said that it is not necessary to provide the maximum illumination close to the side of the car as reading matter is seldom

held less than a foot away from the side. In a stationary position the 23-watt and 56-watt lamps are rated for the same life. The relative efficiencies are 1.3 watts and 1.16 watts per cp. Regarding gage lights, it is possible that a low-voltage lamp designed to run in series with the other lamps of the car could be designed if there is a sufficient demand for these. Where a company has a large number of car types in service the lamp size should be a compromise to avoid duplicating stocks. So far the demand for 94-watt lamps has been small, the 56-watt lamp meeting a wide range of conditions. Further reductions in the cost of tungsten lamps are likely to be made in the near future.

MAINTENANCE OF WAY MEETING

A "Question Box" meeting at which maintenance of way matters were aired preceded the regular club dinner, this being an innovation in the club procedure which was much appreciated. H. M. Steward, chief engineer maintenance of way Boston Elevated Railway, and David Curtin, roadmaster Bay State Street Railway, submitted to an informal cross-examination in a half-hour session late in the afternoon, members being privileged to ask questions freely regarding the topic assigned. Under tie treatment, Mr. Steward said that the Boston Elevated Railway is now having all new ties treated at a commercial plant in Florida with from 6 lb. to 10 lb. dead oil of tar per cubic foot of timber, the vacuum process being used. Long-leaf hard pine is employed. Ties are bored and screw spikes are used, the holes being filled with hot creosote at the company's yard. Ties are purchased hewed, and a machine takes care of adsits and boring at the rate of four to six ties per minute. The screw spikes are tapered at the top and hence keep the water out. On all new permanent track screw spikes are employed. Hot creosote is applied where any preservative material has been removed by the machine treatment. The cost of treating is perhaps 15 cents to 20 cents per tie, and while no guarantee of life is obtained, it is hoped to extend the life from 25 per cent to 50 per cent by the treatment. A recent examination of untreated ties which had been imbedded about twelve years in concrete showed that the material was reduced to a dry pulp.

Mr. Curtin said that \$3 per foot is a fair figure for the cost of track built of 75-lb. T-rail, laid with 8-ft. ties, 24 in. on centers, with gravel foundation. The Bay State company has never been able to secure records of the life of treated ties. Chestnut ties from Maryland and Virginia costing 60 cents to 65 cents each, f.o.b. Boston, are used extensively by the company, but indigenous ties are preferred. With 9-in. girder rail construction and covered track the tie lasts as long as the rail. Electric welding has proved most satisfactory in the Bay State company's experience. The speaker suggested that a reduction in the price of thermit welding is desirable in view of the 50 per cent lower charges made abroad for this work. The importance of extreme care in handling cast-welding of joints was emphasized by both speakers, especially in setting screws, good results being attained by getting the joint 1/16 in. high and grinding it down. Cupping in continuous joints has been found due to low carbon content in the material. The only remedy in an installation where this occurred was to grind the joint to a slight depression. Mr. Curtin said he had welded a mile of track in a paved street but that breaks occur in unpaved streets. A breakage of 2 per cent to 3 per cent in electric and cast-welded joints may be expected. Failures can be reduced by putting in expansion joints every 1000 ft. or so in unpaved streets where the track is exposed to temperature changes.

"SAFETY FIRST" PUBLICITY AT MONTREAL

The Montreal Tramways has recently inaugurated a "safety first" campaign which is meeting with the most gratifying aid from the local French and English papers and co-operation from the railway's employees and the owners of vehicles. The work is in charge of A. Gaboury, superintendent, who has issued an effective line of literature on the subject. He first prepared a series of notices to the platform men in which emphasis was placed on the connection between "safety first" and obedience to the rules and regulations. This was followed by a personal letter addressed to each employee at his home. The letter announced that an accident prevention campaign was to be inaugurated and asked for the cordial help of the individual addressed. A second letter to the platform men, issued under date of April 13, called attention to the fact that as the household moving season was at hand, special care should be taken to avoid collisions with loaded rigs because projecting furniture could be easily broken through careless side-wipes. (Mr. Gaboury has since suggested that moving vans be furnished with red tail-lights.) This letter was accompanied by a blue folder for motormen or a pink folder for conductors. Each folder contained about twenty pertinent suggestions and was really a miniature rule book.

The first announcement to the outside public was a letter which was sent to all transfer, carriage and express companies and to mercantile concerns employing a large number of drivers. This letter stated that drastic instructions had recently been issued to the motor-

"TREACHEROUS."

One of the most treacherous and dangerous things that Street Railway people have to contend with is what is called "**GREASY RAIL**."

Brakes will not always hold a car on a **GREASY RAIL**, as the wheels will not grip, and a car will slide, like **SKATING ON ICE**.

The rail may be all right when one car passes, and then cloud over with a thick filmy substance, so that the next car will go skidding through like a toboggan, unable to stop.

The track may be **CLEAN AND O.K.** for a long distance, but the **NEXT HUNDRED YARDS** may be **GREASY**; because the rail is **GOOD** on some parts of the track, it is not a sure sign that **GREASY RAIL** is not just ahead of you, and the car that strikes that spot may have difficulty in stopping—Keep clear.

A **GREASY RAIL** is to be looked for at all times of the year in **MONTREAL**, especially in the fall, winter and early spring. The falling leaves, the frost or extreme cold cause it, the oozing clayey mud, the summer dew cause it, and it is also found after the passing of the city watering carts, and extra precautions should be taken by everyone.

AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE, and great prudence should be exercised by all drivers and pedestrians in crossing in front of a **MOVING CAR**. You may think it will stop and the motor man may intend to stop, but if he strikes a strip of **GREASY RAIL** his stop will not be made where you thought it would, and the results may be a collision with your rig.

WHY TAKE THE CHANCE? WHY NOT MAKE SURE BY WAITING TILL THE CAR HAS STOPPED?

Our motormen will do all they can to keep away from your rig, but the car must follow the track; it cannot turn out to avoid an accident.

WILL YOU NOT DO YOUR SHARE? and keep your **RIG** away from a **MOVING CAR?**
DO NOT DEPEND ON A CAR TO STOP! - - **WAIT UNTIL IT HAS STOPPED!**
TAKE NO CHANCE **THE GAIN IS NOT WORTH THE RISK.**

"SAFETY FIRST." A. GABOURY.

Circular on Greasy Rail Sent to All Users and Owners of Vehicles

men to observe special precautions toward vehicles and rigs, but the recipient was asked to show the proper spirit of "give and take" to insure freedom from accidents.

As greasy rails are a common cause of collisions, Mr. Gaboury prepared a special circular on this subject, entitled "Treacherous," and sent it to all vehicle operators together with a bi-lingual folder. Both of these publications are reproduced. A similar letter with the same inclosures was sent to all holders of vehicle license. In all some 30,000 letters have been sent out,

and the replies were unanimously in support and encouragement of the movement.

FUTURE DEVELOPMENTS

The correspondence and general literature distribution just described is only a beginning in the Montreal "safety first" work. The company is planning to display all moving picture films bearing on street accidents and also to have entirely new ones made for the purpose. The pictures will be shown in the club quarters of the tramways employees and in the leading moving picture theaters. The views will be made as realistic as possible but without gruesome details that might repel children. Music and other features will be introduced to prevent the exhibitions from becoming monotonous.

<p>NE traversez pas les voies de tramways sans vous assurer d'abord que vous pouvez le faire en sûreté.</p> <p>NE croyez pas que l'homme en charge d'un tramway est nécessairement votre ennemi.</p> <p style="text-align: center;">IL VEUT ETRE VOTRE AMI</p> <p>NE croyez pas que le SON D'UN GONG vous commande de livrer passage; C'EST SIMPLEMENT UNE DEMANDE D'AIDER A EVITER UN ACCIDENT</p> <p>NE traversez jamais les voies s'il y a un tramway tout près.</p> <p style="text-align: center;">LAISSEZ LE PASSER</p> <p>NE vous fiez pas sur l'arrêt du tramway: ATTENDEZ QU'IL SOIT ARRETE.</p> <p>NE négligez pas de porter attention à la cloche qui sonne derrière vous.</p> <p style="text-align: center;">ELLE VEUT DIRE "DANGER": PRENEZ GARDE</p> <p>N' essayez pas de dépasser une voiture arrêtée près du trottoir, sans d'abord regarder s'il n'y a pas de tramway immédiatement en arrière de vous.</p> <p>N' attendez pas à la dernière minute pour livrer passage.</p> <p style="text-align: center;">LES ROUES DE DERRIERE DE VOTRE VOITURE POURRAIENT GLISSER SUR LE RAIL ET ETRE FRAPPEES PAR LE TRAMWAY.</p> <p>NE suivez pas un tramway de trop près dans une côte.</p> <p style="text-align: center;">QUELQU'AVARIE PEUT ARRIVER AU TRAMWAY.</p> <p>NE traversez jamais immédiatement en arrière d'un tramway.</p> <p style="text-align: center;">IL POURRAIT EN VENIR UN EN SENS CONTRAIRE, SUR L'AUTRE VOIE, QUI FRAPPERAIT VOTRE VOITURE.</p> <p>NE suivez jamais la voie dans un temps de brume;</p> <p style="text-align: center;">LE GARDE-MOTEUR PEUT NE PAS VOUS VOIR.</p>	<p>Don't cross the car-tracks without being sure it is safe to do so;</p> <p>Don't think because a man is on the front of a car he is your enemy;</p> <p style="text-align: center;">HE WANTS TO BE YOUR FRIEND</p> <p>Don't think that a LOUD GONG is a command to get out of the way;</p> <p style="text-align: center;">IT IS A REQUEST TO YOU TO HELP TO PREVENT AN ACCIDENT</p> <p>Don't cross in front of an approaching MOVING CAR.</p> <p style="text-align: center;">LET IT PASS</p> <p>Don't depend on a car to stop;</p> <p style="text-align: center;">WAIT TILL IT HAS STOPPED.</p> <p>Don't neglect to listen for the ringing of a gong behind you</p> <p style="text-align: center;">IT MEANS "DANGER" HELP TO PREVENT AN ACCIDENT.</p> <p>Don't think you can PASS between a rig standing at the curb and a CAR.</p> <p style="text-align: center;">MAKE SURE AND KEEP CLEAR</p> <p>Don't wait till the last minute before turning out from the car-tracks;</p> <p style="text-align: center;">THE BACK WHEELS MAY FOLLOW THE TRACK AND THE CAR MAY NOT CLEAR THE BACK OF YOUR RIG</p> <p>Don't follow a car too close going up hill</p> <p style="text-align: center;">SOMETHING MAY HAPPEN TO THE CAR.</p> <p>Don't cross immediately behind a car;</p> <p style="text-align: center;">THERE MAY BE A CAR ON THE OTHER TRACK.</p> <p>Don't follow track on foggy days or in dark places</p> <p style="text-align: center;">MOTORMAN MAY NOT SEE YOU.</p>
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Bi-Lingual Folder Containing Safety Suggestions in French and English

Special performances will be arranged for children, who will be admitted on passes supplied to the schools by the Montreal Tramways. Performances will also be arranged for adults.

A series of weekly meetings is to be inaugurated for the employees, at which Mr. Gaboury will give short lectures on accident prevention. Instruction, drill and competitions for the men in accident prevention measures will be instituted, branches of a local hospital or first-aid society will be established, and each of the men will be provided with small badges bearing in English and French the phrases "Safety First" and "Prenez Garde." Such notices are also to be placed on every street car, on street pole destination signs, on the various company buildings, on as many outside vehicles as the owners will permit and on all letterheads, notices and stationery of the railway. Garages and stables will be supplied with posters and calendars. School children will be presented with little ticket purses, blotters, rulers, erasers, etc., all bearing the same words and, where possible, illustrating how accidents are caused by carelessness. In conclusion, the campaign will not be sporadic but one which will be maintained persistently and made more effective with increasing experience and the enthusiasm which comes from successful results.

Fred L. Ray, an engineer for the Louisville (Ky.) Railway, delivered a stereopticon illustrated lecture recently in Louisville dealing with the construction of the latest type of furnaces and similar apparatus before the local branch of the National Association of Engineers.

Valuation and Rate Making Principles and Precedents

Abstract of Brief Presented to the Public Service Commission of Missouri in Valuation Case of the Springfield (Mo.) Gas & Electric Company and the Springfield (Mo.) Traction Company

A case now pending before the Public Service Commission of Missouri between McGregor-Noe Hardware Company et al. and the Springfield (Mo.) Gas & Electric Company and the Springfield (Mo.) Traction Company is of decided interest because in it are involved valuation and rate-making issues that are highly important in the electric light and electric railway fields. The decision in the case will probably take its place as a precedent in these matters for all classes of public utilities in the State.

The case was the result of application by different copartnerships and corporations in Springfield for the relief under the newly passed public utility act against the Springfield Gas & Electric Company. Although the Springfield Traction Company is joined, relief is simply sought from alleged excessive rates for electric service. It is stated that the Springfield Gas & Electric Company does not own any power plant or station for the manufacture of electric current or energy, but that the plant is the property of the traction company and that the lighting company has intermingled its business with that of the traction company and is able to discriminate in favor of certain customers. The company has answered all the issues raised by the complaint and has presented a brief which is an exhaustive résumé of appraisals and previous decisions involved in the subject of valuation and rate-making. Four primary questions are considered in the brief: (1) What value of the property of the company should be used as a basis of reasonable return? (2) What shall be the allowance for depreciation reserve? (3) What is the proper rate of return? (4) What are the proper operating charges? The abstract of the treatment of these points in the brief follows:

BASIS FOR REASONABLE RETURN

The difference between the rights of a quasi-public service corporation and those of private corporations as to the use of their property is simply this. As to the latter, the right of use and hence to a return thereon is not limited as to the amount of such return, it not being the public concern whether it is more or less than is reasonable. As to the former, however, after the point of reasonable return is reached, the limitation upon the property becomes a matter of public concern and subject to regulation and limitations. There seems to be a prevalent notion that a property devoted to public use is to a large extent public property, but such is not the law. As stated in *Consolidated Gas Company vs. New York*, 157, Fed. 849, "The property under consideration is as much the private property of the complainant as are the belongings of any private citizen." The property of a public utility cannot be taken without just compensation or without due process or in denial of the equal protection of the law, and as the use of the property up to the point of a reasonable return thereon is a property right entitled to a similar protection, it is manifest that any order prescribing rates that do not afford to the utility a reasonable return upon all its property, of whatever nature, that is embarked in the public business would operate as an unconstitutional interference with property rights. Hence the ascertaining of the value of the property of a public utility

means the ascertainment of the whole value, intangible elements as well as tangible.

PRESENT VALUE OF THE INVESTMENT

The brief states that the valuation question is not one of original investment or of present investment, using these terms in a sense of capital outlay, although such investment may be a very persuasive evidence of present value. If the actual investment is less than the present value a return upon the investment alone denies the right to the use of the difference between the amount of the investment and the present value and hence impairs the property right to a reasonable return upon the whole. In *Smith vs. Ames*, 169 U. S. 468, *Louisville & Nashville Railroad vs. Railroad Commission*, 196 Fed. 800-820, and other decisions the doctrine has been sustained that a fair return must be based on the reasonable value of the property at the time it is being used for the public. The original cost of construction and the amount expended in permanent improvements, the present condition of the plant, the amount and market value of bonds and stocks, the present cost of construction or reproduction, the fact that the plant is a going concern with an established business and actual depreciation of value, may all be considered. These different elements, however, are merely evidences bearing on the ultimate question of present value and have more or less force according to the circumstances of particular cases.

If a plant has just been sold and the purchase was made in good faith by a party dealing at arm's length, doubtless the sale price would be conclusive evidence of present value. If a plant were just completed and had been constructed under normal conditions and lacked any attached business, doubtless the construction cost would be a very controlling evidence of present value. Where, however, such a definite criterion of value is absent, other evidences of value must be resorted to, and there may be properly taken the reproduction cost new of the physical property with additions for such of the above elements as have not been included in the reproduction cost of the physical plant, and with proper deduction for deterioration or existing actual depreciation. The inquiry along the line of reproduction should be limited to the replacement of the present system by one substantially like it—that is, the present value of the present or existing plant should be determined and not the value of some hypothetical, imaginary or phantom plant.

ELEMENTS TO BE INCLUDED

The reproduction cost new obviously furnishes no measure of actual value unless it embodies all legitimate elements of value, whether tangible or intangible. To take from the utility the use of any element of value is to take property itself in violation of property rights. If the property of a utility is taken by condemnation or through purchase by a municipality, no element of value attaching to it can be ignored in fixing the compensation to be paid. Courts and commissions have held, however, that any element of value to be considered in proceedings for condemnation purposes must also be considered in ascertaining value as

a basis for rate-making. This is established by such decisions as National Water Works Company vs. Kansas City, 62 Fed. 865; Kennebec Water Works vs. City of Waterville, 54 Atl. 6, and Long Branch vs. Tintern Water Company, 62 Atl. 474.

REPRODUCTION COST NEW OF PHYSICAL PART OF PLANT

A number of witnesses in the present case defined the reproduction cost new of the physical property as follows: "The reproduction cost is based upon the assumed re-creation or substitution of an identical new plant at present prices according to the existing apparatus, specifications, assuming reasonable diligence and methods and a reasonable period of time in construction." The brief discusses the point of whether in applying the reproduction method the appraiser should proceed upon the theory that the work is to be done under wholesale continuous construction. Various authorities, such as Mr. Hayes in his work on public utilities, State Journal Printing Company vs. Madison Gas & Electric Company, 4 W. R. C. R. 501, 548, Hill et al. vs. Antego Water Company, 3 W. R. C. R. 623, 634, recognize that allowance must be made in the unit price for the cost of piecemeal over continuous wholesale construction.

The reproduction method when properly applied by engineers of ability and wide and practical experience furnishes perhaps the most persuasive evidence of the present value of a utility plant, especially one of considerable age. The method is not based upon mere theory and hypothesis. There is little reason why engineers to-day, equally honest and having equal ability and practical experience, should not substantially agree in the appraisal of the physical part of the utility plant.

CONFUSION BETWEEN REPRODUCTION METHOD AND ORIGINAL COST METHOD

Unquestionably the two leading lines of proof to determine the present value of a utility are the reproduction and original cost methods. There is confusion, however, as to whether original cost means the amount of money paid originally for the first unit brought into service or the actual cost of the unit now found in service, which may be a replacing unit performing the same functions as the original unit. The problem seems to be to ascertain the amount actually paid for the particular unit in use. In the reproduction-new method the question is to determine the amount that the particular unit under present prices or average prices for the past five years and present conditions actually costs. Whether the one method or the other shall be applied in any particular case depends upon circumstances, but the reproduction method is mainly used because records of original cost are too often either defective or missing or when in existence contain many irrelevant items.

As regards the trustworthiness of the reproduction method when properly applied by engineers of ability and extensive practical experience, it has been found that the result reached by this method is in many instances practically the same as under the original cost method. When the two costs are far apart, the difference is mainly due to variation in the general price level of the elements which enter into the construction of the plant and the development of its business as between the time when the plant was first built and the time of the reproduction, although contingencies, mistakes of judgment and errors of various kinds may play important parts.

The two methods should be kept separate and distinct. Some engineers are contending that in applying the reproduction method "valuation should be based upon the physical conditions existing at the time the

various portions of the property were built but at the prices prevailing at or near the time of valuation." This is an abandonment of the pure reproduction method, for it is a mixture of that method with the original cost method. Under the reproduction method the cost should be figured upon the basis of existing conditions. Against this estimate may be placed the actual original cost, if it can be determined, and other estimates based upon other lines of proof, but there is no logical or legal warrant for determining the cost by basing it on present prices applied to historic conditions.

THREE APPRAISALS OF PHYSICAL PROPERTY

The brief analyzes in detail the three appraisals of the physical property of the company made by W. J. Squires, F. P. Woy, and W. G. Woodfolk, of Sanderson & Porter. These men agreed upon the physical valuation of the buildings and power house and apparatus, except as to piping, as to overhead cost and as to the distribution system. Mr. Woy applied unit prices for piecemeal construction instead of wholesale construction of the distribution system. Instead of using the present market prices for labor and material, however, he used, as far as possible, actual cost to the company arrived at by an average of such cost for a period not exceeding, except in a very few cases, the last five years.

PRESENT VALUE OF LANDS VERSUS ORIGINAL COST

One of the questions that the brief discusses in connection with the appraisals submitted is the recognition of the unearned increment of land in the valuation of public utilities for rate-making purposes. There is a tendency among certain engineers toward the doctrine that land should be valued not at what it is worth at present, but at what it actually costs. It is the unanimous ruling of courts, however, that in determining reproduction cost new, the plant must be figured at its present value, although this may be six times its original cost. The argument that a utility does not expend the amount of money upon which it is now paying the rate of return in securing the land in question, is not determinative, for as a rule the utility does its full share in all matters pertaining to the social and economical growth of the city. There is no definite occasion for depriving it of important increments of appreciation while loading it with increments of depreciation.

OVERHEAD COSTS

The overhead costs supposed to be considered by the appraisers include the following: (a) contractors' services and expenses; (b) engineering and supervision; (c) administration and management; (d) omissions; (e) incidentals and contingencies, and (f) insurance, fire, casualty and builder's risk. The average allowance by Mr. Squires for overhead for the entire plant, exclusive of land, was 10.38 per cent. Mr. Woy allowed an average percentage on all parts of the plant other than land of 15.15 per cent. The average overhead percentage determined by Mr. Woodfolk was 17.13 per cent. These percentages would be correspondingly less if the value of real estate was included, and a comparison of them with percentages used for similar overheads by other engineers and recognized by commissions in their decisions shows that the allowances by Mr. Woy and Mr. Woodfolk are very conservative.

The allowance for general contractor's services and expenses has usually been 10 per cent. In the New York Consolidated Gas case 15 per cent was allowed in the Master's report. The Interborough Rapid Transit Company has recently been allowed 15 per cent for contractors' profits for the third-tracking of the Second, Third and Ninth Avenue elevated roads in New York

City. For engineering and supervision at least 5 per cent should be allowed. Prof. George F. Swain in his report on the valuation of the New York, New Haven & Hartford Railroad cites three cases where the allowance is greater than this, the East Boston Tunnel, 6.5 per cent, the Washington Street Tunnel, 6.1 per cent, and the Metropolitan Water Works 6.2 per cent. In *Monheimer vs. Coney Island & Brooklyn Railroad*, Commissioner Maltbie of the Public Service Commission for the First District of New York stated that "engineering and administration" were alone often 10 per cent. There is now being paid $7\frac{1}{2}$ per cent for engineering and superintendence in constructing the subways of New York. In the appraisal of the state railways of Massachusetts there was allowed for contingencies 5 per cent. In the appraisal of the Michigan steam roads there was allowed 10.8 per cent; Minnesota steam roads, 5.2 per cent; South Dakota steam roads, 5.7 per cent, and Wisconsin steam roads, 5.5 per cent. The brief concludes that it has been customary to add at least 10 per cent to most careful estimates to cover contingencies, and this is often found to be wholly inadequate. The amount to be allowed for insurance, fire, casualty and builders' risk ranges from one-half of one per cent to 2 per cent.

TOTAL OVERHEAD CHARGES

The total allowance made by Francis Blossom for the overhead cost, including the contractor's fee, was from 26 to 27 per cent. William H. Blood testified that the overhead amounted to a minimum of 25 per cent. A. C. Einstein allowed from 25 to 30 per cent, E. D. Smith 26 per cent and Henry Floy 25 per cent. According to Mortimer E. Cooley, dean of the department of engineering, University of Michigan, the total of overhead charges may vary from 20 or 25 per cent to 50 and 60 per cent of the cost as determined by the inventory, depending upon the items concluded in overhead. This statement is fully supported by a number of well considered decisions of commissions in New York, New Jersey and Wisconsin. In the *Queenstown (N. Y.) Gas & Electric Company* 25.8 per cent of the cost of all the property, aside from land, before it was depreciated, was allowed for overhead charges, including contractors' services. In *Edward G. Boltz vs. Brooklyn Borough Gas Company and Kings County Lighting Company*, 24.1 per cent was allowed for general engineering supervision, administration, contingencies, incidentals and general contractors' profit. In *John G. Mayhew et al vs. Kings County Lighting Company*, 21.8 per cent of the net cost of all tangible property other than land prior to any deduction for depreciation was allowed. In the *Passaic Gas case* the Public Utilities Board of New Jersey allowed 51.45 per cent of the net cost to reproduce new for all overheads including going value. This was in addition to proper allowances for the contractor in the physical values assume and in addition to \$7,500 included in land and plottage.

COST OF PRELIMINARY CONSTRUCTION

The brief next takes up the question of development expenses or preliminary cost and their treatment in various commission and court decisions. In the case of *Rochester, Corning & Elmira Traction Company*, the Public Service Commission for the Second District of New York allowed 5 per cent upon the estimated cost for promoter's profits. In the case of *San Rafael & San Antonio Railway*, decided by the California Railroad Commission, from 7 to 10 per cent was allowed, depending upon the par value of the stock. In regard to financing expenses, it is noted that in the contract between the city of Chicago and the traction company there is a clause reciting that 5 per cent "shall be paid for the company's services in procuring funds therefor,

including brokerage." Recognition was given to taxes during construction for a period of one-and-one-half years through capitalizing one-half of them. In regard to discount on securities, the only debatable question considered by the brief was whether it should be capitalized or amortized. The New York commission holds the latter view while the Wisconsin commission favors for most cases the former view. The brief favors the capitalization theory. In the matter of interest during construction, the brief states that it is generally conceded that interest should be allowed for one-half of the construction period from the inception of the enterprise until the plant is ready for operation. In regard to working capital, W. H. Blood stated that he had made a thorough study of the average cash working capital carried by electric companies and by combined electric and street companies and that for a period of five years the average monthly cash balance was 12 per cent of the gross earnings. Street railway companies require less for the cash working capital than electric lighting companies for the reason that the receipts of the former company come in daily, whereas the payment of the latter's bills is nearly two months subsequent to the rendering of the service.

GOING VALUE

In re *Menominee & Marinette Light & Traction Company*, 3 W. R. C. R. 778—an allowance for going value was made of 60 per cent of the remaining depreciated value of the plant and of about 11 per cent of the remaining reproduction cost new. In *City of Milwaukee vs. Milwaukee Electric Railway & Light Company*, 11 W. R. C. R. 1, \$582,050 was allowed for going value. In *Superior Commercial Club vs. Superior Street Railway*, 12 W. R. C. R. 1, \$132,724, or 22 per cent of the remaining value of the plant, was allowed, and in *Parsons Railway & Lighting Company vs. the City of Parsons*, decided by the Kansas Utility Commission, the going value of the plant was fixed at \$13,000, or 12 per cent of the physical value. In all the cases analyzed there are only three where the allowance is as low as 3 per cent, and these are cases where the value of the property amounted to from \$7,000,000 to \$10,000,000. In many cases it ran as high as 20, $25\frac{1}{2}$, 29 and 30 per cent. H. P. Gillette testified that on the basis of his appraisal of electric railways in Washington a railway is fortunate that can develop a sufficient business to yield a fair return on the cost of physical property without incurring a development expense (a going value expense) of at least 30 per cent of its physical property new.

SUPERSEDED PLANT

Courts and commissions have recognized superseded plant in fixing rates. In *Milwaukee Electric Railway & Light Company vs. City of Milwaukee*, 87 Fed. 577, 40 per cent of the reproduction value is included as representing cost of plant which had disappeared from the present inventory. In the appraisal of the *Chicago Consolidated Traction Company* in 1910, 38.4 per cent was allowed for overhead charges and in addition several million were allowed for franchise value of an old cable road which was in disuse and which was immediately thrown away, so that the Chicago property now has about 60 per cent added to it for going cost.

VALUATION RESULTS

The brief presents a summary of thirteen results reached as to the present value of the electric property of the *Springfield Gas & Electric Company*, among which are included the values based on the actual amount paid by the present owners, the amount of stocks and bonds outstanding, the theory that the plant is worth four times the gross earnings, reproduction

cost new, the reproduction new less theoretical depreciation and the reproduction new less observed existing depreciation. The amounts range from \$681,329 for reproduction new less theoretical depreciation to \$948,500 for the value as based on the amount of stocks and bonds outstanding. It is concluded from these exhibits that the valuation of the commission should not drop below \$700,000 and that it would be better for the public and the company if it were fixed between \$750,000 and \$800,000.

RATE OF RETURN

The brief states that "a reasonable and just rate of service is the highest rate and lowest service which the commission would not be justified in condemning unjust and unreasonable if fixed by the utility itself." The best considered thought on the part of those engaged in the enforcement of public utility laws strongly favors the giving of such a rate of return as will encourage thrift and enterprise. The brief quotes various decisions to show that judicial and also commission sanction has frequently been given to the policy of encouraging investment in public utilities. Various decisions, such as *Wilcox vs. Consolidated Gas Company*, 212 U. S. 19; *Cumberland Telephone & Telegraph Company vs. City of Louisville*, 187 Fed. 637; *Sheppard vs. Northern Pacific Railroad et al*, 185 Fed. 765; *Louisville & Nashville Railroad vs. Railroad Commission*, 196 Fed. 800; *Des Moines Water Company vs. Des Moines*, 192 Fed. 1903, are abstracted to show that while a 6 per cent return on a gas monopoly property in New York City may escape constitutional condemnation, yet in Minnesota the net return on railway investments must be not less than 7 per cent. In Alabama it must be 8 per cent, and in Iowa on water plants it must be 8 per cent to escape the condemnation of being confiscatory. The defendant company believes that a return of less than 8 per cent would be declared confiscatory. A suggestion is made to the commission that any order made should state that the company should be permitted to earn not less than the certain rate named. Such a ruling would not bind the commission as a precedent that no higher rate should be allowed and it would leave to the company a chance by good management, by skill and ability, by economy and efficiency to earn more than the rate named.

REPRODUCTION COST NEW AND THE THEORETICAL DEPRECIATION

The United States Supreme Court in the *Consolidated Gas* case allowed an expenditure of less than 1 per cent for repairs as a deduction from reproduction cost new but refused the contention of the plaintiff that a further deduction of millions should be made for theoretical or accruing depreciation. In the *Minnesota* rate cases the court said that when the estimate of value is made on the basis of reproduction new the extent of existing depreciation should be shown and deducted. In other words, all that the appraisal considers is the existing physical condition of the property, whereas in the setting up of the depreciation reserve there must be included all kinds and classes of depreciation such as inadequacy, supersession, hazards, contingencies, etc. Various commission decisions also, such as the *Passaic Gas* case, and the *City of Helena vs. the Helena Light & Railway Company*, decided by the Public Service Commission of Montana, and the opinions of experts, such as Mr. Floy, James E. Ellison, Halford Ericson, Charles F. Matheson and Alexander C. Humphreys were abstracted to make clear this distinction. It is stated that there is not a decision of the Wisconsin commission (and the same is true of the New York Commission, so far as known) where the rate of return is based

on the reproduction cost new of the physical property less theoretical depreciation.

RELATION BETWEEN VALUATION AND RATE OF RETURN

The rate of return which is fair for any plant is largely dependent upon the elements of value included in the appraisal. If the utility must have certain earnings to enable it to raise money and the commission fails to allow properly for intangible values, it is confronted by the practical necessity of granting a rate of return which may be considerably in excess of that which public sentiment may approve. It would be much more important to the future growth and welfare of the utilities that there be established a reasonably liberal valuation upon its property than that it be given what might be considered an excessive rate of return.

PROPER OPERATING CHARGES

The brief concludes with an analysis of the operating expenses of the Springfield Gas & Electric Company, a consideration of the reasonableness of such expenses and a discussion of the reasons why a control through a holding company became necessary and of the advantages of centralized ownership of public utilities. Tables are inserted showing the past and present inadequacy of the company's gross revenue, and it is stated that the rate of return should be 9 per cent and it would not be considered more than fair and reasonable if 10 per cent were granted. A rate of 10 per cent on a valuation of \$700,000, 9 per cent on \$750,000 and 8 per cent on \$800,000 will give an estimated deficit for twelve months of approximately \$46,000, but this deficit it is expected would decrease with the growth of the city.

UNIVERSITY OF ILLINOIS INSULATION TESTS FOR STEEL CARS

Some interesting tests are being conducted by the University of Illinois for the purpose of bettering the heat insulating qualities of the walls of railway mail cars. As now constructed, these consist of two plates about 4 in. apart, the outer $\frac{1}{8}$ in. and the inner $\frac{1}{16}$ in. in thickness. Between them are vertical steel channels which are separated from the plates by $\frac{1}{4}$ -in. layers of agasote to reduce conduction of heat through them. This is an expensive construction and the tests are designed to provide exact knowledge of its effectiveness. The apparatus used in the tests consists of an insulated box 6-ft. square, with one side removable so that different sections of car-side construction may be substituted. Heat is supplied to the inside of the box by means of a resistance coil, and the heated air is kept in circulation by an electric fan. The heat input to the box, which is all dissipated by convection from the removable side, is figured from the total amount of current supplied to both the coil and the fan. A coefficient of transmission of 0.096 was obtained when using an insulated wooden side. A steel side with a $\frac{1}{4}$ -in. layer of agasote under the channels gave a coefficient of 0.350. The next test to be made is with a steel side having no insulation whatever. After this, a test will be made on a steel section which has the space between the plates filled with some kind of insulating material.

The New York, New Haven & Hartford Railroad Company has recently established a new system of time inspection for all its lines. Under the new system all clocks and watches in use on the lines must be regularly inspected twice a month by expert watch makers appointed for that purpose. Webb C. Ball is general time inspector for the company.

Equipment and Its Maintenance

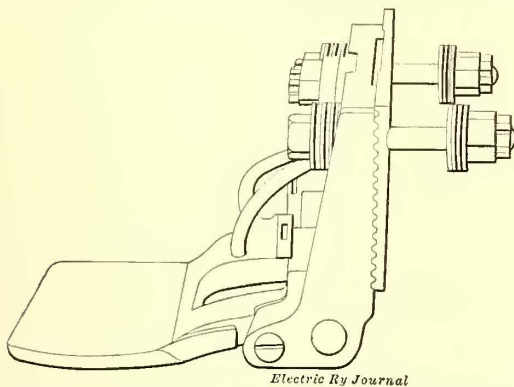
Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates)

EQUIPMENT DEFECTS—CONTACT SHOES

BY C. W. SQUIER, E.E.

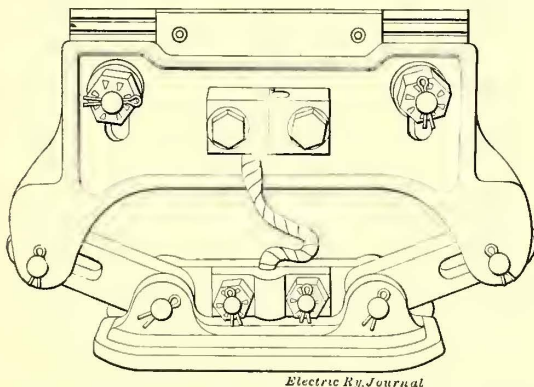
Contact shoes may be divided into two types with reference to the class of third-rail used; those used with the under-running and those with the over-running third-rail. The types used with the over-running third-rail may be further subdivided into shoes using



Side View Under-Running Third-Rail Collector

gravity alone to provide the necessary pressure for contact with the third-rail and shoes that are pressed against the rail by springs. Shoes for under-running third-rails must of necessity be held in contact by spring pressure. On elevated lines and for roads with private right-of-way where a protected third-rail is not needed the gravity shoe is commonly used.

The first third-rail installations were with over-



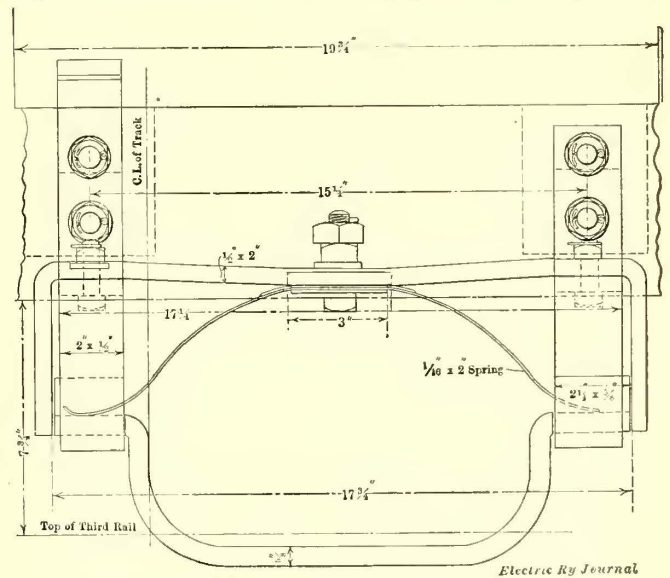
Link-Suspended Shoe for Over-Running Third-Rail

running third-rail and they employed a light cast-iron slipper supported from a frame at either end by links. A flexible copper shunt connected the slipper to the frame so as not to depend on the pins and links for carrying the current. Troubles with this type of shoe consist of broken castings, excessively worn links and pins, broken or burned shunts and burned slippers caused by jumping. On elevated lines the danger from broken castings falling to the street is very great and

as a result links and pins have been made large and strong and castings as heavy as possible. On some surface lines, however, the links are made the weakest part of the construction, as it is considered better to have the links break should a shoe strike an obstruction than to run the risk of having the beam torn off. The breakage of shunts can be decreased by keeping these properly tightened and by rounding the supporting edges so that vibration of the shunt does not come on a sharp edge of the casting or washer.

While the slipper type of gravity shoe is extensively used with light low-speed equipments, still some roads have found it necessary to redesign their shoes so as to eliminate all links, castings and shunts. Such shoes are of wrought iron supported by a wrought-iron yoke, contact being secured by spring pressure in addition to gravity. The spring also acts as a shunt for conducting current from the shoe to the yoke.

The principle troubles with this type of shoe consist of binding in the hangers, broken springs and burned shoes. They should be lubricated on each inspection by working a thin mixture of oil and grease on the inside of the hangers and then swinging the shoe back and forth to distribute the lubrication. Springs should be inspected for slight cracks or fractures that are liable to cause breakage. The height of the shoes above the running rail should be carefully gaged to prevent burning. The shoes should also be gaged after every truck



Yoke Type Shoe for Over-Running Third Rail

overhauling, whenever wheels are changed and whenever a beam is replaced or repaired.

Shoes that are held in contact by spring pressure commonly consist of a flat casting pivoted at the inside end and projecting out at right angles to the car. Troubles with this type consist principally of broken springs and castings and worn pins and bearings.

On roads that operate their cars both by trolley and third-rail it is desirable to have shoes that fold back,

so that the shoes will be out of the way when operating through city streets with the trolley. This is accomplished by folding up the contact slipper on types using spring pressure for their contact, and by turning up the shoe with beam complete for gravity shoes.

Wearing plates riveted to the contact portion of the shoe have been tried by some roads. They are very successful. This avoids the necessity of scrapping an entire slipper when worn. These plates are of soft steel and can be readily replaced when worn through.

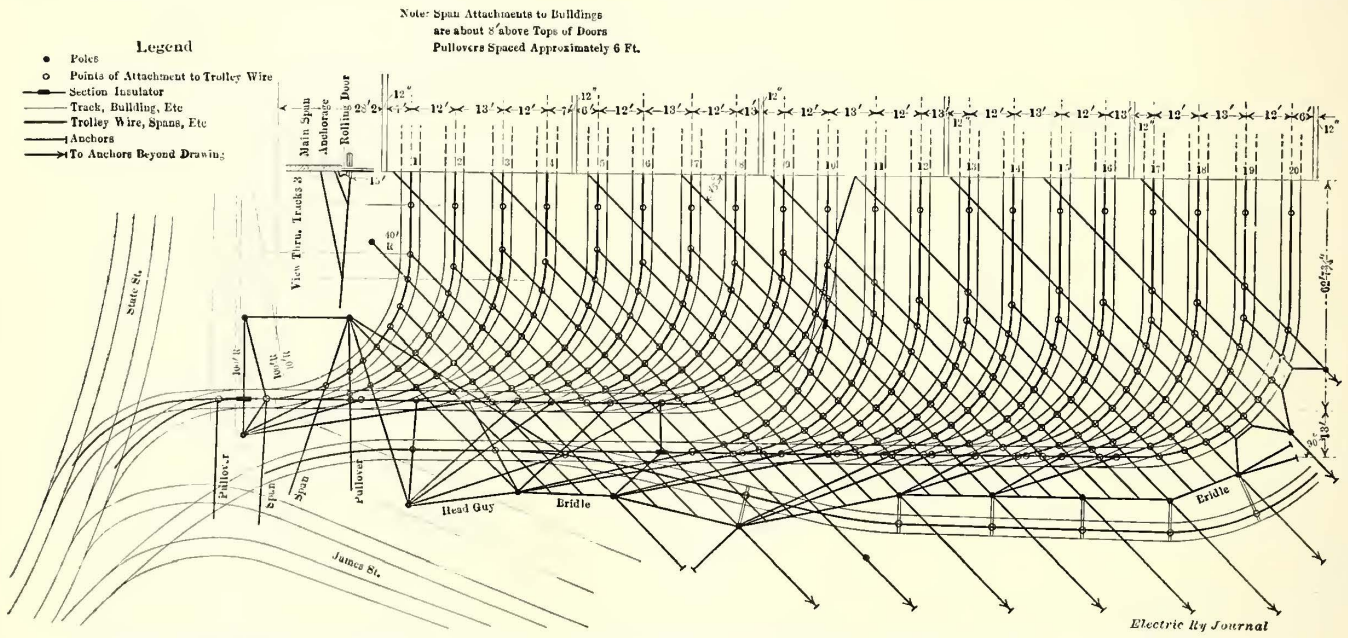
In determining the pressure necessary to give proper contact with the third-rail the speed at which the equipment is to operate and the magnitude of the current to be collected are the principal factors. For speeds up to 30 m.p.h. gravity shoes may be used with a weight for the links and slipper of 15 lb. to 20 lb. For speeds above 30 m.p.h. or 40 m.p.h. spring pressure should be used in addition to gravity, otherwise serious arcing will take

OVERHEAD PROBLEMS—SPANS, BRACKETS AND CURVES

BY CHARLES RUFUS HARTE, CONSTRUCTION ENGINEER
CONNECTICUT COMPANY

Disregard of elementary mechanics is often very evident in support work where spans are drawn so tight at installation that the pole tops pull together until there results a sag more nearly equal to that which should have been used at the outset.

An inclination having 1 ft. of drop for 10 ft. of run gives a pull at the pole of ten times the hanger load plus the effect of the weight of the span itself. No. 0000 trolley wire weighs 0.64 lb. per lineal foot; an ice coat 3/4 in. thick all around, which is a maximum value for all but phenomenal sleet storms, brings this up to a total of 1.77 lb., and the hanger and ear together weigh



Overhead Construction at West Approach of James Street Carhouse, Connecticut Company, New Haven

place due to jumping. With a pressure of 45 lb. or 50 lb. 1500 amp can be handled by a single shoe.

The under-running and the protected over-running types of third-rails have resulted from an endeavor to provide against snow and sleet storms. Various devices are used to cut the sleet on unprotected third-rails. Some roads have steel wire brushes which can be let down by a cam so as to rest on the rail in advance of the contact shoes, and are held in contact by spring pressure. Others consist of crushing rollers and still others of scrapers of various forms. Little trouble is experienced in obtaining a brush or scraper that will remove sleet in extremely cold weather, but it is almost impossible to get one that will work satisfactorily at the time the sleet is falling, for then the ice adheres more firmly to the rail and is more tough and resilient. Crushing rollers followed by scrapers appear to be the most effective, but they also cost more to install and maintain than some sort of steel wire brush. In sections where there are but one or two sleet storms a season, the steel wire brush is most generally used. These are constructed so that they can be readily placed on the shoe beams during the winter season and are firmly secured to crow-foot hangers which can be lowered and raised in guides by means of a cam. To secure satisfactory operation, the hangers must be lubricated at each inspection and the springs must be kept in good condition.

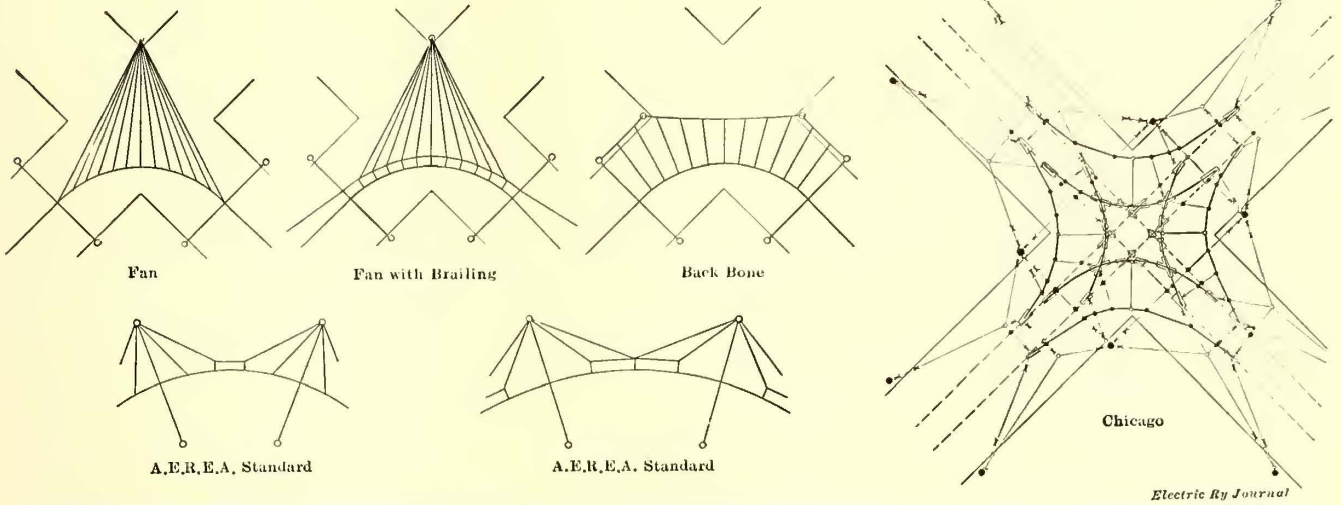
about 4 lb. For a span of 100 ft. the total load under these conditions, with span also ice-covered, will be less than the equivalent of 225 lb. at the hanger, resulting in a pull at the pole of 2250 lb., a factor of safety of two for 3/8-in. commercial strand and reasonable stresses under normal conditions for any but the lightest poles. For No. 0 trolley the equivalent hanger load under maximum ice will be less than 175 lb., permitting the use of 5/16-in. strand for the same factor of safety.

It sometimes is urged that a flat span permits the use of a shorter pole, but while this is quite true it will usually be found that the cost of the additional metal needed to meet the increased stress is much greater than the saving due to length reduction. On a 60-ft. street with track center 15 ft. from curb halving the sag will save but 9 in. of pole over a 10 to 1 span and will double the pole pull.

Line foremen, however, often "get away" with this fallacy because a very small pole deflection offers great relief to a tight span. In the case given above the movement of each pole top 5/8 in. nearer the street center would double the sag and bring the pole pull back to its original value. It is this ability through its very weakness, to relieve stress that holds up many a mile of overhead. More than one new man on an old run-down property has brought ruin about his ears by stiffening his pole system before he strengthened his spans.

Brackets for simple suspension are chiefly tubular arms with flexible span for the hanger attachment and an over-support rod attached to the end casting, the early form with under-support to the arm middle bending at the point of attachment on very little provocation. Against punishment from a dewired trolley neither form of support offers any advantages. The tendency of the smaller size to cripple under such con-

ditions is leading to a constantly increasing use of the 2 3/8-in. "C" grade tubing with walls 0.159 in. thick. The larger sizes losing very rapidly after the polished skin is gone. Whether the longer relative life offsets the longer time the larger stays up without replacement is, however, the real question, and its answer is usually dependent upon local conditions. The odd sizes, Nos. 0 and 000, are very little used, and "figure eight," which at one time promised much, is confined almost exclusively to mine work.



Methods of Dressing Curves and Double Cross with Full Connections Showing Use of the Trolley as a Bridle

ditions is leading to a constantly increasing use of the 2 3/8-in. "C" grade tubing with walls 0.159 in. thick.

Stinginess as to arm length is a common and fruitful source of maintenance trouble on bracket work. There should be at least 12 in. of free strand between the hanger and the end casting to secure proper cushioning by the strand. On tangents the arm length should be the distance from pole face to track center plus effect of pole rake plus at least 12 in. and better 18 in., making the tube a little over 9 ft. long for the usual pole clearance of 7 ft. 6 in. from track center and taking the commercial length of 9 ft. 6 in. On curves, if the poles are on the outside, this value must be increased by the amount of the trolley wire offset; if the poles are on the inside the length can be reduced by the amount of the offset. The semi-standard length of 11 ft. will meet all usual conditions, and has been adopted by at least several companies.

A tight trolley has many advantages but is open to the serious objection that under such circumstances a very small decrease in sag means a great increase in stress, and the average line gang is very apt to "horse up" the wire to a dangerous point. The effect of slight changes in sag is evident from the accompanying table, which gives proper sags for various sizes of wire at various temperatures, all for spans of 100 ft. Other span length values are readily obtained since the sag for the desired span is to the sag of the table as the square of the desired span is to 10,000 (the square of the table span).

CURVES

In the past curves have offered a broad field for individual ideas. The oldest method is the so-called "fan,"

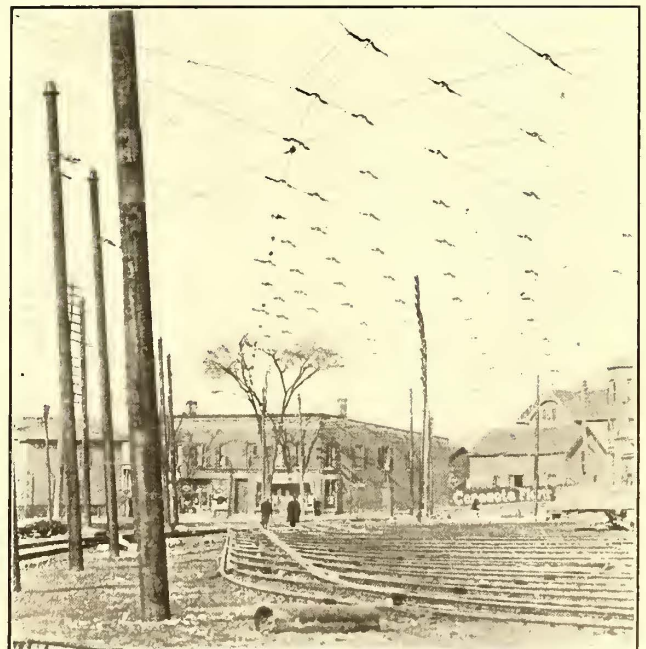
SAGS FOR DIFFERENT SIZES OF WIRE AT DIFFERENT TEMPERATURES

Size of trolley. Temperature, Degrees Fahr.	0		00		000		0000	
	Sag (In.)	Ten- sion (Lb.)	Sag (In.)	Ten- sion (Lb.)	Sag (In.)	Ten- sion (Lb.)	Sag (In.)	Ten- sion (Lb.)
0	2 1/2	1920	3	2020	2 3/4	2780	2 3/4	3500
30	3	1600	3 1/2	1730	3 1/4	2350	3 1/4	2960
60	3 1/2	1370	4 1/4	1420	4 1/4	1800	4 1/4	2260
90	4 1/2	1070	5 1/2	1100	5 1/4	1450	5 1/4	1830
120	6	800	7 3/4	760	7 1/4	1050	7 1/4	1330

On catenary work structural shapes have been successfully used for brackets, but in simple construction their advantages over the usual steel tube do not warrant the higher cost.

TROLLEY WIRE

For the line itself the usual divergence of opinion prevails. Grooved trolley has a strong following because it does not require the use of solder, but round wire appeals to many others because in the past it has given more uniform and better wear. No. 0000 is practically standard for interurban work and is used to a very large extent in city work, although for the latter work No. 00 is the favorite, as it is for multi-track work. No. 00 has in general a more uniform structure than any other size and per pound gives better wear,



Special Work at James Street Carhouse

a series of pulls radiating from one or more poles on the outside of the curve. The tendency of all but the middle "rib" to pull the wire "on end" rather than radially led to the development of three schemes:

First—A lacing or brailing, anchored at each end to adjacent poles, may be so tied to each rib of the fan as to be parallel to and about 1 ft. from the trolley wire, and to hold radial that portion of the rib between it and the trolley. In its full glory brailing and pulls are cut at each intersection and are tied to bull rings 2 in. or 3 in. diameter, or the radial sections of strand are replaced by wood strains, the outer eyes of which take the places of the bull rings.

Second—In the form recommended by the American Electric Railway Engineering Association not more than five pull-off strands are attached to any one pole. If the angle between the pull and its ear is not less than 60 deg. straight fan construction is followed; if the angle would be less than 60 deg. a short brailing connects it with the corresponding pull from the next pole and holds both radial; if midway between poles, if the adjacent pulls need no lacing, it is tied to both poles.

Third—In the so-called "backbone" method, which is favored by many, a heavy bridle is attached to the poles on the outside of the curve, and from it the pull-off strands are run radially to the trolley wire. Failure to realize the toggle-joint action when the bridle is tight has caused failure, and with some an unwarranted dislike of the construction, but properly installed it is one of the best.

Over special work more or less special overhead must be employed, although the more common forms permit standardization to a considerable degree. By careful study it is usually possible to pull one curve against another, and thus reduce to a minimum the numbers and lengths of pull-off strands. In the case of a cross with full connections the exterior strands can be confined to little more than anchor guys; less symmetrical trackwork requires more. Carhouse entries offer unusual opportunities for skill in laying out the overhead. Advantage frequently can be taken of the ability of the trolley wire to serve also as pullover or support. However, it must be borne in mind that the trolley is much more subject to break and the lay-out should be so arranged that such break will involve the smallest possible area.

Curve pull-over devices are pretty well fixed as to general outline, but vary somewhat in section and in weight. "I's" and "T's" of varying flange and web thicknesses result in weights ranging from 24 oz. to 32 oz. for single bodies and 32 oz. to 56 oz. for double bodies. For the heavier sections there is very little excuse. The increase in strength is not at all proportionate to the increased weight, while the latter greatly increases the wear on the trolley wire; in at least two designs the extra metal apparently has been added solely for weight, with utter disregard of any mechanical principles.

The span insulation is usually effected by attaching the strain insulator directly to the pull-over body. In ordering the latter for such use it is well to specify the opening between the jaws of the clevis, this sometimes being too small to admit the strain insulator eye. With early wood strains, where a heavy black paint successfully concealed the grain, and manufacturers were not always too careful in regard to stock used, a wild trolley pole frequently snapped the wood and dropped the span. A short piece of strand is sometimes cut in between strain and body to guard against this, and some companies use only composition strains. The first treatment adds work and expense, which in view of the reliability of the present-day wood strain—if purchased of reliable makers—does not seem warranted. As be-

tween wood and composition there is much opinion on both sides, but really very little actual evidence.

The trolley wheel will operate satisfactorily at moderate speeds if the deflection at the ear does not exceed 12 deg. In the A. E. R. E. A. standard the maximum

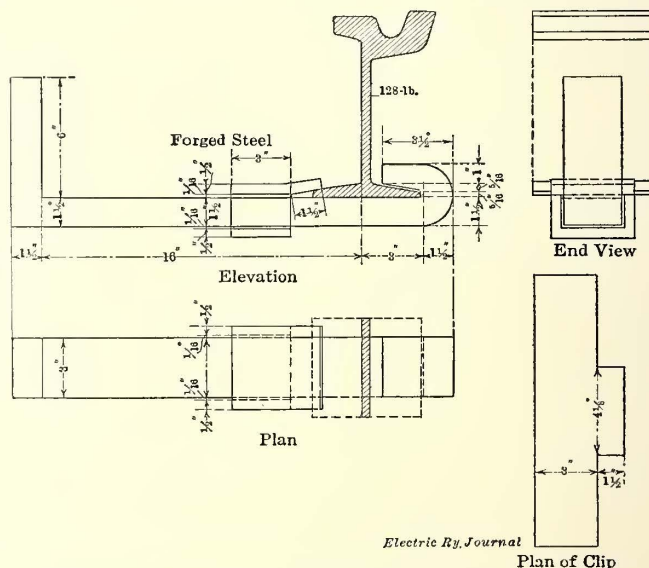
Radius of Curve, Ft.	Deflection at Ear	Spacing of Pull-overs, Ft.	Number of Pulls between Supports	Distance Apart of Poles, Ft.
40	10° 01'	7	4	35
50	9° 10'	8	4	40
60	8° 36'	9	4	45
70	8° 11'	10	4	50
80	7° 52'	11	4	55
90	7° 38'	12	4	60
100	7° 24'	13	4	65
125	6° 25'	14	4	70
150	5° 44'	15	4	75
200-500	5° 44'-2° 17'	20	3	80
750	1° 55'	25	3	100
1000	1° 26'	33½	2	100
1500-2000	1° 14'-0° 57'	50	1	100
Above 2000	1° 0'	100	0	100

deflection is 10 deg. This figure is for a curve of 40 ft. radius, the deflection being reduced as the radius increases. For convenience in installing, the distances apart of ears, with one exception, are in even feet; the pole spacing is of necessity a multiple of the ear spacing.

"OLD MAN" FOR DRILLING

BY WALTER K. TAYLOR

The accompanying sketch shows a very practical "old man" used by the way and structure department of the Brooklyn Rapid Transit System. While the idea is not entirely new, the clip which holds the device in place on the rail has been found to be an effective improvement.



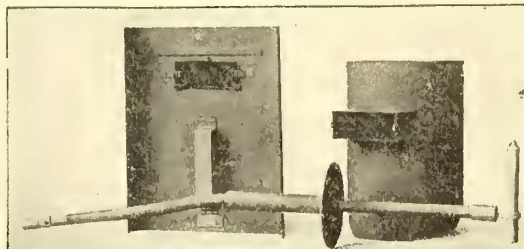
Construction Details of "Old Man" with Special Clip

The clip not only simplifies the setting of the ratchet and drill but also keeps them firmly in the proper position provided the holes are well drilled. The clip can be readily applied to the ordinary "old man" at a trifling cost. The "old man" illustrated is applied and operated by one man.

In order to relieve the congestion at the large main station in Hamburg, Germany, a proposal is to be embodied in the next Prussian railway budget for the electrification on the Hamburg-Altona-Blankenese single-phase system of the suburban line to Bergedorf and Friedrichsruhe. The work is likely to be completed in two or three years, and will form an extension of the lines already electrified.

ARC WELDING SETS

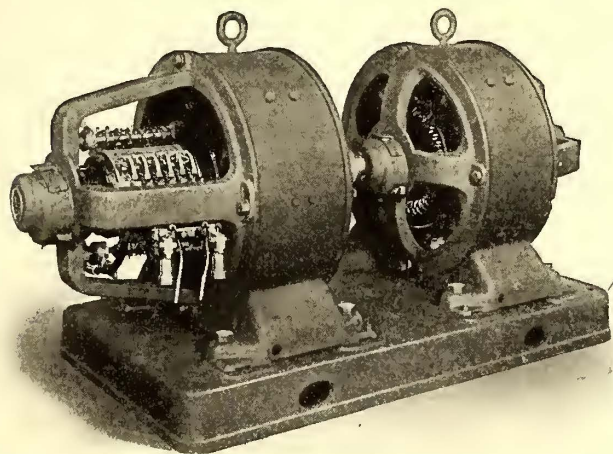
Realizing from past experience the practical value of the electric arc for general welding purposes, the Westinghouse Electric & Manufacturing Company has developed a line of electric arc welding equipments based on eight years' experience in its own shops. The equipments comprise standard apparatus. They have no complicated relay schemes for automatically inserting resistances while ample protection is secured by circuit-breakers and special arrangement of the resistance. The outfits are furnished complete in the four following



Shield Hood and Carbon Holder

sizes: 200, 300, 500 and 800 amp. Each equipment includes a welding generator, or a welding motor-generator set, switchboard, control and all necessary accessories, such as a carbon holder and a hood for protecting the operator, together with a shield and a metal pencil holder for each welding circuit. The welding generator consists of a special 75-volt, commutating-pole, d.c. machine, either belt or motor-driven.

The instrument and control panels are composed of two sections. The upper section contains the indicating instruments, protective apparatus and switches arranged for regulating the welding current, and the lower section contains the starting and protective equipment for the motor-generator set. It is often desired



Motor-Generator Set for Arc Welding

to have several welding circuits connected to one generator. For this arrangement a control panel is provided for each circuit. Each panel can be located at the most desirable place. Metal or carbon pencil welding can be done from any of these panels and one or more arcs can be operated simultaneously.

The St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., expects to purchase moving picture equipment including a machine and screen for the company's theater at Lake Contrary Park.

TROLLEY SPLICE WITH COPPER WEDGE CLAMP

A trolley splice of much tensile strength and low resistance, called the "George" splice, has been put on the market recently by the Holland Trolley Supply Company, Cleveland, Ohio. Comparative tests conducted by the University of Illinois at the request of a large traction system have proved the tensile strength of this splice, which is shown in the accompanying illustration, to exceed that of the

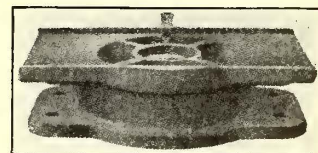
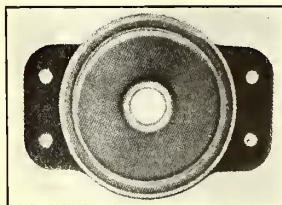


Splice for Round, Grooved and Fig. 8 Wire

original wire. Selected for the tests were a standard and a "George" splice showing resistances of 0.000139 and 0.000044 ohm, respectively, when measured by a Thomson double-bridge with knife edges fastened to the wires at the ends of each splice. The lower resistance of the new splice is due to the copper wedge clamp. The tension tests showed three distinct failures for the standard make: failure No. 1 under a stress of 4800 lb.; No. 2, 4900 lb.; No. 3, 5300 lb. The "George" splice yielded under a stress of 5300 lb. The latter two failures were those of the wires. The wire itself showed a yield point of 6200 lb. and a rupture of 4100 lb. Other features of the new splice are its lightness, shortness and narrowness, which are believed to reduce destructive arcing. It is easy to install, requiring no solder or set screws to weaken the wire. The splice is made for round, grooved and figure "8" wire in the Nos. 0, 00, 000 and 000 sizes.

AN OIL-BEARING CENTER PLATE

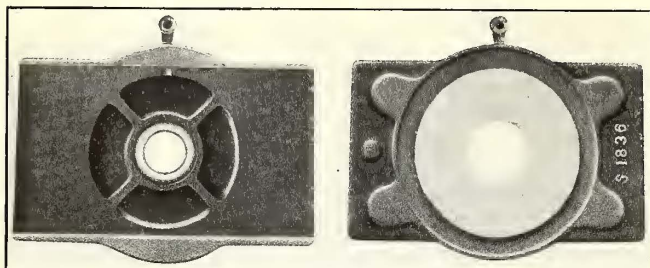
An oil-bearing center plate suitable for any type of motor truck is shown in the accompanying views. This plate is made by the Steel Car Forge Company, Pittsburgh, Pa., and is known as the "Ideal." It is of oil-bearing design, the oil being fed into a reservoir in



Truck Plate and Center Plate Complete

the body or top plate by a pipe from the car body outside or inside of car as preferred. The top plate is made of cast steel and the bottom plate is a drop forging, thus insuring freedom from holes through which the oil could otherwise escape. The wear is taken by a removable bronze ring or washer, which is constantly in a bath of oil. All dust is excluded by means of a felt ring which is so fitted in a machined groove in the truck plate that the top and bottom plates may be separated without displacement or injury. The entire plate contains only five pieces and needs no rollers or ball bearings

to insure minimum friction. It is machined to within a car ahead a sufficient distance to prevent collisions, and to see which way track switches are thrown as they approach the switch. Recent tests of the new headlights fitted with a 36-watt bulb on a city street, on a dark clear night, showed that the second hand of a watch can be read at a distance of 600 ft. and that a man lying on the track can be seen from the car further than is possible with an arc lamp. About sixty-nine railways and steamship lines are now using this type of headlight.

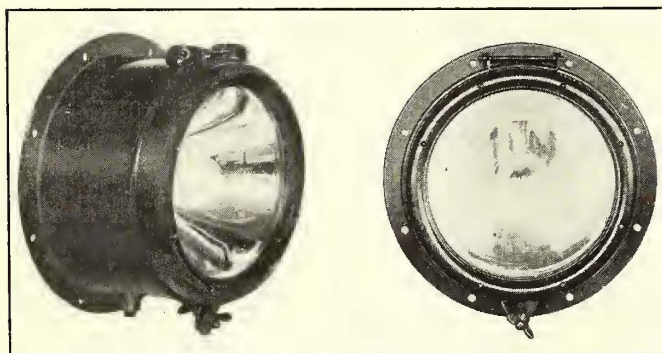


Top and Bearing Side of Body Plate

is provided to resist the propelling action of the motors, and the plates are stated to be of larger diameter than those hitherto used for motor truck work.

PRESSED STEEL HEADLIGHTS WITH WELDED JOINTS

The Esterline Company, Indianapolis, Ind., has just added to its line two headlights which are designated as SR-95 and SE-95. While these headlights embody the use of the "Golden Glow" glass reflectors which characterize this company's products, they possess several new and important features. The lamp bodies and fronts are made entirely of pressed steel, which materially reduces the weight and improves the appearance of the headlights. The makers have taken advantage of the accuracy with which steel stampings can be made by producing a headlight which is water and dustproof. A metal ring which holds the reflector in place also clamps a heavy gasket over which the front or door presses, making a very tight joint. The hinges and latches have no projecting portions to catch wires or ropes. Another innovation is the use of electric-welded joints and fastenings instead of screws or rivets. The headlights are properly ventilated to prevent sweating and clouding of the reflector and front glass. After



Side and Front View of Pressed Steel Headlight

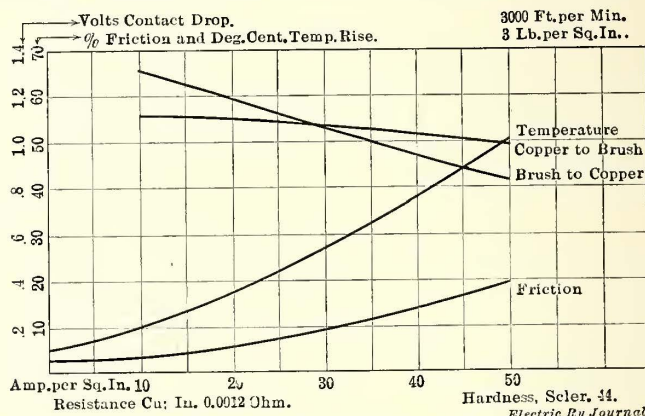
assembling, the lamp bodies are given several coats of baked enamel, inside and out, to render them proof against rust. The front glass, which is made extra heavy, is held in place by spring clips to permit expansion and contraction, without cracking the glass. In the construction of the SE-95 and the SR-95 headlights, 9-in. reflectors are used. These give a headlight larger in diameter and deeper than earlier types, allowing sufficient space for lamps up to 60 watts. The SR-95 is made to recess into the dash of the car, while the SE-95 is designed for mounting on the front of the dash.

The "Golden Glow" headlights are made to meet the demands of railway men for a headlight which projects a non-blinding light of sufficient intensity to serve as a warning to other kinds of street traffic, under all weather conditions. They also enable motormen to see

a car ahead a sufficient distance to prevent collisions, and to see which way track switches are thrown as they approach the switch. Recent tests of the new headlights fitted with a 36-watt bulb on a city street, on a dark clear night, showed that the second hand of a watch can be read at a distance of 600 ft. and that a man lying on the track can be seen from the car further than is possible with an arc lamp. About sixty-nine railways and steamship lines are now using this type of headlight.

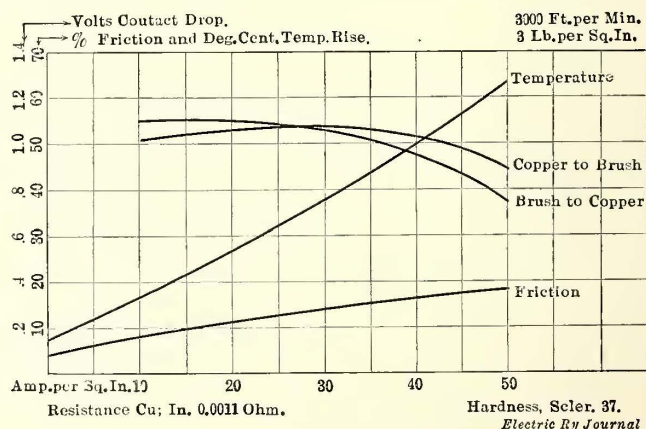
LOAD PERFORMANCES OF CARBON BRUSHES

Some interesting load curves showing creditable carbon brush performances have recently been prepared by the Speer Carbon Company, St. Mary's, Pa. Two of



Test Curves of Grade "H-3" Brush

these curves relating to the operation of carbon brushes on commutators of railway motors and generators are shown in the accompanying diagrams. Each one of the curve charts represents in degrees Centigrade the heat effect which accompanies the increase of load in amperes



Test Curves of Grade "H" Brush

per square inch. It also shows the increased coefficient of friction between the brush and commutator and the drop in voltage at the contact between the brush and commutator, both when the current flows from the copper to the brush and when it flows from the brush to the copper. One set of curves shows the performance of the grade "H" brush, which is of a dense, tough structure adapted to commutators with long cut mica suitable for railway motors and generators. These data were taken at a commutator peripheral speed of 3000 ft. per minute with a brush pressure of 3 lb. per square inch. The other set of curves shows the performance under similar conditions of speed and pressure of a grade "H-3" brush. This brush is somewhat harder than grade "H," being sufficiently hard to keep down the mica and strong enough for all but the most severe railway service.

BALL BEARINGS FOR ELECTRIC RAILWAY CARS

The economy and reliability of anti-friction bearings have been widely demonstrated in their application to storage-battery cars on which any energy-saving device is relatively more important than on ordinary electric cars. The largest user in this country of such bearings is the Third Avenue Railway, New York, and among the types which it has on its storage-battery cars are forty sets of S.K.F. journal ball bearings, a product of Swedish invention. The manufacturer of this bearing, however, also makes a great variety of types for service on standard trolley and third-rail cars, and among recent applications is the adoption of these bearings for a line of standard trolley cars in the New York metropolitan district.

The ordinary ball bearing, consisting simply of an inner and outer race with a single row of balls, forms a rigid unit the durability of which depends upon the precision with which it is put together. The greatest care is required in its manufacture to avoid stresses as well as to prevent the breaking or jamming of the balls. In 1907 the S.K.F. Ball Bearing Company, Gothenburg, Sweden, introduced a self-aligning ball bearing in which the disadvantages of a rigid bearing were eliminated by the use of an outer race which is spherically machined on its inner surface. As will be seen from the illustrations, Figs. 1, 2, 3 and 4, the inner race contains two grooves each ground to a radius slightly larger than the radius of the balls, while the outer race is ground in the form of a section of a hollow sphere whose center is the center of the axis of rotation. It may readily be seen from an analysis of the diagram, Fig. 3, that the balls, retainer, and inner race are free at all times to rotate at an angle within this spherical outer race, and will, without subjecting

are obtained. The diagram clearly shows that the races are so designed that the tangents of the balls at their points of contact with the races are parallel.

Bearing pressures due to the load are accepted through the pair of oblique lines which pass through both contact points on the races, through the center of the ball, and continue in a straight line to the center of the spherical outer race, i.e., the center of the bearing.

The retainer, Fig. 5, for holding the balls, is made in one piece without rivets, screws or other parts that might get loose. Sheet steel is used for small bear-

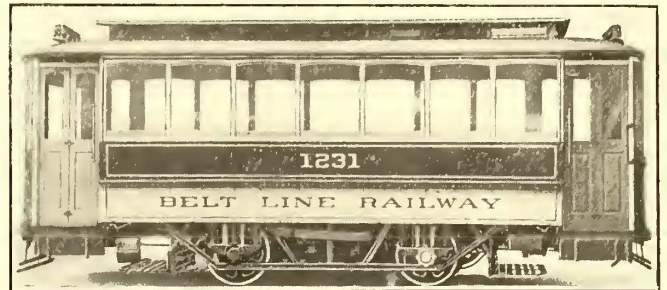


Fig. 7—Belt Line Storage Battery Car of Third Avenue Railway System Equipped with Ball Bearings

ings, and bored iron for larger bearings. This retainer construction practically eliminates bearing friction. The remaining views show the application of this bearing on an 8-ton car of the Third Avenue Railway, where they have been used for three and one-half years with remarkably satisfactory results. S.K.F. bearings are now used for car loads up to 24,000 lb. Extensive experiments abroad, both with self-propelled and standard electric cars, have shown that these bear-

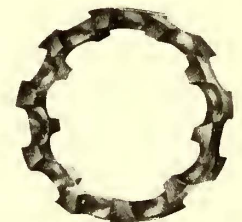
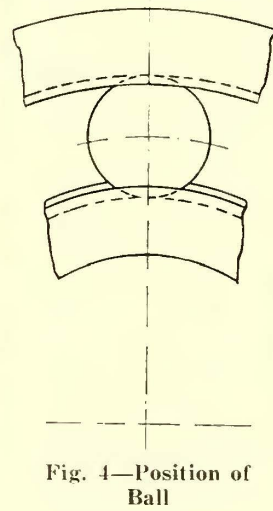
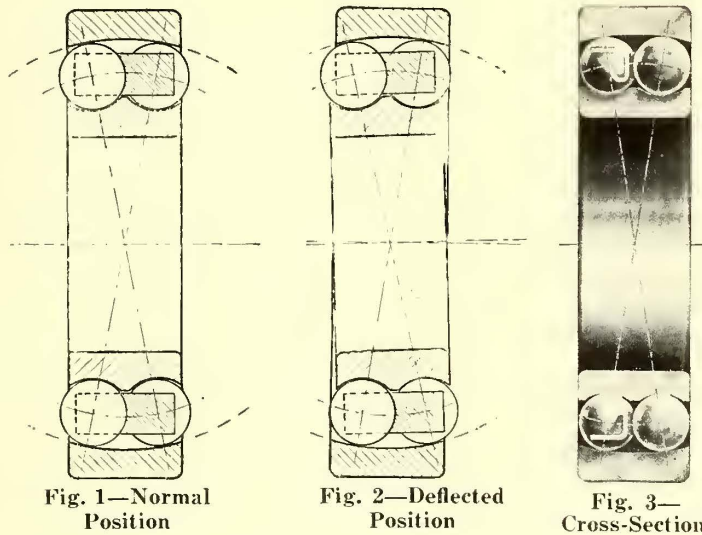


Fig. 5—Solid Retainer

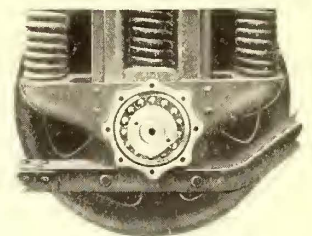


Fig. 6—Bearings Exposed

the race to any undue strain, at all times adjust themselves to any possible degree of deflection without binding the balls or introducing any obstacles to immediate and automatic compensation for any shaft springing or deflection.

The ease by which this self-alignment is accomplished will be fully understood when it is pointed out that the balls roll on the surface of a spherically ground outer ball race with a pure rolling motion, without sliding friction. This movement is facilitated by the distribution of the load over a large number of balls, and as the load is automatically and equally divided between two rows of balls, the most favorable working conditions

ings can produce energy savings as high as 25 per cent, and that they require lubrication but once every three or four months. The American representative is the S.K.F. Ball Bearing Company, New York.

The sixth annual report of the Nebraska State Railroad Commission for the year ended Nov. 30, 1913, contains a general review of complaints and applications filed, and orders issued by the commission during the year. A section of the book is devoted to a tabulation of the officers and directors of the electric railways in Nebraska, as well as of capitalization, financial systems and traffic statistics of the companies.

SWITCH INDICATOR WITH TIME RELEASE AND POWER-SAVING DEVICE

The accompanying illustration shows an improved switch indicator arrangement designed by the Union Switch & Signal Company to save power and to provide an instrument which may be used without track circuit preliminaries. As shown, the switch indicator which is equipped with a push button surmounts an iron box containing the time release, although, if desired, the switch indicator may be used without the time release and its box. The saving of power is due to the fact that only when the button is depressed is the circuit for the indicator closed. The indicator will not clear by the depression of the button unless it is also energized by the external circuit.

In service the indicator is normally de-energized and the blade stands in the horizontal position. Should a trainman desire to use the switch he pushes the button, and if the indicator clears it shows that there is no train approaching and that conditions are proper for leaving the siding. As soon as the switch is opened, the signals leading over the switch and protecting it are set to the stop position, thereby causing the indicator to assume the normal, or stop position, and it cannot again be cleared until conditions in the block are restored to normal.

The time release arrangement is employed where it is undesirable to control the switch indicator by track circuit preliminaries, and it provides a time interval equivalent to that taken by a train in passing through a preliminary.

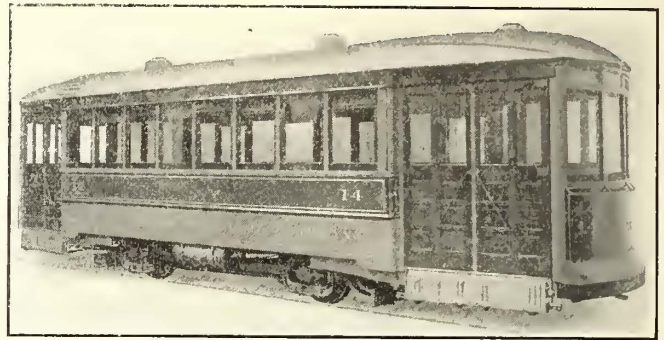
The time release is inclosed in an iron box provided with a lock similar to that used on switch stands. The operation is as follows: A trainman desiring to use the switch first unlocks the box containing the time release and starts it by a slight turning of the knob. At the expiration of a predetermined time he depresses the push button, and if the block is free the indicator will clear. If the indicator clears, the switch may be thrown and the train can proceed onto the main line. The first movement of the time release sets all signals leading over this switch to the stop position, and so long as the time release is in other than the normal position the signals are held at stop. The throwing of the switch continues to hold the signals in the stop position and restores the indicator to the normal or stop position. The box cannot be closed and locked unless the time release is restored to the normal position so as to close the signal circuits, this action requiring a small movement of the time-release knob in the reverse direction.

The switch indicator can be operated on either a.c. or d.c. and the time release can be built for any time interval from fifteen seconds to four minutes. As the in-

dicator is clear for only a short time when it is used with the time release arrangement, the push button attachment may be eliminated if desired and the operation by trainmen will then be simplified, although at a slight increase in the amount of power used.

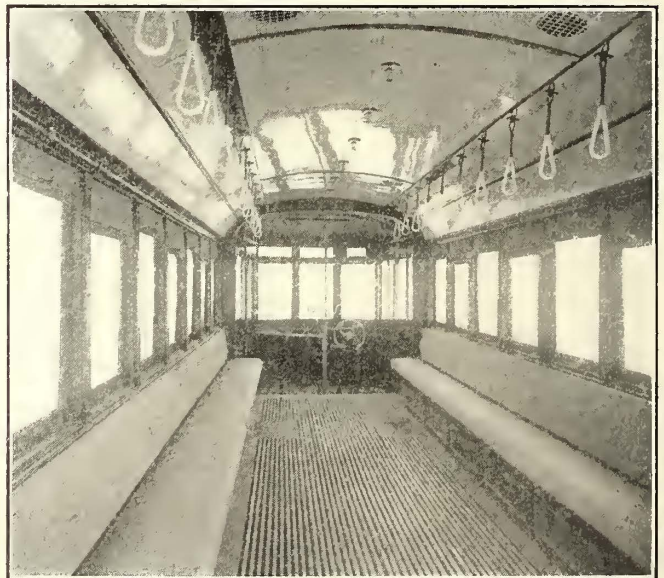
ONE-MAN NEAR-SIDE CAR FOR ASTORIA, ORE.

The advantageous influence of the radial axle truck on the length of single-truck cars is demonstrated by the one-man near-side double-end car ordered by the Pacific Power & Light Company, Astoria, Ore., from The J. G. Brill Company. This car has a body length



One-Man Car with Radial Axle Truck

of 21 ft. and is 34 ft. 3 in. long over the vestibules. The width over the sills is 8 ft. 3 in., the width over-all 8 ft. 6 in. and the height from rail to the trolley base, 10 ft. 8 $\frac{3}{4}$ in. The longitudinal seating accommodates thirty-two passengers. The end-frame of the car is of steel, wood being used for the body and the single-arch roof. The headlining is of maple veneer and the interior trim of oxidized bronze. The truck is of the



The Spacious Interior of One-Man Car for Astoria, Ore.

Radiax E-1 type fitted with cast-iron wheels and 3 $\frac{3}{4}$ -in. x 7-in. heat-treated axles and carrying two GE-58 inside-hung motors. The K-10 controller is used. The air-brakes are of General Electric and the sanders of Nichols-Intern manufacture. Other specialties on the car are the car builder's gong, channel-iron bumpers and vertical wheel-brakes, Syracuse transferable headlights, Hunter destination signs, Pantasote curtain material and "Rico" sanitary sleeving for straps.

LONDON LETTER

(From Our Regular Correspondent)

As a result of the renewed agitation for all-night cars a sub-committee of the Glasgow tramways department has recommended that the corporation start an all-night service experimentally in the autumn. A proposal to institute an all-night service which came before the Glasgow Corporation a year ago was defeated, but the supporters of the movement have received fresh encouragement from the success of Manchester's experiment. James Dalrymple, the tramways manager, has submitted a report on the proposal to reduce the fares again by which passengers would be allowed to travel six stages for a penny and three for a halfpenny, instead of four and two stages respectively, as at present. The Glasgow trams are now carrying 340,000,000 passengers per annum, as against 222,000,000 before the change in fares a year ago and are operating fifty additional cars. The corporation is about to manufacture another lot of 150 cars, which will bring the total up to 1000. Unless new arteries of traffic are completed soon there will be intolerable congestion.

Tramway traffic in Manchester is also badly congested. J. M. McElroy, the general manager of the tramways, has issued a report based on his investigations during his recent trip to cities in America and on the Continent, and he makes a strong point of the fact that the greater the facilities afforded the greater becomes the travel. In this connection he says that "in all cities and towns there is an immense potentiality in the riding habits of the people, and everywhere there is a continual growth in the number of journeys per head of population, and the provision of new or improved transit facilities accelerate this to a very marked degree." The main proposals of the report are the construction of certain new arterial routes; the utilization of the vacant site where the Infirmary stood; the opening up of negotiations with the Corporation of Salford for better intercommunication, and the introduction of transfer tickets. Underground subways for tramcars are considered but not advocated on account of the expense. The report also objects to rapid-transit lines on elevated structures, but adds that the time is rapidly drawing near when Manchester will have to be provided with rapid-transit facilities, and the lines should be so laid that they can be worked in conjunction with the surface lines, by providing suitable transfer points from surface to rapid-transit and vice versa. Mr. McElroy concludes that a point will soon be reached when the construction of underground facilities will become an absolute necessity, and states that, while that time has not yet arrived, consideration should be given without delay to the planning of a general scheme to be constructed later on by instalments. Motor buses are also referred to as forming in the future an important part of the surface-transit facilities, chiefly in the suburbs, and as supplementing the several tramway services in many directions.

Liverpool, the third great city of Great Britain, is also intensely interested in the problem of the relief of congestion, and C. W. Mallins, the general manager, has recently issued a report dealing with a belt system of tube railways encircling the city by junctions with the Overhead Railway; radial lines running through the most populous districts; an extension of the Mersey Railway to the Haymarket; and railway and general traffic tubes to Birkenhead and Seacombe forming junctions with the Wirral Railway, so as to connect any part of Liverpool with the whole of Wirral, including Rock Ferry, Birkenhead Park, West Kirby, and Heswall. The cost of the scheme is estimated at £13,000,000. Owing to the fan-like formation of Liverpool, and the rapid rise of the levels inland from the river, the construction of any adequate means of transport other than a tube system seems to be impracticable, while the question of a bridge across the Mersey must also be left to the future.

In addition to this question Liverpool is also face to face with the problem of the conveyance of goods on the tramways to relieve the dock traffic difficulties, and negotiations have been entered into with the Southwest Lancashire tramway companies and other tramway authorities in the vicinity with a view to ascertaining the expenditure necessary

to establish such a service. The idea is to inaugurate a tentative service of tramway wagons for the transport of goods between the Liverpool docks and Lancashire towns, such as Bolton, Bury, Rochdale, etc., and Mr. Mallins, in his report, states that if a cheap and expeditious system could be established it would undoubtedly prove of great advantage to the whole community. He also expresses the opinion that if a thoroughly well-organized system of mechanically propelled vehicles was provided to deal with the work now carried out by horse vehicles, the number of vehicles could be reduced one-half. The experiment of goods transport would necessarily be on a very limited scale at first, but if found successful a more elaborate system could be established, providing the dock board and the Bootle Corporation would co-operate. The scheme suggested would involve the electrification of the dock railway or the construction of a line of tramways parallel with that railway.

The alterations at Charing Cross Station, whereby interchange facilities have been made between the District Railway and the Hampstead and Bakerloo tubes, are now completed, and Charing Cross (Embankment) station, as it is now called, has become one of the busiest in the world. It is calculated that the station will handle 15,000,000 passengers annually, nearly half of that number interchanging. The Hampstead line has been carried from the old terminus at Charing Cross by means of a single line in the form of a loop down under the District Station and round under the Thames, back again to the down line at the old Charing Cross station. The loop had not only to pass under the Thames where water-carrying strata were encountered, necessitating the use of the Greathead shield, but it also had to pass under the weighty piers supporting Hungerford Bridge, over which run the main lines of the South Eastern & Chatham Railway. The work has been carried on without interruption to traffic. The Embankment station is now really in four stories. At the top is the booking office, from which stairs lead to the platform of the District Railway. From this platform descend other stairways to a large room immediately underneath the District station, from which, in turn, descend four escalators, two, in one direction, to the Bakerloo tube and two, in the other direction, to the Hampstead tube. There is also a connecting walk between the Hampstead tube and the Bakerloo tube, so that complete interchange facilities have been constructed at a cost of about £200,000. No increase of fare will be made in connection with any of these lines, it being expected that sufficient profit will result from the increased traffics to pay for the cost of the extension.

Much interest attaches to the electrification plans of the London, Brighton & South Coast Railway, but, with the exception of the suburban system, which is being rapidly transformed, a decision as regards the main line has not yet been arrived at. The expectation is that within three or four years electric trains will be running between London and Brighton, a distance of 50½ miles, in less than three-quarters of an hour. Philip Dawson, the company's consulting engineer, has recently spent six months on the Continent and in the United States, and he is of opinion that as much progress is being made with this system of traction on this side of the Atlantic as on the other. The transformation of the London & South-Western Company's suburban service, likewise, is making headway, and the work in connection with the first part of the scheme, from Waterloo, by way of Wimbledon, to Kingston and back to the London terminus by Richmond and Putney, is well advanced. The scope of further extension, naturally, will largely depend upon the results which are achieved with the present installation.

As the City Corporation has refused to sanction plans for taking tramways to the city the London County Council has been forced to abandon schemes for continuing the Farringdon Road tramways to Ludgate Circus and the East London tramways to Aldgate. The Council recognizes the danger of the hatpins worn by inconsiderate women, and has put warning notices in the tramcars. The danger, however, is still great, and Mr. Shearman will propose that the Council shall make a by-law dealing with "long, unprotected hatpins and other projecting ornaments" which are a danger and inconvenience to the public.

A. C. S.

News of Electric Railways

Negotiations on Basis of Renewal in Toledo

As stated in the *ELECTRIC RAILWAY JOURNAL* of April 25 it seemed for a time that negotiations between the city of Toledo, Ohio, and the Toledo Railways & Light Company would be indefinitely suspended because of a difference of opinion as to whether the proposed agreement should be in the form of a renewal of the old franchises, as provided in the draft formulated by Henry L. Doherty and his counsel, or a new franchise, as desired by the committee and City Solicitor Thurstin. At a meeting on April 23 the committee announced its intention of proceeding with the negotiations on the basis of a renewal rather than a new franchise. While franchises on some of the lines expired three years ago, others still exist and this forms one of the grounds for the renewal plan. Unless negotiations are commenced before the end of two years after a franchise has expired, it cannot be renewed, but the members of the committee have taken the view that negotiations have been practically continuous since November, 1910, when the first franchise expired.

City Solicitor Thurstin intimated at the meeting of the committee on April 23 that outside interests desire to bid, if the conditions are made so they can do so. He told the committee that he believed the principals would come to the front after the Toledo Railways & Light Company's proposal has been disposed of.

Mr. Doherty and counsel for the company met with the committee and various points in the amended franchises were taken up. He had previously informed the committee that the company could not consider a rate of 3 cents for the entire term of the franchise and he insists that some plan be adopted to secure information that will lead to the adoption of a rate that will be sufficient to provide good service and yield a proper return on the investment.

An open meeting of the franchise committee was held late on April 25. No progress was made toward fixing rate of fare. Two questions were considered. One was the method of appraisal which should be followed in case the city should decide to take over the street railway system. The other was whether the city would also take the power plant on such a purchase. No agreement was reached on either point. Thomas H. Tracy, attorney for the company, insisted that the franchise should provide that the system be appraised as a going concern. Councilman Dotson proposed that the valuation be provided for according to rules set up by the general code for all property used and useful with no charge for the franchise. Mr. Doherty told the committee that the company was willing to sell or retain the power plant in case municipal ownership should be voted for, but that the company wanted it settled in the franchise now so the company would know how to proceed with building other power plants. If the city did not buy the power plant, the charges for power furnished by the company would be determined by arbitration, Mr. Tracy said.

Provincial Control and Operation of Radial Railways Through Hydro-Electric Power Commission

The minister of power introduced in the Legislature of Ontario on April 20 a radial bill that repeals the legislation of last session and puts the development of the system on an entirely new basis. Under the legislation of a year ago control and operation of radial electric railways, with certain restrictions, was vested in the municipalities. The financial provisions left much to be desired. With the support of the hydro municipalities of the province Adam Beck is asking for legislation that will enable the municipalities to finance radial railways and place no direct burden upon the province or the commission. Under the new bill the railways will be built with money secured by issues of bonds by the Hydro-Electric Power Commission, guaranteed by the province. The commission or Government will in turn be protected by debentures deposited with them by the municipalities, covering the expenditure made. The

interest and the sinking fund, together with the deficits, if any, will be met by the municipalities interested. The bonds covering construction will be for fifty years, with a provision not requiring sinking fund charges to be paid during the first ten years. The commission is empowered to enter into a contract with one or more municipalities with the approval of the lieutenant-governor-in-council. The agreement or contract must then be submitted to the electors qualified to vote upon money by-laws.

Franchise Renewal Negotiations in Kansas City

On April 27 Judge William C. Hook in the federal court at Kansas City ordered the receivers for the Metropolitan Street Railway to resume negotiations with the city for a new franchise. The negotiations will be taken up where they were left off at the time the receivers withdrew from the proposition in order to take the issue out of politics.

On the application of Jeremiah Smith, counsel for the Old Colony Trust Company, Boston, which holds more than \$7,000,000 in overdue bonds, Judge Hook on the same day appointed Judge Herman Brumback special master to prepare all facts in the foreclosure suit so there will be no delay in foreclosing the property if the franchise negotiations do not materialize.

In the matter of the receivers paying 1 per cent extra interest pending final settlement or renewal of the loans Judge Hook said he would take that under advisement. Judge Hook said:

"This receivership has lasted three years now. That is longer than any receivership should last. The time has come when the bondholders have a right to insist on some sort of a settlement. The application of Mr. Smith to have a master appointed now to prepare for foreclosure proceedings, in case they come, is just. If negotiations fail, no time should be lost in the bondholders getting their money. Therefore I order the receivers to renew negotiations with the city, if the city is willing. I want them to push the negotiations with all the speed the importance of the question warrants. There ought not to be any difficulty in reaching a contract that the majority of voters will accept. If the majority accepts it it must be right."

When Attorney Smith asked that a special master be appointed to facilitate foreclosure proceedings should they come, Alexander New, counsel for the Kansas City Electric Company, expressed the opinion that no move toward foreclosure should be made until the voters have had a chance to express their opinion.

Frank Hagerman, attorney for the receivers of the company, presented on April 27 a long brief outlining the affairs of the company during the nearly three years of receivership and the two different attempts that had been made to secure franchise extensions. He stated that the second negotiations with the city ended on Jan. 6, "when it became apparent that some persons, opposed to the administration, instead of trying to make a contract upon business principles, were endeavoring to interpose obstacles and insert impossible conditions to create political issues for the spring, 1914, election and the receivers formally withdrew from the negotiations."

After reviewing the financial tribulations of the company and the demands made by the trustees for the various bondholders Mr. Hagerman told of immediate conditions. In this connection he said:

"It is to the real interest of the public and of everyone having a claim upon the property that it be kept together as a whole and not segregated or dismembered, as would be the case with foreclosures of the different securities. The purpose of the bill, for a receivership herein, was to permit the property to be maintained and operated as a whole until some plan could be worked out whereby it could be refinanced, foreclosure averted, new money raised to meet the demands of the city for increased service, and the fair value of the property preserved for its owners.

"This cannot be done unless the contractual relations with the city can be rearranged to the end that the company's

franchise may be extended, renewed, or put in some modified form. Negotiations, therefore, are useless if the mortgages upon the property are permitted to be foreclosed now. In that case, all reason for the payment of any interest by the receivers would cease, and the situation become simply a scramble among security holders for each parcel upon which they may have a prior lien."

In accordance with the instructions from Judge Hook, Ford Harvey, one of the receivers of the company, wrote on the evening of April 27 to Henry L. Jost, who was recently re-elected Mayor of Kansas City, asking when it would be possible for the receivers to confer with the Mayor regarding a renewal of the franchise negotiations. The Mayor responded at once and conference was arranged for April 30.

In his inaugural address on April 20 Mr. Jost referred to the receivership and to the franchise renewal negotiations of the Metropolitan Street Railway as follows:

"When I became Mayor two years ago, I found that the preceding administration, with the full approval of the *Kansas City Star*, was negotiating with the street railway for a new franchise. The street railway people came to me and wanted to continue negotiations. I declined unless and until I could be satisfied that there was an absolute necessity for such negotiations to continue. After investigating conditions I discovered that the company was in financial difficulties and that it was delinquent in its obligations to Kansas City, and I continued the negotiations that the Brown administration had started with the hope that the matter could be adjusted. These negotiations continued until the middle of January. The receivers of the property then discontinued and withdrew. I want it distinctly understood that I am not soliciting a reopening of these negotiations.

"I am going to make a catalog and a statement of the matters and things in which the Metropolitan Street Railway is in default and insist on the performance of these obligations. The property of the company has been in the hands of receivers since June, 1911, during which time the city has received in the way of street railway transportation and benefits only such things as met with the approval of Federal Judge Hook. I am going to find out whether this kind of a thing can continue indefinitely. Miles of streets about these tracks are in wretched condition. I am going to make a special effort to repair the streets—I mean the part that belongs to the city—and I am going to know the reason why we cannot get streets repaired between and outside these street car lines.

"This street railway matter has got to come to a head. If there is a necessity for a new contract, if it is absolutely necessary there shall be a new agreement, that is another thing, but pending any such new contract or pending the final termination of the problem, there must be some distinctive performance on the part of this company of those things for which it stands indebted to the public. I propose to state promptly the things to which the city is entitled under the contract and I am going to demand personally from Judge Hook that these things be done and performed. This company has not, through its agents or anyone else, intimated any intention of asking for the resumption of these negotiations, and this statement has been inspired on that account."

Kentucky Workman's Compensation Act

The Kentucky workman's compensation act, which was passed at the last session of the State Legislature, has been signed by Governor McCreary and becomes a law on June 15, but does not become effective until Jan. 1, 1915. A maximum rate limit of \$1.25 for each \$100 of payroll is set out in the bill, though the compensation board, the creation of which is also provided for, will readjust the rates on July 1, 1915, and semi-annually thereafter. The law applies to practically all industries employing more than six persons other than casual employees and excepts domestic and agricultural pursuits.

The compensation board is to collect from employers a certain percentage of their payrolls, according to rates and classes and to distribute the fund it collects among injured employees or their dependents if they should be killed, according to a schedule of benefits which are named in the bill. The board, further, has great latitude with

respect to all matters not specifically provided for. Street and interurban railways are included in class sixteen.

All employers subject to the act are required to notify the compensation board within a month after it is organized and must decide for themselves whether they come under its provisions. In like manner the employer must notify the board of accidents and give that body information whenever requested. Employers who elect not to accept the act may, by carrying their own risks and satisfying the board of their solvency, deal directly with their employees, paying the same benefits prescribed by the law. Or the employers may carry liability insurance in any company admitted to the State, the amounts to be paid to be not less than those provided in the act. As to benefits the act provides that 50 per cent of wages up to \$12 a week and not less than \$5 a week in any case shall be allowed for temporary total disability, not to exceed \$3,750 in the aggregate. Compensation otherwise is about on the same level.

Progress of New York Municipal Railway Corporation

The New York Municipal Railway Corporation has made public a detailed progress report covering the work done up to April 1 on each of the construction contracts let by the New York Municipal Railway, in carrying out its part of the construction of new rapid transit lines under the dual plan. The work of reconstructing the Fourth Avenue subway at Thirty-eighth Street to permit a connection with the South Brooklyn lines through the Thirty-eighth Street cut is well under way. An order involving about \$200,000 for steel has been placed with the American Bridge Company. The work of excavating the Thirty-eighth Street cut has proceeded to the extent of 50,000 yards of excavation and concrete is being placed as fast as the excavation work permits. This is the section between Fourth and Tenth Avenues, which provides a connection between the Fourth Avenue subway and the New Utrecht and Gravesend Avenue elevated lines.

The steel necessary for the additional reconstruction work now under way in the Centre Street loop has been delivered and the material for track laying is being delivered. The Municipal Railway has let a contract to the Sergeant-Maxwell Company for the construction of a storage yard on Second Avenue between Thirty-seventh and Thirty-ninth Streets, and in connection with this storage yard has contracted with Spearin & Preston for the construction of the pier on the waterfront. The yard will be used for handling track material for the city and for company material generally. It is expected that the yard will be completed some time in May and that the pier will be ready about the first of June. About 1700 tons of rails to be laid in the Fourth Avenue subway have been delivered. On March 20 a contract for the steel necessary for third-tracking the Fulton Street elevated line from Nostrand Avenue to Manhattan Junction was let to Milliken Brothers and the work of preparing plans is well advanced.

On the Liberty Avenue line the construction of foundations has been begun and the steel which was ordered some time ago is now being fabricated in the shops of the contractors. With respect to the physical connection between the Broadway and Myrtle Avenue elevated lines, the contract for which was let on July 8, 1913, to Terry & Tench, the contractors had by April 1 erected practically all the steel work. The track laying has been begun and this, with the installation of the interlocking switches and signal system, will practically complete the job.

George McNulty, Inc., the contractor for the reconstruction of the Sea Beach route reports very satisfactory progress.

On the Lutheran Cemetery extension, the contract for the first section was awarded on Aug. 28, 1913, to Cooper & Evans. On this contract all of the concrete has been placed and 1875 tons of steel, being 53 per cent of the total, had been delivered down to April 1. One thousand two hundred and fifty tons of steel, or 36 per cent of the total, had been erected. During March, 1822 lineal ft. of structure, or 19 per cent of the total extension, was completed. All of the column excavations have been made from Wyckoff Avenue to the end of the first section, and 10 per cent of the column bases were concreted by April 1. Columns have been

erected from Cypress Avenue to a point east of Seneca Avenue, being 35 per cent of the total. The cost of the work done to April 1 was \$135,331, which represents in general a total of 1585 lineal ft. of structure erected. The contract for the second section of the Lutheran Cemetery line was let to Fred Burnam on Feb. 27, 1914. Work on this contract started on March 2. The work during the month was of a preliminary nature.

Inquiry Into New Haven Finances

The inquiry at Washington into the affairs of the New York, New Haven & Hartford Railroad was directed on April 29 toward learning the details of the transactions between the New York, New Haven & Hartford Railroad and the New York, Westchester & Boston Railway, now operating a high-speed electric railway out of New York, and the New York & Portchester Railway. The principal witness was Oakleigh Thorne, formerly president of the Trust Company of America, who in conjunction with Marsden J. Pery, Providence, conducted the negotiations by which the franchises and other rights of both the New York, Westchester & Boston Railway and the New York & Portchester Railway were acquired by the New Haven Railroad. A feature of the testimony was the introduction of a letter written in October, 1906, by Mr. Thorne to C. S. Mellen, then president of the New Haven Railroad. In this letter Mr. Thorne referred to the possible "nuisance" value of the rights of the two companies previously mentioned and intimated that there was a division of sentiment in political circles in connection with the proposed grants to the two companies and that it would be extremely difficult for either of the roads to get any rights because of this division of sentiment. He said: "The fact is that when anything goes through both sides will have to be taken care of and by eliminating this I can greatly facilitate the matter and reduce cost."

Mr. Thorne did not remember the circumstances under which he had become interested in the negotiations. He explained that he had dealt directly with Dick & Robinson in acquiring the stock of the New York, Westchester & Boston Railway and with W. C. Gotshall, president of the New York & Portchester Railway. These men, he said, acquired the stock which he needed and had turned it over to him. He said that \$11,200,000 in all had been expended by the Millbrook Company. Asked for the details of these expenditures he said: "The books of the Millbrook Company were gone over by a firm of auditors and reported to be perfectly satisfactory. I could not make up a detailed account of expenditures because the books were destroyed after everything was settled." Other testimony indicated that the amount paid for the property of the Portchester Railway, chiefly franchises, was more than \$1,000,000.

L. S. Miller, president of the New York, Westchester & Boston Railway and the Millbrook Company, was quoted as stating that the books of the latter company would not show the detailed expenditures. C. S. Sweetland, president of the Providence Banking Company, testified that he had been unable to locate the books of the Rhode Island Securities Company and he thought they had been burned, but if they had it was done inadvertently. He simply acted as transfer agent for the company and knew nothing about the details of its business.

New York Rapid Transit Matters Acted Upon Recently

Several important rapid transit matters were acted upon by the Public Service Commission for the First District during the week ended April 25. The commission awarded one contract for the construction of a section of the Seventh Avenue subway in Manhattan, opened bids for the construction of a section of the Broadway subway in Manhattan, rejected all bids and decided to readvertise for proposals for the section covering the junction between the new Seventh Avenue subway and the existing subway at Times Square, and directed the advertisement for bids for the construction of two new tunnels under the East River. The contract awarded covers that portion of the Seventh Avenue subway between Battery Place to a point just south of Vesey Street. The successful bidder was the Rapid Transit Subway Construction Company, at

\$2,121,077. The road will be a two-track line and must be finished within thirty-three months.

The section upon which bids were opened was Section No. 2 of Routes Nos. 4 and 36, which lies under Broadway between Twenty-sixth and Thirty-eighth Streets. Here the subway will be a four-track line, with a local station at Twenty-eighth Street and an express station at Thirty-fourth Street. On the unofficial figures, reported by representatives of the bidders, the Thomas J. Buckley Engineering Company, New York, had the lowest bid, at \$2,450,000. The commission is now considering the award of the contract for this section.

The section upon which all bids were rejected was Section No. 6-A of Routes Nos. 4 and 38. Bids for the construction of this section were opened last March and the lowest bidder was the Oscar Daniels Company, at \$304,316. The Interborough Rapid Transit Company, which operates the existing subway, protested against the award of the contract to the Daniels Company on the ground that its bid showed that the company had not the proper conception of the difficulties of the work or the dangers to passengers in the subway. One of the items upon which bidders submitted figures was for the support of the subway and the protection of train service in it. On this item the Oscar Daniels Company bid only \$12,000, while the Rapid Transit Subway Construction Company, which is allied with the Interborough Rapid Transit Company, bid \$135,000. After conferences with the bidders and with Mayor Mitchel and President McAneny, of the Board of Aldermen, who is chairman of the transit committee of the Board of Estimate and Apportionment, the commission decided to reject all bids and readvertise. Accordingly, the commission will receive bids anew and open the same on May 13.

Bids for the construction of the two new tunnels under the East River from downtown Manhattan will be opened on May 22. The work on these tunnels will be the most difficult and expensive in the whole dual system. One of the tunnels will be operated by the Interborough Rapid Transit Company and will run from Old Slip, Manhattan, to Clark Street, Brooklyn. The other will be operated by the New York Municipal Railway Corporation and will run from Whitehall Street, Manhattan, to Montague Street, Brooklyn. Each tunnel will be built by the shield method, with the aid of compressed air. Each will consist of two circular cast iron tubes, one for each track. Both tunnels will be owned by the city of New York, although the money to pay for the tunnel for operation by the Interborough Company will be mainly supplied by that company under the dual system agreements. The cost of the tunnel for operation by the New York Municipal Railway Corporation will be borne wholly by the city of New York.

Ohio Commission Seeks Additional Authority

Specific legislation giving the Public Utilities Commission of Ohio greater power to supervise rates and to investigate and order changed the "rules, regulations and practices of carriers" is asked by the commission in its annual report, the first since the commission was reorganized in August, 1913. The commission desires authority as follows:

To suspend or postpone the effective date of freight tariff schedules.

Fix a definite time for the payment or assessments levied on railroads and utilities for the maintenance of the commission.

Require notice to and approval by the commission prior to the abandonment of stops, stations and agencies by steam and interurban railroads.

Amend the existing statute specifying the number of trainmen required on passenger trains so the law may be readily understood, applied and interpreted.

Require railroads and public utilities to notify the commission immediately of changes in the personnel of the responsible officers.

Require the installation of block signals on railroads where gross earnings justify such expenditures.

Require railroads to give thirty days' notice of changes in rates unless otherwise ordered by commission.

Require railroad companies to pay the expenses and loss

in wages of their employees compelled to appear before the commission in investigations made necessary by the company's neglect or default.

Require all actions which may be brought against the commission in the court of common pleas to be brought in Franklin County.

Order the refunding of illegal or unreasonable charges by railroads and utilities and exempt the members of the commission and all its employees from being compelled to testify in civil actions, when the matter out of which the action grew has been officially investigated by the commission or its employees.

Repeal the law which fixes the fiscal year for railroad companies.

On its own motion to investigate and to make appropriate orders affecting the rules, regulations and practices of carriers.

Reduction in Fare Refused.—The Aldermen have refused the request of the workmen of the city for the sale of eight street car tickets for a quarter, good during the noon hour on the Regina (Sask.) Municipal Railway.

Electrification of Canadian Road.—The work of electrifying the Kerr Lake branch of the Timiskaming & Northern Ontario Railway for the use of the Nipissing Central Railway will probably be begun May 4. Practically all the material is now on the ground.

Terms for Extensions in Seattle.—Members of the franchise committee of the Charter Commission of Seattle, Wash., will endeavor at the meeting of the City Council in June to break the deadlock between the Council and the Puget Sound Traction, Light & Power Company, over street railway extensions. The committee has decided to amend the present charter to provide that the company may be granted permission to build extensions on terms substantially the same as those made for the original lines.

Peculiar Condition in New York Commission.—The term of office of John E. Eustis of the Public Service Commission of the First District of New York expired on Feb. 1, 1914. Understanding that a successor was to be appointed, Mr. Eustis went on vacation on Feb. 7. He arrived in New York recently, after an absence of more than seventy-five days, to find himself still in office, Surrogate Schulz, who was nominated for the office of commissioner by Governor Glynn, having failed to qualify as commissioner. It is not now expected that Mr. Schulz will accept, nor can another be confirmed until after May 4.

Public Service Commission Not Acceptable as Arbitrators.—A committee of the union employees of the Indianapolis Traction & Terminal Company, Indianapolis, Ind., has notified Governor Ralston of Indiana that his proposal that three members of the Public Service Commission act as a permanent board of arbitration would not be acceptable. The letter of the men to the Governor is concluded as follows: "The employees again ask you to use your good offices in prevailing upon the company to accept some fair means of establishing an arbitration board other than the gentlemen of the commission."

Negotiations for Purchase of Seattle, Renton & Southern Railway.—Negotiations looking to the sale of the Seattle, Renton & Southern Railway to the city of Seattle, abandoned several months ago, are to be reopened, and the property offered to the municipality on terms that will permit payment of the purchase price from the earnings. Mayor Gill is known to favor the purchase of the property in order to end the controversy in the Rainier Valley, which has finally resulted in a plan for the city to parallel the line. Harold Preston has been retained by the receivers to represent the company in the new negotiations.

Appointment to Detroit Commission.—James Wilkie, a member of the water commission, has been appointed by Mayor Marx to succeed W. D. Mahon, president of the Amalgamated Association of Street & Electric Railway Employees, on the Detroit Street Railway Commission. Mr. Mahon's reasons for resigning from the commission were read before the Federation of Labor, which backed his appointment to the board. He charged that the commission was not taking the short cut to municipal ownership of the lines of the Detroit United Railway in Detroit and that the issue was being used as a political football by the Marx

administration and the commission. The charges are denied by the administration's supporters.

State Constabulary Called in Pennsylvania Strike.—Because the officers of the Webster, Monessen, Belle Vernon & Fayette City Street Railway, Charleroi, Pa., refused to accede to the demand of the employees that the union be recognized in all dealings, the motormen and conductors went out on strike on April 25. The company is operating its cars with men imported from Philadelphia and Pittsburgh. The strikers have put a line of motor buses and hacks into service between Charleroi, Monessen, Fayette City and Belle Vernon. A corps of the State constabulary has been assigned to duty at Charleroi. The company has placed guards on its cars.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

MARYLAND

Governor Goldsborough has signed the workmen's compensation act and the bill relating to the tax on corporations.

MASSACHUSETTS

The House has killed the bill reducing the membership of the Boston Transit Commission from five to three, sustaining a recent adverse committee report on the measure. The committee on metropolitan affairs has referred to the next Legislature the petition for an extension of the Boylston Street subway in Boston, and has voted to report a permissive bill allowing the Boston Elevated Railway to build a station in the Boylston Street subway at Arlington Street.

NEW YORK

Finance alone will be considered according to the proclamation of Governor Glynn for the extraordinary session of the Legislature on May 4. The Governor has signed the act to amend the tax law by exempting from the additional franchise tax on transportation and transmission corporations a ferry company operating between any of the boroughs of New York City under a lease granted by the city.

Mayor Mitchell of New York City has vetoed the bill to amend the rapid transit act so as to allow the Public Service Commission, with the approval of the Board of Estimate, to employ persons and purchase machinery to construct subways, and to permit the commission to award contracts not exceeding \$25,000 without public letting.

The Governor has vetoed the bill to amend the code of criminal procedure in relation to the payment of expenses of prosecution of crimes committed on railway trains. The Governor has vetoed the bill to amend the business corporations law in relation to proxies and earnings. The purpose of the bill was to amend the co-operative law enacted last year by striking therefrom the provisions for division of profits on the basis of patronage, which is the fundamental principle of co-operative companies. The Governor has approved the bill to amend the labor law by providing that the stipulation for one day of rest in seven shall not apply to employees engaged in any industrial or manufacturing process in which the regular day's work of such employee is not more than eight hours' duration. He has also signed the bill to extend from Dec. 31, 1914, to Dec. 31, 1915, the time within which the International Railway and the Crosstown Street Railway, Buffalo, may complete and begin operation of their roads.

Gov. Glynn has vetoed the bill permitting a company composed of all the trunk line railroads reaching New York to operate a city owned marginal railway along the Brooklyn waterfront from Brooklyn Bridge to Sixty-fifth Street.

The Governor has approved the act amending Section 186 of the railroad law, by providing that a street surface railroad shall not lose its corporate existence if it has completed a portion, instead of the greater portion, as at present, of its route, "or of extension," within ten years of the filing of its certificate and which was operating such portion on March 23, 1912, and had operated such portion continuously for five years prior thereto.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Associations

A meeting of the Central Electric Traffic Association will be held at the Beckle House, Dayton, Ohio, on May 19. The summer meeting of the Central Electric Railway Association will be held at the Secor Hotel, Toledo, Ohio, on June 25 and 26.

Pennsylvania Street Railways Association

The following program has been announced for the meeting of the Pennsylvania Street Railways Association to be held at the Board of Trade Building, Harrisburg, Pa., on May 13:

Address by Edmund James Cattell, city statistician of Philadelphia.

Discussion of problems submitted to the "Question Box." Paper, "An Analysis of Damage Claims Arising from Street Railway Transportation," by Cecil Rice, superintendent of the claim department of the Pittsburgh Railways.

Informal talks by members, manufacturers and supply men.

Adjournment for luncheon at the Harrisburg Club.

The business session of the association will be held on the evening of May 12.

Southwestern Electrical & Gas Association

H. S. Cooper, secretary of the Southwestern Electrical & Gas Association, Slaughter Building, Dallas, Tex., has issued the preliminary program for the tenth annual convention of the association which is to be held at the Hotel Galvez, Galveston, Tex., on May 20, 21, 22 and 23. Besides the general sessions, at which matters of interest and importance to all the different public utilities represented in the association will be discussed, separate and distinct sessions have been arranged for the gas, railway, electric light and power interests. There will be very few formal papers, the idea being to stimulate discussion, and the papers and addresses which will be delivered will have this object for their end. There will be a special session for the accountants. Among the prominent features will be:

A symposium on "Safety First" by a claim agent, a superintendent of transportation, a master mechanic, an electric light and power manager, a gas superintendent and a member of the general public.

A paper on "Fire Prevention Versus Fire Protection" by the general manager of a combined railway, light, gas and water property.

A paper on "Public Policy of Public Corporations" by the general superintendent of a management association having more than twenty separate properties in the Southwest.

A paper on the practical side of "Commercial Departments" by the general manager of one of the largest light and power properties in the State.

A paper on "Economy in Use of Power in the Operation of Cars" by a superintendent of railways who has given this especial—and successful—attention.

A symposium on rates by several prominent gas and electric men who have made this subject a specialty.

The question box will include the most generally interesting inquiries received by the association office since the last convention, and to this will be appended a digest of all the replies received from circular inquiry made by the secretary of the association. Many of these inquiries were not fully answered, and as many of the replies may not be convincing to others it is anticipated that this type of question box will provoke discussion. The railroads have arranged to give a rate of 1 1-3 fares for the round trip to and from Galveston from any part of Texas. Delegates from the East are advised to address Fred Johnson, district manager of the Wagner Electric Company, 1115 New Bank of Commerce Building, St. Louis. Applications for hotel reservations should be made to the hotel at which the delegate desires to stop or to Marion Douglas, chairman of the hotel committee, Security Building, Galveston.

Financial and Corporate

Stock and Money Markets

April 29, 1914.

The tone of the trading on the New York Stock Exchange to-day was uncertain. At the beginning of business fractional advances were made on demand from Europe. The tone held firm even in the late afternoon, although trading diminished. Reading, Union Pacific and New York, Ontario & Western yielded about a point under small sales. Rates in the money market to-day were: Call, 2 per cent; sixty days, 2½@3 per cent; four months, 3¼@3½ per cent. Six months, 3½@3¾ per cent.

In the early trading in Philadelphia to-day Philadelphia Rapid Transit was in supply at 13½. Later it recovered to 14. American Railways sold at 37½.

The market in Chicago was extremely dull to-day. The only railway issue dealt in was Chicago Railway's 2's, sales of which totaled only 150 shares.

The Boston market opened firm. Boston Elevated and West End were the only electric railway issues dealt in.

The market for stocks was broader to-day in Baltimore. The bond transactions totaled \$35,700, par value, half of which were in United Railways 4's.

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

	Apr. 22	Apr. 29
American Brake Shoe & Foundry (com.)	84½	83
American Brake Shoe & Foundry (pref.)	134½	130
American Cities Company (com.)	35½	35½
American Cities Company (pref.)	60¾	60¾
American Light & Traction Company (com.)	342	340
American Light & Traction Company (pref.)	105½	105½
American Railways Company	37	37½
Aurora, Elgin & Chicago Railroad (com.)	36	32½
Aurora, Elgin & Chicago Railroad (pref.)	37	37
Boston Elevated Railway	78½	78
Boston Suburban Electric Companies (com.)	7	7
Boston Suburban Electric Companies (pref.)	*63	*63
Boston & Worcester Electric Companies (com.)	*6¼	*6¼
Boston & Worcester Electric Companies (pref.)	37	37
Brooklyn Rapid Transit Company	89½	90
Capital Traction Company, Washington	100	100
Chicago City Railway	135	135
Chicago Elevated Railways (com.)	20	20
Chicago Elevated Railways (pref.)	65	65
Chicago Railways, pteptg., ct. 1	90	90
Chicago Railways, pteptg., ct. 2	31½	30½
Chicago Railways, pteptg., ct. 3	6	6
Chicago Railways, pteptg., ct. 4	2	2
Cincinnati Street Railway	103	102½
Cleveland Railway	103¾	103¾
Cleveland, Southwestern & Columbus Ry. (com.)	*4	*4
Cleveland, Southwestern & Columbus Ry. (pref.)	*2	*2
Columbus Railway & Light Company	13	13
Columbus Railway (com.)	53	53
Columbus Railway (pref.)	79½	79½
Denver & Northwestern Railway	*71	*71
Detroit United Railway	a80	a80
General Electric Company	143	144
Georgia Railway & Electric Company (com.)	120	120½
Georgia Railway & Electric Company (pref.)	86½	87
Interborough-Metropolitan Company (com.)	14	14½
Interborough-Metropolitan Company (pref.)	60%	60¾
International Traction Company (com.)	*80	*80
International Traction Company (pref.)	*85	*85
Kansas City Railway & Light Company (com.)	*15	*15
Kansas City Railway & Light Company (pref.)	*35	a35
Lake Shore Electric Railway (com.)	*5	*5
Lake Shore Electric Railway (1st pref.)	*92	*92
Lake Shore Electric Railway (2d pref.)	22	*22
Manhattan Railway	131	131½
Massachusetts Electric Companies (com.)	9	9¼
Massachusetts Electric Companies (pref.)	59	57
Milwaukee Electric Ry. & Light Co. (pref.)	*95	95
Norfolk Railway & Light Company	25¾	25¾
North American Company	74	74
Northern Ohio Traction & Light Co. (com.)	70	70
Northern Ohio Traction & Light Co. (pref.)	101	101
Philadelphia Company, Pittsburgh (com.)	40	38¾
Philadelphia Company, Pittsburgh (pref.)	38	38¾
Philadelphia Rapid Transit Company	14¾	13½
Portland Railway, Light & Power Company	51	51
Public Service Corporation	112	112
Third Avenue Railway, New York	40	39
Toledo Traction, Light & Power Co. (com.)	a20	a20
Toledo Traction, Light & Power Co. (pref.)	a70	a70
Twin City Rapid Transit Co., Minneapolis (com.)	103	103
Union Traction Company of Indiana (com.)	11½	*11½
Union Traction Company of Indiana (1st pref.)	75	*75
Union Traction Company of Indiana (2d pref.)	14	*14
United Rys. & Electric Company (Baltimore)	26½	26¾
United Rys. Inv. Company (com.)	15	15
United Rys. Inv. Company (pref.)	43	43
Virginia Railway & Power Company (com.)	50%	56
Virginia Railway & Power Company (pref.)	96	87
Washington Ry. & Electric Company (com.)	87¾	87½
Washington Ry. & Electric Company (pref.)	85½	84½
West End Street Railway, Boston (com.)	68	a68
West End Street Railway, Boston (pref.)	90	82
Westinghouse Elec. & Mfg. Company	73	73
Westinghouse Elec. & Mfg. Co. (1st pref.)	117	118½

* Last sale. a Asked.

ANNUAL REPORTS

The Delaware & Hudson Company

According to the eighty-fourth annual report of the Delaware & Hudson Company for the year ended Dec. 31, 1913, the increases in the net operating revenues of the allied electric railways were as follows: The United Traction Company, \$36,652; Hudson Valley Railway, \$10,551; Schenectady Railway, \$41,318. The net operating revenues of the Troy & New England Railway and the Plattsburgh Traction Company decreased \$378 and \$391 respectively. Dividends of 4 per cent for 1913 were declared on the capital stock of the United Traction Company, 6 per cent on that of the Schenectady Railway, 2½ per cent on that of the Troy & New England Railway and 5 per cent on that of the Plattsburgh Traction Company.

The United Traction Company reconstructed and repaved 2.09 miles of single track, resurfaced and realigned 5.34 miles of single track and constructed one mile of additional single track. During the year twelve new double-track prepayment cars were purchased by the Northern New York Development Company and leased to the United Traction Company.

The high water during March, 1913, caused a loss to the Hudson Valley Railway through a reduction of revenues and an increase in operating expenses of approximately \$11,000. Besides the reconstruction and the paving of various sections of track, this company constructed a new bridge at Fort Edward, N. Y., and put into service three new interurban cars on the line between Glen Falls and Troy.

One of the most interesting features of the Delaware & Hudson Company report is the section devoted to a discussion of the causes which during the recent years have added to the operating and financial difficulties encountered by railways. During 1913, on account of wage increases to engineers, firemen, conductors and trainmen and on account of full crew legislation, the railroad paid to its employees \$8,508,673, which was \$1,122,780, or 15.2 per cent, in excess of the amount that would have been paid for the same services at the rates of compensation that were in force June 30, 1910.

An analysis of the change since 1909 in the prices of materials and supplies showed that while there had been both increases and decreases, the former were in connection with the most important articles and the most extensive purchases. The increased cost on the basis of the 1912 purchases was \$326,603, the difference between a total increase of \$358,277 in the cost of articles that advanced in prices and a total decrease of \$31,673 in the cost of those that were reduced in price. The aggregate sum expended in 1912 was 6.65 per cent in excess of an amount based on 1909 prices.

The operating expenses of the company were also increased through federal and state regulation in the form of laws covering hours of service, full crews, filing of rate schedules, periodical reports, employer's liability, elimination of grade crossings and the like. The expenses necessitated by laws along these lines ranged from \$78,716 in 1907 to \$325,497 in 1913, a total of \$1,525,919 for the entire period.

The greatest increase, however, was in taxes. According to a table compiled, the property investment increased 7.4 per cent between 1910 and 1913, the operating revenues 21.06 per cent, the operating expenses 28.2 per cent and the taxes 46.34 per cent. Stated in amounts, there was an increase from \$237,539 in 1903 to \$621,190 in 1913, or 162 per cent. According to the report, part of this increase in 1913 was due to the double taxation on corporation dividends under the income tax and the removal of the \$5,000 exemption limit. This added about \$15,000 to the tax payments of the company, and the assumption of the income tax on the so-called "tax free" bonds from March 1 to Dec. 31, 1913, added another \$3,000.

The report also discusses the question of rates as affecting railroad income and in this connection particularly mentions the lack of a thoroughly compensatory basis of payment for the parcel post service now rendered by the railways and also the need of higher freight rates. It is

interesting to note that two reasons assigned for difficulties in obtaining necessary railroad capital are the competition of two classes of bonds, municipal and industrial. No mention is made of the increased popularity of electric railway and other public utility securities.

The report states that the sum of \$25,217 was expended for the purchase of one gas-electric car.

Public Service Railway

The income statement of the Public Service Railway, Newark, N. J., for the years ended Dec. 31, 1912 and 1913, follows:

	1913	1912
Total revenue from transportation.....	\$15,377,906	\$14,602,901
Total revenue from operation other than transportation	156,011	152,484
Total operating revenue.....	\$15,533,917	\$14,755,385
Operating revenue deductions:		
Way and structures.....	\$1,428,054	\$1,464,636
Maintenance of equipment.....	1,074,976	976,089
Traffic	3,389	4,219
Conducting transportation	4,896,893	4,736,246
General and miscellaneous.....	1,278,227	1,205,574
Total	\$8,681,539	\$8,386,764
Taxes	1,106,490	1,051,716
Total operating revenue deductions....	\$9,788,029	\$9,438,480
Operating income—railway	\$5,745,888	\$5,316,905
Operating income—other operations.....	14,343	17,017
Total operating income	\$5,760,231	\$5,333,922
Non-operating revenue	171,175	195,936
Gross income	\$5,931,406	\$5,529,858
Income deductions	5,115,408	4,961,302
Net income	\$815,996	\$568,556
Appropriations (excluding dividends)	180,726	Cr. 1,967
	\$635,270	\$570,523

According to the above statement the total revenue from transportation increased 5.3 per cent during 1913; total revenue from operations other than transportation, 2.3 per cent, and total operating revenue, 5.28 per cent. The expenditures for the maintenance of way and structures decreased 2.49 per cent, the expenditures for maintenance of equipment increased 10.1 per cent the traffic expenses decreased 19.6 per cent, the passenger transportation increased 3.4 per cent and the general and miscellaneous expenses increased 6.02 per cent. Taxes showed an increase of 5.2 per cent during the period. The railway operating income increased 8.06 per cent, the operating income from other operations decreased 15.7 per cent, the non-operating income decreased 12.1 per cent and the gross income increased 7.25 per cent. Income deductions increased 3.1 per cent and the net income increased 43.5 per cent.

The revenue passengers carried during 1913 numbered 308,619,532 and the transfers and passes 95,377,279, making a total of 402,996,811. The percentage of passengers carried on transfers was 21.1 per cent and the average fare per passenger was 3.8 cents. The car mileage amounted to 49,434,185 and the car hours numbered 5,675,982. Passenger receipts per car mile were 31.066 cents and the passenger receipts per car hour were \$2.71.

The balance sheet of the company as of Dec. 31, 1913, follows:

ASSETS:		LIABILITIES:	
Fixed capital installed prior to Jan. 1, 1911.....	\$82,148,463	Funded debt	\$42,070,000
Fixed capital installed since Dec. 31, 1910	5,325,594	Taxes accrued	183,093
Fixed capital in other departments	40	Interest accrued	414,034
Materials and supplies	450,476	Other accrued liabilities	243,120
Cash	195,392	Advances from other corporations (Public Service Corporation of New Jersey)	6,309,250
Bills receivable.....	850	Other accounts payable	1,062,533
Accounts receivable.....	127,737	Other unfunded debt	203,435
Interest and dividends receivable.....	27,106	Accrued amortization of capital	35,579
Other current assets.....	39,625	Unamortized premium on debt.....	10,066
Other special deposits	7,710	Casualty and insurance reserve	51,999
Investments	134,361	Capital stock	38,000,000
Prepayments	153,055	Corporate surplus ..	103,475
Unamortized debt discount and expense	76,176		
	\$88,686,585		\$88,686,584

Increase In Stock of the Taylor-Wharton Iron & Steel Company

An issue of \$500,000 additional common stock of the Taylor-Wharton Iron & Steel Company has been offered for sale by William Morris Imbrie & Company, New York, N. Y., at 110. The subscriptions for the stock were closed on April 27. On that day the issue was oversubscribed about two and one-half times. The proceeds of the stock will provide for a part of the cost of erection of a new plant in Easton, Pa., and for improvements and extensions to the existing plant at High Bridge, N. J. The two points are about 20 miles apart. When the new plant at Easton is completed it is expected that most of the railway material manufactured by the company will be made at that point.

A letter written by Knox Taylor, president of the company, addressed to the bankers who offered the stock, gives detailed information in regard to the plans for development. The new issue of \$500,000 of common stock is in addition to the following: \$1,600,000 of 7 per cent cumulative preferred stock outstanding out of an authorized issue of \$2,000,000; \$850,000 of common stock of an authorized issue of \$2,000,000; and \$1,250,000 of first mortgage sinking fund 6 per cent bonds of an authorized issue of \$2,000,000. The expenditures for the new plant will aggregate between \$1,800,000 and \$2,000,000, which will be provided out of earnings, through the present financing and by the sale of property which the new plant will replace.

Mr. Taylor says that at the new Easton plant, under low production cost conditions, the company will be able materially to increase the business in railway track work where the use of manganese steel is more and more becoming a very important factor. The acquisition of the Wharton company proved a very beneficial arrangement. During the first year of operation the earnings of the Taylor-Wharton Company increased considerably over the average combined earnings of the separate companies for ten years.

Operating earnings of the company for the year ended Dec. 31, 1913, after the deduction of all expenses including administrative and overhead charges, but before the deduction of charges for maintenance and depreciation, were \$638,396. From this there were deducted the sums of \$159,869 for maintenance and \$96,333 for depreciation, or a total of \$256,202. This left a balance of \$432,194. From this amount \$73,165 was deducted for special disbursements and to mark down inventory below cost price to offset a fall in the market price of raw material.

The balance sheet shows that, exclusive of various reserve and special depreciation accounts, the book value of the common stock of the company on Dec. 31, 1913, was over \$200 per share in tangible assets, with no value for processes, patents or good-will.

Public Utility Investments

The speaker at the finance forum held under the auspices of the Public Utility section of the West Side Y. M. C. A. in New York City on April 27 was W. H. Gardiner, statistician for Henry L. Doherty & Company, New York. The topic was "Investments in Public Utility and How Held." The speaker called attention to the increase in the volume of outstanding securities of public utilities as compared with those of steam railroads. It appears that during the last decade the volume of the former has increased by 100 per cent while that of the latter has increased only 50 per cent. Public utility service is more difficult than railroad service for the reason that utilities are subject to instant demand for service. Mr. Gardiner quoted Mr. Vanderlip as stating that \$400,000,000 per year will be needed during the next few years to keep the electric light business up to the demand. The public utilities are expanding so rapidly that when all are included, \$23,000,000 per week will be required for their development. Unless utilities can finance extensions, trouble is bound to follow because the public constantly demands improved service.

The speaker explained the relation of the holding company to the underlying corporations and to their financial needs. In the electric light, gas and traction business some \$8,000,000,000 of securities are outstanding, of which about

75 per cent are administered by holding companies. These companies make it possible for small investors to diversify their holdings. Formerly many small companies were financed by a few individuals in each case, and the holdings of these were, on the average, quite large. The present tendency as illustrated for example, in the case of the Doherty company, is to distribute securities among a large number of shareholders. This company has 25,000 shareholders with an average holding of \$630 in securities each. This average holding is about one-half that of all steam railroad securities. It is not far from the average holding in the Pennsylvania Railroad and the United States Steel Corporation, which have been very successful in their efforts to distribute their securities widely.

After these introductory remarks Mr. Gardiner discussed some of the recent fundamental changes in financial matters. He called attention to the fact that banks are transferring their holdings from railroad, state, municipal and other bonds to public utility bonds. He stated that authorized issues of bonds are usually too small, due to the fact that when the issues were authorized the increase in business was underestimated. Such a condition is always a clog on the development of a company's business. Regulation gives stability to the earning power of securities and is establishing confidence. Taking up the matter of bonds in detail he called attention to the historical development of the bond which was originally issued against real estate only. At the time when this was the practice special equipment formed but a small part of the investment in the industry. Now the reverse is true. Bonds are therefore issued against this equipment. In practice money has to be obtained when needed at the best price possible. For a regulating body to dictate the terms under which securities may be issued sometimes results in an unpopular bond issue. The speaker called attention to the present peculiar status of public utility securities. In accordance with the data which he showed in tabular form the earning power of public utilities is greater than that of railroads and in many cases greater than that of industrial securities. At the same time the average of quotations for public utility securities is much less than the average for railroad stocks. A diagram exhibited by the speaker showed the relative value of traction and other securities.

Attitude of Investment Bankers' Association on "Blue Sky" Law

The attitude of the Investment Bankers' Association of America toward legislation, particularly as regards "blue sky" laws, is set forth in a statement by the association's president, George B. Caldwell, which follows in part:

"The Investment Bankers' Association is wholeheartedly in sympathy with the aim of the so-called 'blue sky' laws. The Kansas law read well on the surface, though upon analysis it was impossible of operation. As the court has held, it required the State to approve not only the security, but the price at which the security was sold. Intended for the risky investment promoter, it applied also to the dealer in genuine investment securities, buying and selling only secured investment bonds paying less than 6 per cent.

"It very quickly became evident that business could not be done under such laws. There are no States, excepting, possibly, Maine, Wisconsin and Ohio, in which the 'blue sky' laws enacted have been found capable of enforcement. Their provisions are so drastic and unworkable that the officials charged with their enforcement have tried in one way or another to waive the provisions of the law. This does not always help the investment dealer. In Michigan, every violation of the law is made a felony; and in Iowa, every dealer is required to give a bond in the sum of \$5,000, conditioned upon a strict compliance with the law.

"The Investment Bankers' Association was compelled to take the lead in attacking the chief laws enacted. I hope our course will influence others to join with us or accept our co-operation in working out an honest and wholesale policy."

American Water Works & Electric Company, Pittsburgh, Pa.—E. C. Converse, former president of the Bankers Trust Company; William Nelson Cromwell of Sullivan & Cromwell; Howland Davis of Blake Brothers & Company, Andrew

Squire of Squire, Sanders & Dempsey, Cleveland, and Albert H. Wiggin, president of the Chase National Bank, have been selected by the reorganization committee of the American Water Works & Guarantee Company to act as voting trustees of the new American Water Works & Electric Company stock. The trust will have the voting power of the three classes of stock for a period of five years. The committee announced that Robert Wetherill of R. Wetherill & Company, Chester, Pa., has agreed to act as a member of the board of directors of the new company in addition to those whose names were published in the *ELECTRIC RAILWAY JOURNAL* of April 4, 1914, page 794. A charter was issued at Richmond, Va., on April 27 to the American Water & Electric Company, Richmond, with a capital of \$25,000,000. H. Hobart Porter is president; Henry H. Pierce, New York, secretary, and Charles L. Scott, Hempstead, N. Y., treasurer.

Bay State Street Railway, Boston, Mass.—The Public Service Commission of Massachusetts has authorized the Bay State Street Railway to issue \$230,000 of fifty-year 4 per cent bonds of the Boston & Northern Street Railway and \$210,000 of fifty-year 4 per cent bonds of the Old Colony Street Railway. The proceeds will be used to fund floating indebtedness incurred in the construction and improvements made to the properties. The bonds are dated July 1, 1914.

Cape Breton Electric Company, Ltd., Sydney, N. S.—The stockholders of the Cape Breton Electric Company will vote on May 5 on a proposition to increase the authorized capital stock from \$250,000 of preferred stock to \$500,000 to provide for extensions. There is outstanding a common stock issue of \$1,625,000.

Chicago (Ill.) Elevated Railways.—Samuel Insull, Henry A. Blair and Ira M. Cobe, composing the executive board of the Chicago Elevated Railways, have instructed engineers of the elevated and surface lines to prepare new figures looking toward a merger of all of the traction interests of Chicago, both elevated and surface.

Cleveland (Ohio) Railway.—It is announced that of the \$2,141,000 of stock of the Cleveland Railway recently offered to stockholders about \$2,000,000 has been sold. Stockholders had the right to pay one half on April 1 and one half on July 1 but the majority elected to pay in full on April 1. Up to April 1 checks for \$1,500,000 had been received and the company paid off \$1,230,000 of floating debt, on which 5 per cent and 6 per cent interest was paid.

Columbia Railway, Gas & Electric Company, Columbia, S. C.—The Columbia Railway, Gas & Electric Company has sold to Redmond & Company \$3,000,000 of first mortgage 5 per cent bonds of the Parr Shoals Power Company, a subsidiary, guaranteed principal and interest by the Columbia Railway, Gas & Electric Company. The bonds are being offered at 90 and interest to yield 5½ per cent.

Columbus Railway, Power & Light Company, Columbus, Ohio.—Initial dividends of 1¼ per cent have been declared on the preferred stock, Series 3, and the common stock of the Columbus Railway, Power & Light Company, both payable on May 1 to holders of record of April 18.

Grand Valley Railway, Brantford, Ont.—On April 22 Justice Middleton made an order under which J. G. Wallace was to take possession on April 23 of the Woodstock, Thames Valley & Ingersoll Electric Railway from E. B. Stockdale, who has been receiver of the Grand Valley Railway, the parent road, since May 29, 1912. Mr. Wallace was appointed trustee recently to represent certain bondholders under a mortgage by the Woodstock, Thames Valley & Ingersoll Electric Railway to the Harrisburg Trust Company.

Hagerstown & Frederick Railway, Frederick, Md.—The recently elected executive committee of the Hagerstown & Frederick Railway has organized as a board of control. Henry Holzappel, Jr., was elected chairman. The other members of the committee are: Alexander Armstrong, Jr., Hagerstown; F. Howard Warfield, Baltimore; Emory L. Coblenz, Frederick, and Cyrus Frank Flook, Myersville.

International Railway, Buffalo, N. Y.—Commissioner Hodson of the Public Service Commission of the Second District of New York, was to hold a hearing at Buffalo on May 2, on the application of the International Railway

for authority to issue \$502,000 of fifty-year 5 per cent bonds under its refunding and improvement mortgage. The petitioner proposes to erect on Franklin and Pearl Streets in Buffalo a building to be used for its offices and as a terminal for its interurban cars. The company has purchased the necessary land, and the present buildings will be torn down. The petition sets forth that the \$502,000 requested will be used as follows: To reimburse the treasury of the company for money already paid \$10,000; cash still to be paid \$42,000; to take up the present mortgage \$250,000, and to construct and furnish the new building \$200,000.

Kansas City Railway & Light Company, Kansas City, Mo.—The committee representing the holders of the bonds of the Kansas City Railway & Light Company deposited on the agreement date of March 10 has arranged for the payment at the office of the Equitable Trust Company of New York interest due May 1 on these bonds. Owing to the fact that some of the holders of the bonds have been unable to deposit within the time originally fixed, the committee is permitting further deposits to be made, but this permission is subject to withdrawal without notice.

Metropolitan Street Railway, Kansas City, Mo.—On April 27 attorneys for the bondholders of the Metropolitan Street Railway asked the federal court for expedition of the foreclosure proceedings filed against the company in 1911, or an increased rate of interest on overdue obligations. Representatives of the city were present at the hearing, at which Federal Judge Hook presided, to protest against any increase in interest. Overdue obligations of the company aggregate \$23,000,000. The holders want their principal or an increase of 1 per cent in addition to the rates of 6 and 7 per cent which have been paid by the company pending a final settlement. The company was represented at the hearing by Frank Hagerman, attorney for the receivers; the city by Judge Andrew F. Evans, city counselor; the Old Colony Trust Company, Boston, which instituted the proceedings that resulted in the receivership, by Jeremiah Smith, Boston, and H. L. McCune, Kansas City, and the New York Trust Company and others by Byrne & McCutcheon, New York.

Pittsburgh & Butler Street Railway, Pittsburgh, Pa.—The plan for increasing the bonded indebtedness of the Pittsburgh & Butler Street Railway from \$2,000,000 to \$4,000,000 contemplates the creation of \$500,000 of general mortgage 5 per cent bonds due in 1936 and \$1,500,000 of income bonds due in 1936. As stated in the *ELECTRIC RAILWAY JOURNAL* of April 25, 1914, page 946, the stockholders will vote on the plan on June 12.

Portland Railway, Light & Power Company, Portland, Ore.—The \$1,064,000 of first and refunding mortgage 5 per cent bonds recently purchased by Drexel & Company, Philadelphia, and Lee Higginson & Company, New York, and offered at 93½ and interest have been sold. The proceeds of \$964,000 of these bonds are to reimburse the company in part for expenditures for additions and improvements since Jan. 1, 1912, at not exceeding \$80 in bonds for each \$100 of expenditures. The remaining \$100,000 of bonds was used to retire underlying bonds which matured March 1.

Public Service Corporation of New Jersey, Newark, N. J.—The New York Stock Exchange has listed \$7,000,000 of additional general mortgage 5 per cent sinking fund fifty-year bonds of the Public Service Corporation of New Jersey, due 1959. This makes the total listed to date \$37,000,000. The proceeds cover plant extensions and betterments for the Public Service Gas Company; track extensions, betterments, new bridges, additional equipment and real estate for the Public Service Railway, and new generating stations and transmission and distribution lines for the Public Service Electric Company during 1913. The balance is to be used for similar purposes during 1914.

Warren, Brookfield & Spencer Street Railway, Brookfield, Mass.—The Warren, Brookfield & Spencer Street Railway will be sold at a foreclosure at the power house and station in Brookfield on June 4, by the receiver of the road, Thomas T. Robinson. The road, which runs from West Warren to Spencer, including a branch line from East Brookfield to North Brookfield, has been in the hands of a receiver since May, 1912. No bid under \$150,000 will be

accepted at the sale, and the sum of \$35,000 must be paid in cash.

West End Street Railway, Boston, Mass.—The West End Street Railway has sold to Estabrook & Company, Boston, \$539,000 of new thirty-year 5 per cent bonds dated 1914 and maturing in 1944. These bonds are being offered at 106 and interest. At an auction on April 24, 5600 of new common shares at \$50 were sold in eighteen lots at prices ranging from \$66.125 to \$68 and dividends per share, 4775 shares going to G. S. Baldwin and associates.

Dividends Declared

American Railways, Philadelphia, Pa., quarterly, 1¼ per cent, preferred.

Columbus Railway, Light & Power Company, Columbus, Ohio, 1¼ per cent, preferred B; 1¼ per cent, common.

Connecticut Railway & Light Company, Bridgeport, Conn., quarterly, 1 per cent, preferred; quarterly, 1 per cent, common.

East St. Louis & Suburban Company, East St. Louis, Ill., quarterly, 1¼ per cent, preferred.

Lehigh Valley Transit Company, Allentown, Pa., 1 per cent, preferred.

Ohio Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred.

Washington-Virginia Railway, Washington, D. C., 2½ per cent, preferred; 1½ per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Mar., '14	\$415,279	.....	.....	.....	.....	.....
1 " " '13	399,797	.....	.....	.....	.....	.....
9 " " '14	4,136,489	.....	.....	.....	.....	.....
9 " " '13	3,854,742	.....	.....	.....	.....	.....

BATON ROUGE (LA.) ELECTRIC COMPANY						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Feb., '14	\$13,748	*\$9,514	\$4,234	\$2,148	\$2,086	
1 " " '13	11,835	*7,077	4,758	2,076	2,682	
12 " " '14	166,635	*106,576	60,059	25,220	34,839	
12 " " '13	149,464	*91,182	58,281	21,117	37,164	

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Jan., '14	\$272,026	*\$171,949	\$100,077	\$43,771	\$56,306	
1 " Feb., '14	246,540	*154,066	92,474	43,880	48,594	

GRAND RAPIDS (MICH.) RAILWAY						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Feb., '14	\$96,747	*\$62,638	\$34,109	\$13,662	\$20,447	
1 " " '13	93,550	*56,548	37,002	14,821	22,181	
12 " " '14	1,302,624	*\$14,911	487,713	164,352	323,361	
12 " " '13	1,247,860	*713,284	534,576	175,265	359,311	

COMMONWEALTH POWER RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Feb., '14	\$256,180	*\$72,315	\$183,865	\$80,000	\$103,865	
1 " " '13	114,143	*1,893	112,250	30,000	82,250	
12 " " '14	2,658,493	*598,882	2,059,611	860,000	1,199,611	
12 " " '13	1,360,167	*148,705	1,211,462	360,000	851,462	

JOPLIN & PITTSBURG RAILWAY, PITTSBURG, KAN.						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Mar., '14	\$48,762	*\$31,773	\$16,989	\$12,542	\$4,447	
1 " " '13	46,370	*26,922	19,448	12,542	6,906	
12 " " '14	582,593	*356,838	225,755	150,500	75,455	
12 " " '13	549,879	*323,555	226,324	151,632	74,692	

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Feb., '14	\$26,244	*\$15,502	\$10,742	\$7,639	\$3,103	
1 " " '13	24,372	*15,490	8,882	7,323	1,559	
12 " " '14	297,442	*195,036	102,406	90,622	11,784	
12 " " '13	289,952	*190,593	99,359	86,880	12,479	

PENSACOLA (FLA.) ELECTRIC COMPANY						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Feb., '14	\$22,287	*\$14,302	\$7,985	\$7,169	\$816	
1 " " '13	22,506	*14,113	8,393	6,369	2,023	
12 " " '14	282,923	*181,384	101,539	82,867	18,672	
12 " " '13	288,976	*177,557	111,419	76,384	35,035	

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Feb., '14	\$691,464	*\$405,768	\$285,696	\$175,510	\$110,187	
1 " " '13	655,734	*409,552	246,182	169,095	79,087	
12 " " '14	8,701,725	*5,001,313	3,700,413	2,079,536	1,620,877	
12 " " '13	8,289,230	*4,833,168	3,456,061	1,997,668	1,458,393	

SAVANNAH (GA.) ELECTRIC COMPANY						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Feb., '14	\$66,654	*\$43,838	\$22,816	\$22,613	\$203	
1 " " '13	62,404	*45,006	17,398	17,392	6	
12 " " '14	836,699	*555,715	280,984	272,791	8,193	
12 " " '13	762,456	*563,164	199,292	198,075	1,217	

TAMPA (FLA.) ELECTRIC COMPANY						
Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus	
1m., Feb., '14	\$80,357	*\$42,018	\$38,340	\$5,074	\$33,266	
1 " " '13	62,356	*32,856	29,501	4,759	24,742	
12 " " '14	874,942	*484,777	390,164	56,331	333,833	
12 " " '13	763,938	*399,173	364,765	54,084	310,681	

*Includes taxes.

Traffic and Transportation

Patrick F. Sullivan on Team Work

Patrick F. Sullivan, president of the Bay State Street Railway, which operates more than 940 miles of suburban and city railway in Massachusetts, was on April 19 the subject in the very interesting series "Business Builders of New England" which is being published in the Boston Post. Like Gen. William A. Bancroft, president of the Boston Elevated Railway, who was the subject of a previous article in the series, Mr. Sullivan dwelt on the need for concentration among young men, advising them "do the \$25 job as though you were getting \$35."

Mr. Sullivan began work in the mill when he was seven-teen years old. He then went with his brother on the Lowell Daily News, and while working on that paper was offered the secretaryship of the Lowell Horse Railroad and the Dracut Street Railway. He says that he doubted his fitness for the office, but took the position determined to apply to it all the energy and knowledge he possessed. Realizing his lack of education he decided to better himself in this respect and studied at night. One of the passages in his early reading which made a great impression on him was the following from Disraeli: "After mature deliberation, I have brought myself to the conviction that a human being with a certain purpose must accomplish it; and that nothing can resist a will that will stake even existence upon its fulfilment."

According to Mr. Sullivan many of the so-called big problems are big for the moment only. When the smoke of battle has cleared it is seen that all problems are very much alike. Speaking of the need for co-operation and team work Mr. Sullivan said:

"The daily story of the baseball game contains the daily story of our life struggle. It is like two individuals or companies trying to get ahead. The live, blood-tingling struggle is always there. It shows a thousand and one things—it shows above all that we cannot go it alone regardless of everybody and everything else—it shows us that team work does count—that every man on the team has got to do his part if the winning run is to come in. Home runs are few in a season—home runs in business are few—but like the man who lifts the ball over the fence, the business man who figuratively does the same is singled out. It isn't necessary to suggest a growing list of 'Home Run Bakers' in the fields of finance, industry and commerce. Every one knows them, and in a measure how they did it. Keep that home run in mind—it will probably be some time before it comes, and much longer before you get the habit—but if you are always on the alert every time you're at bat and swing for the big one, you will in nine cases out of ten reach first—and if you do, you've done well."

Man Efficiency Considered by Safety Committee of the Memphis Street Railway

The regular monthly meeting of the Safety Committee of the Memphis (Tenn.) Street Railway was held on April 9, with 100 members present. Reports showed a gratifying reduction in number of accidents. The meeting was devoted to the discussion of "Safe Operation of the Open Car," and the reading of a paper by J. H. Haylow, chief engineer of way, on "Man Efficiency As Applied to the Employees of this Company, and Our Safety Work." Mr. Haylow said in part:

"Man efficiency means the quality that produces the most effective service, or the possession of adequate skill or knowledge for the proper performance of a duty or calling. Safety is the practice and putting into execution the quality of efficiency; a man can be efficient without being safe, but a man cannot be safe without being efficient. The men we desire in this safety work and the men we desire in this company's organization are the ones who on awakening in the morning jump out of bed, refreshed, speedily wash, shave and neatly dress, get to their work on time, perform their daily duties attentively and safely and have little concern as to when the whistle will blow. Men of this type have some passion for their work.

"In the first place efficiency means the best results from

minimum labor and expense. Efficiency is within the reach of all. We have heard and read about how much money a man can live on, but little or nothing about how much time a man can live on. Conserve your time. Time is money. Efficiency results from the combination of qualities such as health, loyalty, concentration, imitation, aspiration, compensation, recreation and many others. I shall confine myself to the first three mentioned:

"I deem health to be one of the most important qualities because great achievements are barred to a man of unsound body or mind. Three things are imperative to a man who would enjoy health, namely, a liberal supply of good wholesome food, a daily bath and an abundance of fresh air in sleeping rooms.

"Loyalty means devoted allegiance to your employer, to your fellow worker and to yourself. Without loyalty there is no effective organization and the higher qualities of service are impossible. There must be co-operation among men in the same department and co-operation among the various departments to secure an organization which will be a credit and a pride to the company and the community it represents.

"Concentration is the focusing of attention on one thing at a time. Great demands are made on one's concentrating capacity by outside distractions. The mind may be compared to rays of light. Light throws its rays in all directions. To focus or bring more light to one point a reflector is used. So with the mind; it is susceptible to its surroundings, taking in a wide range of objects, and the more we concentrate or focus our thoughts on our work the more efficient will be the result achieved. It is difficult at first to concentrate one's thoughts, whether he is reading the books of rules, repairing a rail joint, adding a column of figures or running a car. The effort to concentrate will be well repaid, for after the ability to concentrate has been acquired the work in hand will be made much easier.

"The day is past when a man can expect to wait modestly for others to seek him out and put him forward. Each man must be his own generating plant, as progress depends upon the individual. There are two doors to the temple of efficiency—on one is inscribed 'push' and on the other 'pull.' This means that the man who would be efficient must both push and pull."

Reasons for the Baltimore Employees' Bulletin

T. A. Cross, general manager of the United Railways & Electric Company, Baltimore, Md., says in the employees' bulletin of that company dated April, 1914:

"Did you ever stop and think seriously when this bulletin was handed you, 'the reason for its publication'?"

"You realize of course it must take some one's time to prepare it and an expenditure of money to have it printed. The approval of its publication and delivery to you, in view of this time consumed and money expended, must therefore be with the feeling that it has and will be of benefit both to you and to the company.

"The company realizes the difficulties with which you have to deal from day to day, and it is with the idea of lessening, if not preventing, such difficulties that suggestions are given you through the medium of this bulletin.

"The company often has brought to its attention the bad results of an unreported accident and the failure of a crew to secure witnesses to an occurrence happening in connection with their car; the annoyance of a complaint on account of alleged discourtesy on the part of an employee; the financial loss caused by the careless operation of a car, particularly over special work, and many others. It is felt that you too realize these things, but owing to the infrequency with which you are brought in contact with the actual bad results they are not impressed as forcibly upon your mind as might be and you may some time make a 'slip,' which the company has to straighten out. This bulletin is for the purpose of endeavoring to keep these bad results before you so you may be on the lookout and prevent that 'slip.'

"Don't therefore, when the bulletin is handed you, do as one conductor did, hand it to a passenger saying: 'Do you want to read this; it is of no value to me.' Read it carefully and show, by trying to carry out its suggestions, that you

have an interest in the welfare of the company of which you are a part."

Chicago Markets Commission Recommends Use of Interurban Freight Service

In a preliminary report to the Chicago City Council, the Municipal Markets Commission, which has been investigating possible savings from rearrangement of the Chicago produce markets, has recommended among other things, the use of electric railways to bring farm products direct to the household or the retail markets. In this connection the report says in part:

"In order to give the producer direct access to the markets of the city, and to furnish the Chicago consumer with a fresher and more varied allotment of farm products, electric railway freight service should be placed in operation over the existing street railway lines, and the interurban railways should receive direct access to the city's market. Rapid and easy access to the new markets by street railways to and from the city will encourage production and result in a vast amount of undeveloped land near the city of Chicago being divided into small truck, poultry, dairy and fruit farms. Urban and interurban street railways should be operated to shorten the route between the producer of farm products and the consumer, but carrying of freight by street railway lines inside the city limits should not be permitted to interfere with the proper handling of the passenger traffic. Freight handled by the interurban railways could be carried over the local Chicago lines between 11 p. m. and 5 a. m. without inconvenience to the public."

The Chicago produce market is concentrated on South Water Street in the downtown district, a point not reached by the steam roads or any transportation system other than wagons. This market is considered inadequate, unsanitary and wasteful. In its recommendation to the City Council, the commission stated that the city should proceed to formulate plans for a comprehensive system of wholesale terminal markets under the control of the city accessible to the city and interurban railways. It was estimated in the report that \$51,000,000 a year could easily be saved if the city would take advantage of all the transportation and other facilities now afforded to eliminate waste between the producer and consumer.

Interborough Rapid Transit Company Dramatic Show

On April 24 a minstrel show was given in Carnegie Hall by the employees of the Interborough Rapid Transit Company, New York. One hundred and twenty-five subway guards, motormen, ticket agents, track walkers, ticket choppers, dispatchers and shopmen entertained an audience of 3000 people for three hours with what is said to be the "liveliest amateur show New York has seen in a long time." In place of Mr. Shonts, who was called out of town, an address of welcome was delivered by Frank Hedley, vice-president of the company.

The scene was opened with "The March Lorraine" by the subway band of 117 pieces, and the first part consisted of solos and chorus music on the part of 100 minstrel men, including eight end men. All the suits and furniture used were made by departments of the company. Part 2 consisted of vaudeville, in which the special number was a quartet entitled "The Interborough Rhapsody." There was also a cotton plantation sketch in which a number of specialties were introduced. The costumes, scenery and lighting effects of the cotton plantation sketch were devised and executed in the Interborough shops. Following this there was what was known as the "Interborough Photograph Album" and interesting motion pictures.

The entire production was financed by the company and presented under the auspices of the welfare department, of which H. H. Vreeland is director. The performance was directed by the following employees: Monroe Silver, stage manager; O. C. Belden, musical director; George Eton, interlocutor; R. J. Piggott, organist, and E. Bartz, violin soloist. The entire seating capacity of Carnegie Hall was reserved for the employees of the company and their families, and there were applications for three times as many seats as were available.

Kansas City Trade-Extension Trips.—The first of a series of trade-extension trips to be given by the Kansas City Commercial Club will be made to Liberty, Moseby and Excelsior Springs on May 5. The Kansas City, Clay County & St. Joseph Railway will place special cars at the service of the business men.

"Price of Thoughtlessness" Shown in Toronto.—Nearly 600 school children visited the Strand Theater, Toronto, Ont., on April 14 for the purpose of viewing the special motion picture "The Price of Thoughtlessness." The film portrayed in a striking manner the dangers that lurk on the streets for children. The show was arranged in connection with the campaign of the Ontario Safety League.

Objection to Smoking in Louisville.—A suggestion made recently by one of the women's organizations that a crusade be started against the practice of smoking on the street cars has provoked considerable discussion in Louisville, Ky. The rules of the company permit smoking on the platforms. Since the front-door exit system has been put into operation in Louisville, Ky., the front platform has been made the smokers' own.

Rulings of California Commission.—The Railroad Commission of California has granted the application of the Glendale & Eagle Rock Railway to discontinue the sale of 50-cent twenty-ride commutation tickets except to persons under the age of eighteen and to collect a regular one-way fare of 5 cents. The commission has dismissed the inquiry made on its own initiative looking to the establishment of through routes and joint rates affecting the Glendale & Eagle Rock Railway.

Complaint Closed.—The Public Service Commission of the Second District of New York has closed upon its records in the complaint of the village of Liverpool against New York State Railways, in the matter of service between Liverpool and Syracuse, and as to certain of the cars operated. A conference was held between representatives of the municipality in question and of the New York State Railways, the result of which was a temporary adjustment of the pending issues in a manner satisfactory to both parties.

New Car Placards in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., has made a change in the signs in its cars prohibiting passengers from conversing with motormen. The new sign reads, "Patrons, please do not talk to the motorman. It insures safety." Old placards read, "Do not talk to the motorman. It prevents accidents." The new signs conclude with a line instructing passengers to leave cars by the front exits. This admonition formerly was on a separate sign and the new method eliminates one placard.

Suggestion Regarding Large Currency Fare Payments.—The Metropolitan Street Railway, Kansas City, Mo., which uses its transfers as a medium of communication with its patrons, recently suggested that passengers who have no currency of two-dollar denominations or less, leave the bill which they tender in payment of fare with the conductor and call at the offices for their change on the following day. John M. Egan, general manager of the company, stated that the suggestion was made for what it was worth and that the company would make no effort to enforce it.

Consideration of Demands of Municipal Railway Employees Postponed.—The Board of Supervisors of San Francisco, Cal. has postponed indefinitely consideration and action on the request of the employees of the Geary Street Municipal Railway for concession in the agreement covering the wages and other terms of service of the men. T. A. Cashin, superintendent of the company, reported to the Mayor recently on the request of the men and the Mayor transmitted Mr. Cashin's report to the Supervisors without recommendation. The demands of the men were reviewed briefly in the *ELECTRIC RAILWAY JOURNAL* of March 21, 1914, page 692.

Recent Topeka Advertising.—The recent advertising of the Topeka (Kan.) Railway has confined itself almost exclusively to a promotion of the "safety first" movement. "Safety first," while now a general campaign has in few instances been furthered by the use of paid advertisements. Under the head of "Street Car Hints," the company ran a

list of "don'ts," warning the public against getting off cars while in motion; stepping off backwards; dashing for the sidewalks without looking after stepping off a car, etc. The advertisements are concluded with the statement that co-operation by patrons will greatly improve service and prevent accidents.

Pittsburgh Employees Asked to Arbitrate.—Daily conferences have been held since April 1 by the officers of the Pittsburgh (Pa.) Railways Company with representatives of the motormen and conductors regarding wages and working conditions. Because of an apparent inability to agree, the Pittsburgh Railways has asked that the points of difference be submitted to an arbitration committee of five and that the questions be settled for five years. The company addressed the men to this effect in a letter dated April 17. The principal request of the men is for an increase in pay to 35 cents an hour flat from the present sliding scale of 23½ cents an hour for the first six months to 30 cents an hour after four years of service.

Complaint Suspended Indefinitely.—The Public Service Commission of the Second District of New York has suspended indefinitely the complaint of land owners and manufacturers in the Lincoln Park district just west of the city line of Rochester against the New York State Railways, Rochester lines, alleging inadequate transportation facilities. It developed at the hearing held in the matter that the transportation facilities sought by the complainants involved a rearrangement of lines and the elimination of one or more grade crossings. It was agreed at that time that nothing could be done under existing conditions, because of lack of money for crossing elimination, and the commission decided that no further proceedings be had in the case until it has a suitable appropriation which may be devoted to the crossing eliminations and until the parties shall apply for further hearing.

The Beckoning Land.—The Roanoke Railway & Electric Company, Roanoke, Va., and the Lynchburg Traction & Light Company, Lynchburg, Va., have issued a publication, "The Beckoning Land," by E. Alexander Powell, F. R. G. S., author of "The Third Empire," "Masters of Europe," "All Aboard for Bombay," "The Last Frontier," etc. It is printed on heavy coated paper with illuminated head, tail and side pieces done in brown, and also contains a number of full-page illustrations most artistically executed in color. The publication has to do with all Virginia, but more particularly with the territory through which the Roanoke Railway & Electric Company and the Lynchburg Traction & Light Company operate. It contains thirty-four pages exclusive of the cover. As a frontispiece there is a reproduction in color of a sunrise photograph made from the top of Mill Mountain. The title of this is "The Dawn of a New Day."

Decision by Supreme Court of Nebraska in Transfer Case.—In the case of Jones versus the Omaha & Council Bluffs Street Railway, Omaha, Neb., the Supreme Court of Nebraska on appeal held that a street railway has the right to collect and receive fares and fix such reasonable rules concerning the issuance and use of transfers as will prevent it from being defrauded and that as between the conductor and the passenger the transfer produced must be regarded as conclusive as to the rights of the latter. The plaintiff Jones entered a car in South Omaha on July 24, 1909, intending to go north through Omaha to Courtland Beach. He paid his fare. At Thirteenth and Dodge Streets, Omaha, he left the car, walked south on Thirteenth Street to Douglas Street, west on Douglas Street to Fourteenth Street, where he entered a store and, after making a small purchase, walked north along Fourteenth Street, across Douglas and Dodge Streets, and at the intersection of Fourteenth and Dodge Streets he entered a car going north on Fourteenth Street and presented to the conductor in payment of his fare a transfer slip of the day before on the Sherman Avenue line punched "south." He asked for a Cuming transfer at Seventeenth and Cuming Streets, and also said he wanted a transfer on Locust Street to the Beach. On refusal to pay his fare or leave the car, the plaintiff was ejected and brought suit for damages. The Supreme Court ruled that the evidence disclosed by the record failed to sustain a verdict for the plaintiff and that the jury should have been directed to find a verdict for the defendant.

Personal Mention

Mr. James Z. George has resigned as head of the publicity and advertising department of the New Orleans Railway & Light Company, New Orleans, La.

Mr. John Brizzolara has been elected secretary of the Fort Smith Light & Traction Company, Fort Smith, Ark., to succeed his father, the late James Brizzolara.

Mr. John J. Gannon has been elected vice-president of the New Orleans Railway & Light Company, New Orleans, La., to succeed Mr. J. S. Pevear, who has been elected president of the company.

Mr. P. J. Hayes has been appointed general manager and purchasing agent of the Greenville Railway & Light Company, Greenville, Tex., to succeed Mr. F. R. Newman, resigned.

Mr. James S. Gibson, general superintendent of the Metropolitan Street Railway, Kansas City, Mo., has been elected a director of the Missouri Savings Association Bank, Kansas City.

Mr. C. H. Bales, an inspector, has been appointed assistant division superintendent at Tenth and Minnesota Streets by the Metropolitan Street Railway, Kansas City, Mo., succeeding Mr. B. B. Boucher.

Mr. H. G. Hoagland, who has been treasurer, general manager and purchasing agent of the Fort Smith Light & Traction Company, Fort Smith, Ark., has also been elected third vice-president of the company.

Mr. F. E. Smith, who resigned as comptroller of the Chicago (Ill.) Railways after the completion of the consolidation of the surface lines in Chicago, is at Excelsior Springs, Mo., preparatory to a trip to Florida.

Mr. Wallace J. Ivers has resigned as superintendent of car equipment of the Cumberland Light & Power Company, Portland, Maine, which operates the Portland Railroad and the Lewiston, Augusta & Waterville Street Railway.

Mr. W. G. Murrin has been appointed general superintendent of the British Columbia Electric Railway, Vancouver, B. C. Mr. Murrin was formerly mechanical superintendent, to which position is now added the supervision of the company's city and suburban system at Vancouver.

Messrs. Semmler and Dempwolff of the civil engineering department of the Prussian State Railroads, Hanover, are visiting the United States and Canada on a two months' tour. While they are particularly interested in steam railroad construction problems, they will also give a good deal of attention to signaling, including signal practice on electrified steam railroads.

Mr. B. B. Boucher, assistant division superintendent of the Metropolitan Street Railway, Kansas City, Mo., at Tenth and Minnesota Streets, has been appointed assistant division superintendent at Forty-eighth and Harrison Streets, vice Mr. W. C. Comer, who has tendered his resignation. Mr. Boucher has been with the company since 1907, when he entered its employ as a trainman.

Mr. Andrew S. Macreadie has been appointed superintendent of transportation of the Cumberland County Power & Light Company, Portland, Maine, to succeed Mr. Frank S. Briggs, resigned. Mr. Macreadie was formerly superintendent of the Cape Division of the company. He has been connected with the Cumberland County Power & Light Company and its subsidiaries, the Lewiston, Augusta & Waterville Street Railway and the Portland Railroad, for many years.

Mr. H. J. Jumonville, auditor of the New Orleans Railway & Light Company, New Orleans, La., has been appointed to a similar position with the American Cities Company, with headquarters in New Orleans. Mr. Jumonville has been with the New Orleans Railway & Light Company in the accounting department for many years. In his new position he will have supervision of all books of the American Cities Company. Mr. Jumonville succeeds Mr. S. C. Stivers, resigned.

Mr. R. H. Sperling, general manager of the British Columbia Electric Railway, Vancouver, B. C., has been offered a seat on the London board of the company, carrying with it the appointment of assistant to Mr. R. M. Horne Payne,

the chairman of the board. Mr. Sperling became connected with the company in 1896 and in the following year was appointed the electrical expert in charge. He later became general superintendent of the company and when Mr. J. Buntzen, the former general manager of the company, was appointed to a seat on the London board in 1905, Mr. Sperling was chosen as his successor. Mr. Sperling has gone to London to confer with the directors.

Mr. R. A. Leussler, who has been elected president of the Iowa Street & Interurban Railway Association, entered street railway work in 1898, when Mr. F. B. Brownell, the car builder, was appointed receiver of the Peoples Railway, St. Louis. Mr. Leussler was employed by Mr. Brownell as his personal representative in the management of the railway property. Prior to that time he gained experience in the transportation business with the United States Express Company at Chicago as night agent of that company's Grand Central Depot and as chief clerk at its Chicago, Milwaukee & St. Paul Railway depot. When all of the street railways of St. Louis were consolidated in 1899 Mr. Leussler was appointed chief clerk to the secretary and treasurer of the consolidated company, the St. Louis Transit Company. He remained in that position until the street railways of Omaha and Council Bluffs were consolidated in 1903, when he went to Omaha as secretary of the Omaha & Council Bluffs Street Railway, the consolidated company. In 1906 he was appointed assistant general manager of the Omaha & Council Bluffs Street Railway, which position he has since held.

Mr. W. B. Brockway, who has been connected in executive capacities with various Ford, Bacon & Davis properties since 1900, has withdrawn from railway work to become comptroller of the Berlin Mills Company with general offices at Portland, Maine. Mr. Brockway was identified with steam railroad operating and accounting work prior to 1896. From 1896 to 1900 he was secretary and treasurer of the Toledo, Bowling Green & Fremont Railway, Toledo, Ohio. In 1900 he was appointed secretary and auditor of the New Orleans & Carrollton Railroad, Light & Power Company, New Orleans, La., and soon after became general auditor of the various Ford, Bacon & Davis and Newman properties in the South and



W. B. Brockway

West. In this responsible position Mr. Brockway acquired a very extensive knowledge of electric railway, lighting and gas accounting problems under different conditions, and his experience on these lines became very valuable. He has also done a great deal of work and occupied executive positions during the past fourteen years with various public utility properties with which Ford, Bacon & Davis were connected, among others that of secretary and treasurer of the Sierra & San Francisco Power Company, which supplies power to the United Railroad, San Francisco. Mr. Brockway has always taken a prominent part in the affairs of the American Electric Railway Accountants' Association from the date of its organization in 1897 under the name of the Street Railway Accountants' Association of America. In that year he was elected secretary and treasurer of the organization and continued in that capacity until 1904. In 1906-7 he served as president of the association. He is now a member of the committee on standard classification of accounts of that association, the committee on accounting definitions and the committee on accounting for variable rates of fare. He represented the receivers of the Knickerbocker Trust Company, New York, N. Y., during the receivership of that company in 1907. He is the author of "Electric Railway Accounting" published in 1906 and has contributed a number of articles on electric railway accounting to the ELECTRIC RAILWAY JOURNAL. The Berlin Mills Company, with which Mr. Brockway becomes connected, is the outgrowth of the business established in 1852. The company manufactures newspaper, sulphite, fiber and

timber. It has paper mills at Berlin, N. H., with a capacity of 250 tons a day. Its timber lands are located in Maine and New Hampshire and it has timber rights in Canada.

Mr. S. B. Way, whose appointment as general manager of The Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company, Milwaukee, Wis., was announced in the *ELECTRIC RAILWAY JOURNAL* of April 25, 1914, is in addition also actively interested in the management of the Wisconsin Gas & Electric Company, operating in Racine and Kenosha; the Watertown Gas & Electric Company, Watertown, Wis., the Burlington Electric Light & Power Company, Burlington, Wis., and the North Milwaukee Light & Power Company. He has been identified with public-utility business for nearly sixteen years, and during practically all that time has been associated with the interests of the North American Company. Mr. Way became assistant general manager of the Milwaukee companies in November, 1911, and early in the year 1912 was elected vice-president. He is now placed in charge of the local management of the companies, his promotion being a deserved recognition of the ability he has demonstrated as a public-utility manager and executive. Mr. Way is thirty-nine years old and received his technical education at Drexel Institute, Philadelphia. He began his business career with the Electric Storage Battery Company of Philadelphia, for which he became erecting engineer. In 1898 he left the service of that company to become electrical superintendent of one of the electric-service companies in St. Louis, which later became the present Union Electric Light & Power Company of that city. Mr. Way remained in the service of the St. Louis company until appointed assistant general manager of the Milwaukee companies.

Mr. J. S. Pevear, who has been vice-president of the New Orleans Railway & Light Company, New Orleans, La., since the fall of 1913, has been elected president of the company, which position has been vacant since the election of Mr. Hugh McCloskey as chairman of the board of directors and president of the American Cities Company. Mr. Pevear was formerly vice-president of the International Railway and vice-president of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y. Mr. Pevear became connected with the Buffalo & Lake Erie Traction Company in 1911 as general superintendent. He had previously been connected with the Twin City Rapid Transit Company, Minneapolis, Minn., and the General Electric Company. He was superintendent of the St. Paul lines of the Twin City Rapid Transit Company. The International Railway system, with which Mr. Pevear was connected as vice-president, is a consolidation into one operating company of various street railways in the United States and Canada, including lines in Buffalo, Niagara Falls, Lockport and Tonawanda, and comprising in all 374 miles. The Twin City Rapid Transit Company controls the entire street railway systems of Minneapolis, St. Paul and Stillwater, and has the exclusive right to operate street cars between St. Paul and Minneapolis. The entire system is 402 miles in length. The New Orleans Railway & Light Company comprises 201 miles of line, all the street railways in New Orleans. Mr. Pevear is



S. B. Way



J. S. Pevear

also second vice-president of the American Cities Company, which controls the New Orleans Railway & Light Company, Birmingham Railway, Light & Power Company, Memphis Street Railway, Little Rock Railway & Electric Company, Knoxville Railway & Light Company and the Houston Lighting & Power Company. The American Cities Company is in turn controlled through common stock ownership by the United Gas & Electric Corporation.

Mr. Charles J. Griffith, who has been elected president of the Arkansas Association of Public Utility Operators, is treasurer and general manager of the Little Rock Railway & Electric Company, Little Rock, Ark. Mr. Griffith was born in Rochester, N. Y., on Feb. 15, 1865, and was educated in Lafayette, Ind. He engaged in the telegraph business until 1889, when he became associated with the Municipal Light & Power Company, St. Louis, Mo., and the Missouri-Edison Electric Light & Power Company. In 1899 he was associated with the Pine Bluff Water & Light Company, Pine Bluff, Ark. In 1892 he entered the service of the Little Rock Traction & Electric Company, but resigned from that company in August, 1897, to accept a position with the Brown Electric Company, Little Rock, as superintendent of construction. This company constructed an electric light and power plant for the State of Arkansas to light all of the state institutions at Little Rock. Mr. Griffith afterward superintended the installation of the electric light plants in the Peabody and the Cordova Hotels at Memphis, Tenn., and supervised the installation of an electric light plant at Crystal Springs, Miss. In 1899 he became associated with the Southern Engineering Company, St. Louis, Mo., and superintended the installation of the municipal electric light plant at Hastings, Neb., and the electric light and water works in West Plains, Mo. In 1902 he re-entered the service of the Little Rock Railway & Electric Company as master mechanic and was appointed superintendent of the railway department in 1905 and general manager in 1912. A portrait of Mr. Griffith was published in the *ELECTRIC RAILWAY JOURNAL* of March 23, 1912.

OBITUARY

E. B. Lincoln, general manager of the Muncie & Portland Traction Company, died at Portland, Ind., on April 27, 1914. Mr. Lincoln was general manager of the company for the past seven years. He went to Portland from St. Paul, Minn., having previously been in the banking and harvester business, and connected with several steam railroads in Minnesota and the northwest. Mr. Lincoln was a thirty-second degree mason, being a member of the Ancient Landmark No. 5, A. F. and A. M., St. Paul, Minn., as well as the Zion Commandery and Zuhrah Shrine, Minneapolis, Minn. He was graduated from the Shattuck Military School at Faribault, Minn.

Limited Service Between Chicago and Starved Rock

Effective on May 24, through limited interurban service will be established between Chicago and Starved Rock, a historic State park on the Illinois River below Ottawa, Ill. This service will be furnished in accordance with a traffic agreement which has been entered into between the Chicago & Joliet Electric Railway and the Chicago, Ottawa & Peoria Railway, both of Joliet, Ill. Passengers from Chicago will be picked up on Archer Avenue at a point reached by a trunk line of the Chicago Surface Lines from the loop district. At present it is planned to run only one train each way daily catering to picnic parties. This train will leave Chicago at 8:15 a. m. and arrive at Starved Rock at 11:30 a. m. The return trip will be made between 6 p. m. and 9:30 p. m. The service will be arranged so that direct connections may be made to points south of Starved Rock.

In connection with this service the Chicago, Ottawa & Peoria Railway has issued a handsome folder—"The Famous Illinois Valley—The Garden Spot of the World and Nature's Wonderland"—which was mentioned in a recent issue of *ELECTRIC RAILWAY JOURNAL*. Replies to requests for circulars, or other inquiries for information concerning points reached by the "Illini Trail" are typed on a special form of stationery. This is in the form of a four-page circular, one outside page of which is printed in letterhead form, the other three pages containing information, descriptive matter and illustrations of the points of interest along this company's line.

Construction News

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

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

RECENT INCORPORATIONS

***Evansville & New Harmony Traction Company, Evansville, Ind.**—Application for a charter has been made by this company to build a 30-mile electric line to connect Evansville and New Harmony. Capital stock, \$100,000. Incorporators: W. F. Laubscher, Evansville, N. J. Reping and J. T. Cutler.

***Delta Light & Traction Company, Greenville, Miss.**—Chartered in Mississippi presumably to succeed the Delta Electric Light, Power & Manufacturing Company in Greenville. Capital stock, \$200,000. Incorporators: A. R. Turnbull and W. J. Jones, Norfolk, Va.; T. A. Hefty, Bowden, N. C.; L. A. Beasley and H. D. Williams, Kenansville, N. C.

***Atlantic & Carolina Railroad, Warsaw, N. C.**—Chartered in North Carolina to build a 10-mile interurban railway from Warsaw to Kenansville. Capital stock, \$50,000. Directors: A. R. Turnbull and W. J. Jones, Norfolk, Va.; T. A. Hefty, Bowden, N. C.; L. A. Beasley and H. D. Williams, Kenansville, N. C.

FRANCHISES

San Francisco, Cal.—The Geary Street Municipal Railway has been authorized by the Board of Supervisors to build the Masonic Avenue extension to the baseball park. It is proposed to have Mahoney Brothers do the work under the present contract for building the Van Ness Avenue and Chestnut Street lines, at the same unit cost.

Santa Clara, Cal.—The Peninsula Railway, San Jose, has asked the Council for a franchise for an extension of the present line in Santa Clara to the Catholic cemetery on condition that the Council grant a withdrawal of the franchise on Saratoga Avenue to the city limits in Santa Clara.

Woodward, Ia.—The Interurban Railway has received a franchise from the Council for an extension to the site selected for the State epileptic colony 5 miles north of Woodward.

Kansas City, Kan.—The Metropolitan Street Railway has received a franchise from the Council to double-track its line on Twenty-fourth Street from Grand Avenue to Main Street in Kansas City.

West Covington, Ky.—The Union Light, Heat & Power Company has received a twenty-year franchise from the Council to build an electric railway from the eastern to the western city limits of West Covington.

Owen Sound, Ont.—The Council is asked to grant a twenty-five year franchise to build an electric railway in Owen Sound. This is part of a plan to build an electric railway between Owen Sound and Meaford.

Sudbury, Ont.—The Sudbury-Copper Cliff Suburban Electric Railway has received from the Canadian government an extension of two years on its franchise in which to build its line in Sudbury. L. L. Forest, Sudbury, is interested. [E. R. J., Feb. 7, '14.]

Oregon City, Ore.—The Portland & Oregon City Railway has filed an acceptance of the twenty-five-year franchise granted by the Council three months ago. The franchise gives the company the right to come into Oregon City on Center Street at the northern limits, to extend south on Center Street to Fifteenth Street, west to Water Street, and on Water Street to the southern limits of the city.

Westerly, R. I.—The Norwich & Westerly Railway has received a franchise from the Council for a turnout and siding near the Westerly railroad station.

Dallas, Tex.—John T. Jones and associates have asked the Council for a franchise for an electric railway on Fitzhugh Avenue from Columbia Avenue to Grand Avenue in Dallas.

Terrell, Tex.—The Dallas & Terrell Interurban Railway has received a franchise from the Council in Terrell. This

is part of a plan to build a 30-mile electric line between Dallas and Terrell. A. M. Somers, Terrell, is interested. [E. R. J., May 24, '14.]

Spokane, Wash.—The Washington Water Power Company has asked the Council for a franchise over certain streets in Spokane.

Fayetteville, W. Va.—The Fayette Traction Company has received a franchise from the Council in Fayetteville. C. W. Dillon, president. [E. R. J., April 12, '13.]

TRACK AND ROADWAY

***Opelika, Ala.**—Surveys will soon be made for a proposed 7-mile electric railway from Opelika to Auburn, Ala. W. S. Lounbury, Opelika, is interested.

El Centro, Cal.—Surveys are being made to build an electric railway between El Centro, Imperial and Calexico. Lewis R. Kirby, San Diego, is interested. [E. R. J., April 18, '14.]

Marin County Electric Railway, Mill Valley, Cal.—Work has been begun by this company on the first unit of its railway, known as the Throckmorton Avenue branch. This is part of a plan to build an electric line through Mill Valley. [E. R. J., April 18, '14.]

Geary Street Municipal Railway, San Francisco, Cal.—Plans for the extension of the Van Ness Avenue line in San Francisco across Market Street into Eleventh Street and thence to Potrero Avenue are nearing completion and bids will be asked early in June. With Eleventh Street the route for the Van Ness Avenue extension will be from Twenty-fifth Street via Potrero Avenue, Eleventh Street, Van Ness Avenue to the Exposition site and a quick connection between the north side and the south of Market section and Mission districts can be made. A permit for the extension of the Geary Street Municipal Railway through the Fort Mason reservation has been issued by the War Department to the Board of Supervisors and its acceptance recommended by the Public Utilities Committee. The permit requires that work on the proposed extension shall begin within thirty days from the date and that cars shall be operated over the extension on or before Oct. 15, 1914. The construction and operation of the line will be subject to the supervision and direction of the commanding general, and any electric railway desiring to operate its cars over the city's tracks shall have the right to do so.

Pocatello, Idaho.—J. D. Browning, representing an Eastern syndicate, is authority for the statement that active construction of an electric railway in Pocatello will begin at once. The City Council at a recent meeting granted a franchise. The system provides lines for the principal streets and the use of the viaduct now in existence and, owing to the terms imposed by the Public Utilities Commission, there can be no delay. [E. R. J., Jan. 24, '14.]

Twin Falls, Idaho.—C. V. Parks, Twin Falls, is promoting the construction of an electric interurban line from Twin Falls to Albee, on Rock Creek. The proposed line will be 17 miles in length. Citizens of Twin Falls are interested in the movement.

Kewanee, Bradford & Henry Interurban Railway, Kewanee, Ill.—Preliminary arrangements are being made by this company to build the 35-mile electric line from Kewanee southeast via Bradford to Henry. C. G. Lampman, Kewanee, Ill., is interested. [E. R. J., April 4, '14.]

La Salle (Ill.) Terminal Railway.—Preliminary surveys are being made by this company between La Salle, Granville and Oglesby. Robert H. Baldwin, 829 First National Bank Building, Chicago, Ill., engineer. [E. R. J., April 18, '14.]

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company is asked to build a 1-mile extension on Minnesota Street from Shelby Street to Keystone Avenue, in Indianapolis.

Indianapolis, Linton & Vincennes Traction Company, Linton, Ind.—The taxpayers in Vincennes, Bowling Green and other towns in southern Indiana are pledging money to assist in the construction of this railway between Indianapolis, Linton, Vincennes, Mooresville, Bicknell, Patoka, Tell City and Jasonville. John A. Schaffer, Indianapolis, chief engineer. [E. R. J., April 18, '14.]

Keokuk, Nauvoo & Fort Madison Interurban Railway, Keokuk, Ia.—Preliminary arrangements have been completed and plans are being made to begin work soon on its electric line to connect Keokuk, Nauvoo, Fort Madison, Carthage and Hamilton. H. S. Payne, Fort Madison, is interested. [E. R. J., Dec. 28, '12.]

Union Electric Company, Dubuque, Ia.—Work has been begun by this company on the extension of the West Locust Street line so that it will connect with the West Eighth Street line at Asbury Street in Dubuque.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—The entire interurban proposition up the Kaw Valley has been financed. The section of the line between Kansas City and Bonner Springs is nearly completed and will be placed in operation this month. Work will begin at once laying the track to Lawrence. The survey and right-of-way has been obtained up the north side of the Kaw River to Lawrence. At Lawrence the line will cross the Kaw River and extend down Massachusetts Street, turn west near Mount Oread, the site of the State university, and extend up the Wakarusa Valley to Topeka. J. J. Heim, Kansas City, is interested. [E. R. J., March 21, '14.]

Columbus, Kan.—The Century Engineering & Construction Company has been awarded a contract for the construction of a 22-mile interurban electric line from Columbus, Kan., to Miami, Okla., via Hattenville, Okla. Work will be begun at once. Commercial organizations of Columbus are backing the proposition. [E. R. J., April 11, '14.]

***Concordia, Kan.**—The Eakin-Donelan & Company, Concordia plans to build an electric railway from Concordia to Salina. Frederick E. Schornstein is manager of the Kansas interests of the company.

Olathe, Winfield & Arkansas City Railway, Topeka, Kan.—The charter recently secured by this company, which proposes to build an electric line 175 miles in length, provides that the line shall extend through Johnson, Miami, Franklin, Anderson, Coffey, Woodson, Greenwood, Elk, Butler and Cowley counties from Olathe, Kan. W. A. Powell, Enid, is interested. [E. R. J., March 14, '14.]

Topeka (Kan.) Railway.—This company contemplates the extension of its Washburn College terminals on Seventeenth Street west and south to Seabrook.

***Lexington, Ky.**—John G. King, Lexington, and associates are considering plans to build an interurban electric railway from Lexington to Richmond, a distance of 26 miles.

Louisville (Ky.) Railway.—Residents of a section of Louisville in the extreme eastern end adjacent to Cherokee Park have asked the Louisville Railway for the extension of its Oak Street line, to serve their portion of the city. The plan of the citizens is to divert the line at Transit Avenue and Bardstown Road, and extend new tracks out Transit Avenue about 1½ miles to the city limits at Workhouse Road.

Bay State Street Railway, Boston, Mass.—Plans are being made by this company to double-track its line between Lowell and Lawrence.

Hartford & Springfield Street Railway, Springfield, Mass.—Extensive repairs on the roadbed of this company are being planned.

Detroit (Mich.) United Railway.—Plans are being considered by this company for the extension of the Harper Avenue-Centerline line, from Centerline to Utica, in return for the right-of-way. This is part of a plan to extend the interurban lines into the Thumb district in Michigan.

Electric Short Line Railroad, Minneapolis, Minn.—This company has accepted a subscription of \$12,000 of the stock of the company from farmers of Butternut Valley, who want this line to extend through Mankato.

Twin City & Lake Superior Railway, Minneapolis, Minn.—The projected electric railroad between Minneapolis, St. Paul, Duluth and West Superior, which was planned by a company incorporated in February, 1907, called the Twin City & Lake Superior Railway, may be built by a California syndicate, which is negotiating for the purchase of the stock. The line has been graded from Irondale, just outside of Minneapolis, 40 miles to Sunrise, and also is in condition for about 10 miles south of Foxboro, Douglas County. It commonly is called the Arrow line, and has a right-of-way

137 miles long, between the Twin Cities and Duluth. This is several miles shorter than any railroad now operating between these cities. The original board of directors included, E. W. Farnham, Chicago; W. H. Crossland and S. B. Kidder, Minneapolis; S. O. Carlyle, Wyoming, Minn., and Peter Eimon, Superior.

Mesaba Electric Railway, Virginia, Minn.—Plans are being considered by this company for an extension to Biwabik and another westward from Hibbing.

***Clarksdale, Miss.**—Plans are being considered to build an electric railway between Lyon, Clarksdale and Friars Point, Miss. No names are given of those interested in the project.

Caldwell County & Southern Electric Railway, Kingston, Mo.—This company has purchased the right-of-way for its line between Hamilton and Kingston, Mo., a distance of 10 miles. Extensions of the line to connect with the Kansas City, Clay County & St. Joseph Railway terminal at Excelsior Springs, Mo., are also planned. Most of the stock in the Caldwell County & Southern Railway has been subscribed. S. C. Rogers, Kingston. [E. R. J., April 18, '14.]

Big Horn Canyon Irrigation & Power Company, Billings, Mont.—Surveys are being completed by this company for an electric railway, 65 miles in length, to give traffic facilities to lands which it is proposed to irrigate. Included in plans of the company is the construction of a hydroelectric plant on the Big Horn River to develop 25,000 hp. Power from the generating station will be used for operation of the railroad and for electric pumping for the irrigation of 35,000 acres of land. It is planned to irrigate 100,000 acres by canals in addition to that served by the pumping plants. The railroad is to be constructed first and will be used for transportation of construction materials. J. J. Harris, Hardin, president. [E. R. J., March 28, '14.]

Brooklyn (N. Y.) Rapid Transit Company.—The Public Service Commission, First District, has approved the form of contract submitted by the Brooklyn Rapid Transit Company for the third-tracking of the Fulton Street elevated line from East New York to Nostrand Avenue, for which consents were only recently obtained.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—New track is being laid by this company on State Street from North Park to Twelfth Street in Erie.

Ithaca (N. Y.) Traction Company.—The Fred T. Lay Company has begun work on the double-tracking of North Tioga Street in Ithaca for the Ithaca Traction Company, which took over the property of the Ithaca Street Railway on April 1. The work was begun at Falls Street, at the north end of Ithaca, and will extend through Tioga to Seneca Street. [E. R. J., April 4, '14.]

Cleveland (Ohio) Railway.—This company has been asked to extend its East Seventy-ninth Street crosstown line southerly to Kinsman Road in Cleveland.

***Galion, Mount Gilead & Delaware Electric Railway, Mount Gilead, Ohio.**—Plans are being considered by this company to build an electric railway from Galion to Mount Gilead and Delaware.

Bartlesville (Okla.) Interurban Railway.—Matters of dispute between this company and the City Council of Bartlesville have been settled and work on the belt line to the southwestern part of Bartlesville will begin shortly.

***Cushing (Okla.) Traction Company.**—Preliminary arrangements are being made by this company to build an electric railway inside the corporate limits of Cushing. Application for a franchise will be made about May 15. Officers: Frank Brown, Independence, Kan., president; B. B. Jones, Bristow, Okla., vice-president; M. Jones, Bristow, treasurer; Roy Jones, Cushing, secretary, and Henry Askin, Cushing, general manager.

Berlin & Northern Railway, Berlin, Ont.—During the next few weeks this company will award contracts for grading 10,000 yd. of new track and to build one 28-ft. span bridge within two months.

***Fort William, Ont.**—The owners of property lying along Victoria Avenue West and the western boundary of Fort William have offered to build an electric railway in that section and turn it over to the city complete, provided the city will give some specified service over the branch.

Hamilton (Ont.) Street Railway.—The special committee of the City Council dealing with electric railway improvements met on April 18 and discussed a number of matters with officials of the company. The latter agreed to complete this year the tracks on Kenilworth Avenue, and to renew the tracks on King Street between Catherine and James Streets, and on Queen Street from Herkimer to Aberdeen Avenue. If possible, York Street will be renewed. The question of a better service on Aberdeen Avenue was not favorably received. The officials said that it could not be done unless there was a double track on the street.

Niagara, Welland & Lake Erie Railway, Niagara Falls, Ont.—Work will be begun at once by this company on its North Main Street line in Welland. C. J. Laughlin, vice-president.

Eugene, Ore.—Residents of Santa Clara district and representative business men of Eugene recently petitioned the County Court to again grant a franchise to the Portland, Eugene & Eastern Railway, or to any other electric line that may be interested to build a line from Eugene to Santa Clara. A company which has for its object the building of a line from Eugene to Santa Clara has been formed. It is known as the Santa Clara Street Car Company. Ray Goodrich, Eugene, has been appointed secretary.

Puget Sound & Willapa Harbor Railway, Portland, Ore.—This company has awarded a contract to Gurthrie, McDougal & Company, Portland, Ore., for the bridge work along the line from Firdale to Raymond.

Washington-Oregon Corporation, Portland, Ore.—This company has been asked by the North End Improvement Club to extend its lines from Centralia to the Logan District, a distance of 1 mile.

Chambersburg & Shippensburg Railway, Chambersburg, Pa.—This company advises that it has completed its 11-mile line between Chambersburg, Red Bridge Park, Greencastle and Shippensburg and plans to place it in operation June 1. Headquarters: Chambersburg. Thad M. Mahon, Chambersburg, president. [E. R. J., April 18, '14.]

Wayne County Railway, Honesdale, Pa.—Construction of this company's line will be begun at once by the laying of its tracks through Honesdale and the paving with vitrified brick between and outside the rails for a distance of about 1½ miles, the work to begin simultaneously with the paving of the roadway under contract awarded by the State Highway Department of Pennsylvania, and all the work will be under the supervision of the State Highway Commissioner. The grading and construction of the railway north and south of Honesdale will be begun about the same time. Six steel bridges with concrete abutments will be required for the operation of the railway. E. F. Draper is contractor for construction and equipment of the railway with offices at Honesdale. Much of the work will be sublet. The line will be 25 miles in length. Power will be purchased. [E. R. J., April 4, '14.]

Clarksville Railway & Light Company, Clarksville, Tenn.—Plans are being considered by this company for a 3-mile extension to Dunbar's Cave.

Fort Worth & Denton Interurban Railway, Fort Worth, Tex.—This company, which plans to build an electric railway between Fort Worth and Denton, has reported total stock subscriptions of \$482,000; cash paid in on three 10 per cent assessments, \$112,135, and a cash balance on hand of \$107,000. The line will run through Justin or Roanoke. E. E. Baldrige, Fort Worth, president. [E. R. J., April 18, '14.]

***Fort Worth, Tex.**—Plans are being contemplated to build an electric railway from Fort Worth to the new million-dollar reservoir site 6 miles above Fort Worth on the river. The promoters of the line are not yet ready to announce the names of those interested in the project.

Ogden (Utah) Rapid Transit Company.—Surveys are being made by this company near Brigham City for the proposed line into Bear River Valley. The route is north from Brigham City about 2 miles and then near the cement works of the Ogden Portland Cement Company. From there the survey will extend in a northwesterly direction toward Bear River City and then through the Elwood district and into Tremonton and from there to Garland, which will be the terminus for the present.

***Bellingham & Northern Railroad, Sumas, Wash.**—This company has secured a right-of-way for the construction of its proposed electric line around Sumas and it is announced that work will be begun at once. This company is a subsidiary of the Chicago, Milwaukee & Puget Sound Railway.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company contemplates an expenditure of \$350,000 in track reconstruction, special work and paving on its lines in Milwaukee during the present summer.

SHOPS AND BUILDINGS

San Francisco-Oakland Terminal Railway, Oakland, Cal.—The old buildings of this company at the southwest corner of Twenty-second Street and Grove Street in Oakland are being torn down, to be replaced by a modern three-story office building. The structure will be 118 ft. x 66 ft. and of concrete and brick construction.

Illinois Traction System, Peoria, Ill.—This company has awarded the contract to build its new passenger station and office building at Peoria.

St. John (N. B.) Electric Railway.—This company's new carhouse in St. John will be 58 ft. x 115 ft. and of brick and steel construction.

International Traction Company, Buffalo, N. Y.—Plans are being considered by this company for improvements at its carhouses, which will cost about \$40,000.

Johnstown (Pa.) Traction Company.—Work has been begun by this company on its new passenger station in Windber. The structure will be 40 ft. x 31 ft., and of brick construction.

Eastern Texas Traction Company, Dallas, Tex.—Plans are being considered by this company to build a new office building in Greenville.

Texas Traction Company, Dallas, Tex.—Plans for the construction of a new terminal station at the corner of Houston Avenue and Woodward Street, Dallas, are being prepared.

POWER HOUSES AND SUBSTATIONS

Chicago (Ill.) Railways.—This company will add to its substation equipment considerable new apparatus comprising four 4000-kw rotary converters, four 4200-kva air-blast transformers, four 600-kva air-blast reactances, four 20,000 cu. ft. blower sets and switchboard panels. The contract for all the apparatus has been awarded to the General Electric Company.

Holyoke (Mass.) Street Railway.—This company will place in operation in its power house in Holyoke a 1200-kw generator with switchboard panel and has contracted with the General Electric Company to build and install the apparatus.

Worcester (Mass.) Consolidated Street Railway.—A new transformer is being installed at the Stutbridge substation by this company.

Guelph (Ont.) Radial Railway.—Plans are being made by this company for improvements at its power house in Guelph.

Dominion Power & Transmission Company, Hamilton, Ont.—This company has let further contracts in connection with its auxiliary steam generating plants as follows: Condensing outfit together with boiler feed pumps to the Canadian Westinghouse Company; two stacks to the Canadian Kellogg Company; boilers to the Edge Moor Iron Works, Edge Moor, Del.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company will add to its substation equipment a 300-kw motor-generator set. The machine has been ordered from the General Electric Company.

Virginia Railway & Power Company, Richmond, Va.—This company will add to its equipment a 938-kva alternating current generator. This apparatus has been ordered from the General Electric Company.

Yakima Valley Transportation Company, North Yakima, Wash.—This company will place in operation in one of its substations a 300-kw synchronous motor-generator set and switchboard, the equipment having been purchased from the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Ithaca (N. Y.) Street Railway has ordered five open and five closed prepayment cars from The J. G. Brill Company.

Glendale & Eagle Rock Railway, Glendale, Cal., expects to purchase one express car and one passenger car.

Union Street Railway Company, New Bedford, Mass., has ordered six 33-ft. car bodies from the J. M. Jones Company, Watervliet, N. Y.

El Paso (Tex.) Electric Railway, noted in the *ELECTRIC RAILWAY JOURNAL* of April 4, 1913, as having ordered six closed prepayment semi-steel city cars from the St. Louis Car Company, has specified the following details for this equipment:

Seating capacity.....44	Couplers .....Tomlinson
Weight (car body only), 13,000 lb.	Curtain fixtures....National
Length of body..28 ft. 10 in.	Curtain material..Pantasote
Length over vestibule, 40 ft. 11 in.	Destination signs....Hunter
Width over sills....8 ft. 4 in.	Fare boxes.....Johnson
Width over all...8 ft. 7 in.	Fenders.....H. & B.
Body .....steel	Hand brakes.....Peacock
Interior trim.....brass	Headlights.....U. S.
Headlining .....Agasote	Motors .....West.
Roof .....arched	Registers .....International
Underframe .....steel	Sash fixtures.....Edwards
Air brakes.....West. S-M-3	Seats, style.....St. Louis
Axles .....Pollock	Seating material.mahog. slat
Bumpers .....channel	Step treads.....Feralun
Car trimmings..stat. bronze	Trolley catchers...Keystone
	Trucks....Baldwin, Type M

Northern Texas Traction Company, Fort Worth, Tex., has specified the following details for the twenty closed prepayment cars which are being built by the American Car Company:

Seating capacity.....52	Gears and pinions..tool steel
Bolster centers, length..26 ft.	Gongs.....P. Wall Mfg. Co.
Length of body...33 ft. 9 in.	Hand brakes..Am. Car Co., with Peacock brakes
Length over vestibule, 45 ft. 9 in.	Heaters .....Consol.
Width over sills....8 ft. 4 in.	Headlights.....Crouse Hinds
Width over all....8 ft. 7 in.	Journal boxes.....Baldwin
Height, rail to sills..32 3/4 in.	Motors, type and number, West. 306-CA, outside
Height, sill to trolley base, 8 ft. 9 1/2 in.	Paint.....Am. Car. Co.
Body .....composite	Registers .....International
Interior trim, statuary bronze	Sash fixtures..O. M. Edwards
Roof.....plain arch	Seats.....Heywood Bros. & Wake.
Underframe .....metal	Seating material..cherry slat cushions & backs stained mahogany
Air brakes.....West.	Springs .....Baldwin
Axles .....Baldwin	Step treads.....Feralun
Bumpers.....Am. Car Co.	Trolley catchers or retrievers, Elec. Serv. Sup. Co.
Cables .....West.	Trolley base.....Holland
Car trimmings.....Dayton	Trucks....Baldwin Type M
Control, type.....West.	Ventilators...Am. Car Co., Stone & Webster Type
Couplers..Ohio Brass Co., Tomlinson Type A	Wheels .....Baldwin
Curtain fixtures.Cur. Sup. Co.	
Curtain material..Pantasote	
Destination signs....Hunter	
Fenders.....H. B.	

TRADE NOTES

Walpole Tire & Rubber Company and the Massachusetts Chemical Company, Walpole, Mass., have removed their Boston sales offices to the general offices at Walpole.

H. F. Keegan Company, Chicago, Ill., has been appointed sales agent in Indiana, Ohio and Illinois for the Chillingworth seamless gear cases manufactured by Thayer & Company, New York, N. Y.

H. M. Byllesby & Company, Chicago, Ill., have removed their offices from the Insurance Exchange Building to the nineteenth floor of the new Continental & Commercial Bank Building, LaSalle and Adams Streets.

Ralph H. Beach, formerly connected with the Federal

Storage Battery Car Company, has opened an office in the Singer Building, 149 Broadway, New York, N. Y., where he is in the business of selling storage battery cars and locomotives. Mr. Beach has no connection with the Railway Storage Battery Car Company, of 30 Broad Street, New York.

J. G. White Engineering Corporation, New York, N. Y., has been retained by the Capitol Traction Company of Washington, D. C., to make a complete inventory and valuation of its property. This valuation is to be made simultaneously with a valuation of all public utilities in the District by the Public Utilities Commission of the District of Columbia, in accordance with the provisions of the Act of Congress passed March 4, 1913, creating that commission.

Mesta Machine Company, Pittsburgh, Pa., has received an order from the Sistersville Electric Light & Power Company, Sistersville, W. Va., for a 28 in. x 36 in. twin tandem horizontal double-acting natural gas engine to be direct connected to a 1250-kw a.c. generator, to run at 120 r.p.m. This engine is of similar design, although of larger size, to the other two Mesta gas engines installed by this company in 1911. These two engines have been running continually at 200 r.p.m. and furnishing the power for lighting and street railways at Sistersville, W. Va. The Whitaker-Glessner Company has recently ordered a 26 in. x 48 in. simple Corliss steam engine of the heavy duty rolling mill type.

Western Engineering Sales Company, San Francisco, Cal., has opened offices in the Rialto Building, where it will represent manufacturers of contractors' equipment and electric railway supplies, including the St. Louis Frog & Switch Company; the Toledo Bridge & Crane Company; the Euclid Crane & Hoist Company; the Chicago Pneumatic Tool Company; the Connersville Boiler Company, and the Curtis Pneumatic Machine Company. In the new company are associated F. N. Rumbley and J. W. Stjernstedt. Mr. Rumbley was for some time connected with the Curtis Pneumatic Machine Company, the Pennsylvania Railroad Company and the National Railways of Mexico; while Mr. Stjernstedt was formerly with the Curtis Pneumatic Machine Company, and later engaged in mining work.

General Electric Company, Schenectady, N. Y., has received the following orders for car equipment: Portland, Eugene & Eastern Railway, four GE-216, 50 hp two-motor car equipments; San Diego (Cal.) Electric Railway, forty GE-201, 60 hp, two-motor car equipments complete with MK control and forty emergency straight air brake equipments with CP-27 compressors; Union Electric Company, Dubuque, Ia., six GE-203, 50 hp, two-motor car equipments; Connecticut Company, New Haven, Conn., will install on cars at Hartford, Conn., twenty complete GE-200, 40 hp, four-motor car equipments and air brake equipments with CP-27 compressors; American Railways Company, Philadelphia, Pa., ten two-motor and four-motor complete GE-201, 65 hp car equipments, twenty-six additional GE-201, 65 hp motors, ten GE-203, 50 hp, complete four-motor equipments, twenty K-35 controllers and eight extra CP-27 air compressors.

ADVERTISING LITERATURE

Egry Registry Company, Dayton, Ohio, has issued catalogs describing its systems of unit waybilling and train dispatching.

Thomas A. Edison, Inc., Orange, N. J., has issued a booklet entitled "The Edison Primary Cell as Applied to the Track Circuit."

Watson-Stillman Company, New York, N. Y., has issued a catalog describing its hydraulic jacks and lifting tools, which include pulling jacks, pit jacks, motor lifts and battery lifts.

McKeen Motor Car Company, Omaha, Neb., has issued a leaflet describing its latest model motor truck, and also a cartoon entitled "The Railroad of the Future as Seen by the Cartoonist."

Allen-Bradley Company, Milwaukee, Wis., has issued Bulletin B-531 describing its Type G starting switches for small a.c. induction motors which do not require a starting resistance to limit the current.